

**02 INFORMATION ABOUT PRINCIPAL INVESTIGATORS/PROJECT DIRECTORS(PI/PD) and
co-PRINCIPAL INVESTIGATORS/co-PROJECT DIRECTORS**

Submit only ONE copy of this form for each PI/PD and co-PI/PD identified on the proposal. The form(s) should be attached to the original proposal as specified in GPG Section II.B. Submission of this information is voluntary and is not a precondition of award. This information will not be disclosed to external peer reviewers. **DO NOT INCLUDE THIS FORM WITH ANY OF THE OTHER COPIES OF YOUR PROPOSAL AS THIS MAY COMPROMISE THE CONFIDENTIALITY OF THE INFORMATION.**

PI/PD Name: Herbert L Dershem

Gender: ☒ Male ☐ Female

Ethnicity: (Choose one response) ☐ Hispanic or Latino ☐ Not Hispanic or Latino

Race:
(Select one or more) ☐ American Indian or Alaska Native
☐ Asian
☐ Black or African American
☐ Native Hawaiian or Other Pacific Islander
☒ White

Disability Status:
(Select one or more) ☐ Hearing Impairment
☐ Visual Impairment
☐ Mobility/Orthopedic Impairment
☐ Other
☒ None

Citizenship: (Choose one) ☒ U.S. Citizen ☐ Permanent Resident ☐ Other non-U.S. Citizen

Check here if you do not wish to provide any or all of the above information (excluding PI/PD name): ☒

REQUIRED: Check here if you are currently serving (or have previously served) as a PI, co-PI or PD on any federally funded project ☒

Ethnicity Definition:

Hispanic or Latino. A person of Mexican, Puerto Rican, Cuban, South or Central American, or other Spanish culture or origin, regardless of race.

Race Definitions:

American Indian or Alaska Native. A person having origins in any of the original peoples of North and South America (including Central America), and who maintains tribal affiliation or community attachment.

Asian. A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.

Black or African American. A person having origins in any of the black racial groups of Africa.

Native Hawaiian or Other Pacific Islander. A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

White. A person having origins in any of the original peoples of Europe, the Middle East, or North Africa.

WHY THIS INFORMATION IS BEING REQUESTED:

The Federal Government has a continuing commitment to monitor the operation of its review and award processes to identify and address any inequities based on gender, race, ethnicity, or disability of its proposed PIs/PDs. To gather information needed for this important task, the proposer should submit a single copy of this form for each identified PI/PD with each proposal. Submission of the requested information is voluntary and will not affect the organization's eligibility for an award. However, information not submitted will seriously undermine the statistical validity, and therefore the usefulness, of information received from others. Any individual not wishing to submit some or all the information should check the box provided for this purpose. (The exceptions are the PI/PD name and the information about prior Federal support, the last question above.)

Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational opportunities; and to assess involvement of international investigators in work supported by NSF. The information may be disclosed to government contractors, experts, volunteers and researchers to complete assigned work; and to other government agencies in order to coordinate and assess programs. The information may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records", 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records", 63 Federal Register 268 (January 5, 1998).

List of Suggested Reviewers or Reviewers Not To Include (optional)

SUGGESTED REVIEWERS:

Not Listed

REVIEWERS NOT TO INCLUDE:

Not Listed

COVER SHEET FOR PROPOSAL TO THE NATIONAL SCIENCE FOUNDATION

PROGRAM ANNOUNCEMENT/SOLICITATION NO./CLOSING DATE/If not in response to a program announcement/solicitation enter NSF 03-041					FOR NSF USE ONLY	
NSF 03-577 09/15/03					NSF PROPOSAL NUMBER	
FOR CONSIDERATION BY NSF ORGANIZATION UNIT(S) (Indicate the most specific unit known, i.e. program, division, etc.)						
EIA - CISE RESEARCH INFRASTRUCTURE						
DATE RECEIVED	NUMBER OF COPIES	DIVISION ASSIGNED	FUND CODE	DUNS# (Data Universal Numbering System)	FILE LOCATION	
				050947084		
EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN)		SHOW PREVIOUS AWARD NO. IF THIS IS <input type="checkbox"/> A RENEWAL <input type="checkbox"/> AN ACCOMPLISHMENT-BASED RENEWAL		IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> IF YES, LIST ACRONYM(S)		
381381271						
NAME OF ORGANIZATION TO WHICH AWARD SHOULD BE MADE Hope College			ADDRESS OF Awardee ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE Hope College 41 Graves Place Holland, MI. 494239000			
AWARDEE ORGANIZATION CODE (IF KNOWN) 0022731000						
NAME OF PERFORMING ORGANIZATION, IF DIFFERENT FROM ABOVE			ADDRESS OF PERFORMING ORGANIZATION, IF DIFFERENT, INCLUDING 9 DIGIT ZIP CODE			
PERFORMING ORGANIZATION CODE (IF KNOWN)						
IS Awardee ORGANIZATION (Check All That Apply) (See GPG II.C For Definitions)			<input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> FOR-PROFIT ORGANIZATION		<input type="checkbox"/> MINORITY BUSINESS <input type="checkbox"/> WOMAN-OWNED BUSINESS	
			<input type="checkbox"/> IF THIS IS A PRELIMINARY PROPOSAL THEN CHECK HERE			
TITLE OF PROPOSED PROJECT REU: An Undergraduate Research Participation Program in Computer Science						
REQUESTED AMOUNT \$ 342,250	PROPOSED DURATION (1-60 MONTHS) 60 months		REQUESTED STARTING DATE 01/01/04		SHOW RELATED PRELIMINARY PROPOSAL NO. IF APPLICABLE	
CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW						
<input type="checkbox"/> BEGINNING INVESTIGATOR (GPG I.A)						
<input type="checkbox"/> DISCLOSURE OF LOBBYING ACTIVITIES (GPG II.C)						
<input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION (GPG I.B, II.C.1.d)						
<input type="checkbox"/> HISTORIC PLACES (GPG II.C.2.j)						
<input type="checkbox"/> SMALL GRANT FOR EXPLOR. RESEARCH (SGER) (GPG II.D.1)						
<input type="checkbox"/> VERTEBRATE ANIMALS (GPG II.D.5) IACUC App. Date						
<input type="checkbox"/> HUMAN SUBJECTS (GPG II.D.6) Exemption Subsection or IRB App. Date						
<input type="checkbox"/> INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED (GPG II.C.2.j)						
<input type="checkbox"/> HIGH RESOLUTION GRAPHICS/OTHER GRAPHICS WHERE EXACT COLOR REPRESENTATION IS REQUIRED FOR PROPER INTERPRETATION (GPG I.E.1)						
PI/PD DEPARTMENT Department of Computer Science			PI/PD POSTAL ADDRESS 27 Graves Place			
PI/PD FAX NUMBER 616-395-7123			Holland, MI 494229000 United States			
NAMES (TYPED)	High Degree	Yr of Degree	Telephone Number	Electronic Mail Address		
PI/PD NAME Herbert L Dershem	Ph.D.	1969	616-385-7508	dershem@cs.hope.edu.		
CO-PI/PD						
CO-PI/PD						
CO-PI/PD						
CO-PI/PD						

CERTIFICATION PAGE

Certification for Authorized Organizational Representative or Individual Applicant:

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant institution is: (1) certifying that statements made herein are true and complete to the best of his/her knowledge; and (2) agreeing to accept the obligation to comply with NSF award terms and conditions if an award is made as a result of this application. Further, the applicant is hereby providing certifications regarding debarment and suspension, drug-free workplace, and lobbying activities (see below), as set forth in Grant Proposal Guide (GPG), NSF 03-041. Willful provision of false information in this application and its supporting documents or in reports required under an ensuing award is a criminal offense (U. S. Code, Title 18, Section 1001).

In addition, if the applicant institution employs more than fifty persons, the authorized official of the applicant institution is certifying that the institution has implemented a written and enforced conflict of interest policy that is consistent with the provisions of Grant Policy Manual Section 510; that to the best of his/her knowledge, all financial disclosures required by that conflict of interest policy have been made; and that all identified conflicts of interest will have been satisfactorily managed, reduced or eliminated prior to the institution's expenditure of any funds under the award, in accordance with the institution's conflict of interest policy. Conflicts which cannot be satisfactorily managed, reduced or eliminated must be disclosed to NSF.

Drug Free Work Place Certification

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Drug Free Work Place Certification contained in Appendix C of the Grant Proposal Guide.

Debarment and Suspension Certification

(If answer "yes", please provide explanation.)

Is the organization or its principals presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency?

Yes ☐

No ☒

By electronically signing the NSF Proposal Cover Sheet, the Authorized Organizational Representative or Individual Applicant is providing the Debarment and Suspension Certification contained in Appendix D of the Grant Proposal Guide.

Certification Regarding Lobbying

This certification is required for an award of a Federal contract, grant, or cooperative agreement exceeding \$100,000 and for an award of a Federal loan or a commitment providing for the United States to insure or guarantee a loan exceeding \$150,000.

Certification for Contracts, Grants, Loans and Cooperative Agreements

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, Title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than \$10,000 and not more than \$100,000 for each such failure.

AUTHORIZED ORGANIZATIONAL REPRESENTATIVE		SIGNATURE		DATE
NAME				
TELEPHONE NUMBER	ELECTRONIC MAIL ADDRESS			FAX NUMBER

*SUBMISSION OF SOCIAL SECURITY NUMBERS IS VOLUNTARY AND WILL NOT AFFECT THE ORGANIZATION'S ELIGIBILITY FOR AN AWARD. HOWEVER, THEY ARE AN INTEGRAL PART OF THE INFORMATION SYSTEM AND ASSIST IN PROCESSING THE PROPOSAL. SSN SOLICITED UNDER NSF ACT OF 1950, AS AMENDED.

Project Summary

REU Site: An Undergraduate Research Participation Program in Computer Science

The primary objective of the Hope College Research Experience in Computer Science is to provide promising undergraduates with an intensive and meaningful research experience that will encourage them to consider a career in computer science research. This is accomplished by exposing students to the techniques, attitudes, and rewards of computer science research and providing encouragement and direction through close collaboration with a faculty mentor on a significant research project, including student participation in the preparation of formal dissemination of the work by means of presentations, posters, and research articles.

In each of five years, this project will support the participation of eight students, at least four of whom will be from institutions other than Hope College. These students will join at most four Hope College undergraduates on research teams that will work with four faculty mentors. These mentors will each lead a team of undergraduates in working on a research project that will usually be part of the mentor's research program and funded by other sources.

Descriptions of these research projects will be distributed to potential applicants both on and beyond the Hope College campus. Special efforts will be made to attract applications from qualified females and members of underrepresented minorities. Participants will be chosen from among the applicants based on their interest in their chosen project, their motivation toward a research career, and their level of preparation for their project. This will be assessed by statements from the applicant and a professor at the applicant's institution, and the applicant's undergraduate transcript.

In order to further encourage the strengthening of undergraduate research programs at other institutions and to provide diversity in the Hope College program, each year one faculty mentor will be recruited from an institution other than Hope College. This mentor will be selected based on the applicant's potential as a successful research mentor and the potential impact that participation will have on undergraduate research at the applicant's institution.

One undergraduate research position will be reserved for a member of an underrepresented minority group who is at least two years away from receiving the baccalaureate degree. This participant will receive an invitation to participate in the program for two summers, with the invitation for the second summer contingent upon successful participation the first summer.

During each summer, the student participants will reside on the Hope College campus, spending a minimum of 40 hours per week on research activities for a 10 week period. Each participant will work in close collaboration with a faculty mentor and be given exclusive use of a SUN workstation and a PC on the Hope College Computer Science network in addition to any other hardware or software necessary for the participant's assignment. The development of communication skills will be emphasized through a seminar series on technical presentations skills, including speaking, writing, and poster preparation. The participants will prepare and deliver a talk, a paper, a poster, and an electronic poster on their work at the conclusion of the summer.

To encourage students to consider graduate study and a research career, they will be provided opportunities to attend a seminar to prepare them for taking the Computer Science Graduate Record Examination, meet and talk with alumni of the Hope Summer Research program who are currently in graduate school, attend research presentations by visiting scholars, and visit the research labs at a major university and talk with professors and graduate students there.

Intellectual Merit: The research projects are drawn from a number of important fields of Computer Science including bioinformatics, algorithms, wireless networks, and programming environment research.

Broader Impact: This program provides a model for a successful undergraduate research program that will encourage the development of strong programs involving a diverse group of faculty and students at institutions that currently have no such program. It will also prepare a cohort of undergraduates for successful research careers.

Institution: Hope College

Major field and subfields: Computer Science

Title: An Undergraduate Research Participation Program in Computer Science

Number of students involved and program length: 8/summer, 10 weeks/summer, for 5 summers

Point of Contact: Dr. Herbert L. Dershem, (616)395-7508, dershem@cs.hope.edu

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Project Description (Including Results from Prior NSF Support) (not to exceed 15 pages) (Exceed only if allowed by a specific program announcement/solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	15	_____
References Cited	_____	_____
Biographical Sketches (Not to exceed 2 pages each)	6	_____
Budget (Plus up to 3 pages of budget justification)	8	_____
Current and Pending Support	4	_____
Facilities, Equipment and Other Resources	0	_____
Special Information/Supplementary Documentation	0	_____
Appendix (List below.) (Include only if allowed by a specific program announcement/ solicitation or if approved in advance by the appropriate NSF Assistant Director or designee)	_____	_____
Appendix Items:		

*Proposers may select any numbering mechanism for the proposal. The entire proposal however, must be paginated. Complete both columns only if the proposal is numbered consecutively.

Project Description

The NSF-REU program has provided support to the Computer Science Department at Hope College to successfully prepare undergraduates for careers in computer science research for the past twelve years. This has allowed us to evaluate what works well in undergraduate research projects and has informed the design of the project presented in this proposal. In addition, over this period of time this support has enabled a number of other institutions to strengthen their undergraduate computer science research programs through collaboration and consultation with those participating in this program. The success of the program and the plans for the next five-year period are described in this proposal. In addition, the project described in this proposal builds upon the experiences of the past twelve years in that it proposes new approaches to address areas where our evaluation has shown weaknesses.

a) Overview

Objectives and Intended Impact

The objectives of this project are:

- to encourage and motivate undergraduate participants to pursue careers in Computer Science research
- to provide a model for Computer Science undergraduate research for other primarily undergraduate institutions
- to increase the number of undergraduates from groups underrepresented in computer science research who are considering such careers
- to support and enhance undergraduate research and instruction in the Hope College Computer Science Department
- to encourage and support undergraduate research at institutions that presently lack the infrastructure to support such research

As a result of the proposed project, we expect that the Computer Science undergraduate research program at Hope College will continue to have a major impact on the students, faculty, and curriculum of the department. We also expect that as a result of their participation, the student and faculty participants in this program will play a role in increasing the presence and importance of undergraduate research at many other institutions, and as a result, the entire computer science academic community will benefit.

Targeted Student Participants

This project targets students with an interest in and aptitude for research careers in computer science. These students will be students attending Hope College and students from other institutions throughout the United States. Through our recruiting efforts we will specifically target qualified females, members of underrepresented minorities, and students attending institutions with limited opportunities for undergraduate research.

Intellectual Focus

The research projects that will be carried out with support from this grant will be chosen according to the following criteria: (1) the project will be one that the faculty mentor is interested in, enthusiastic about, and qualified to carry out, (2) the project will be accessible to undergraduates and will engage students in activities that will expose them to the techniques, the processes, and the rewards of computer science research, and (3) the project will extend the knowledge base of computer science. In the Hope College undergraduate research program, the first two criteria are of higher priority than criterion 3.

It is expected that each faculty mentor and her student team will work on their project in a close, collaborative manner. In addition, there will be a focus on other topics that are integral to computer science research, including research techniques and communication skills.

Organizational Structure

The **Principal Investigator** will have full responsibility for

- recruiting faculty mentors
- collecting definitions and descriptions of projects
- preparing publicity and application materials
- selecting undergraduate participants
- managing the summer program
- carrying out all assessment and reporting activities

The **Faculty Mentors** will serve, along with the Principal Investigator, on the committee that selects undergraduate participants from among the applicants. They will each also supervise one or two project teams consisting of the mentor and two to four undergraduate collaborators.

Timetable

The following is the timetable for the five years of the project:

Activity	2004	2005	2006	2007	2008
Publicity & application materials distributed	Jan 15, 2004	Jan 15, 2005	Jan 15, 2006	Jan 15, 2007	Jan 15, 2008
Application Deadline	Feb 20, 2004	Feb 20, 2005	Feb 20, 2006	Feb 20, 2007	Feb 20, 2008
Offers extended to undergraduates	Mar 1, 2004	Mar 1, 2005	Mar 1, 2006	Mar 1, 2007	Mar 1, 2008
Beginning of research period	May 31, 2004	May 30, 2005	May 29, 2006	May 28, 2007	May 26, 2008
End of research period	Aug 6, 2004	Aug 5, 2005	Aug 4, 2006	Aug 3, 2007	Aug 1, 2008
Annual progress report submitted to NSF	Nov 15, 2004	Nov 15, 2005	Nov 15, 2006	Nov 15, 2007	Nov 15, 2008

Institutional Commitment

The Computer Science Department and Hope College are committed to the principle that excellence in undergraduate education must include active student involvement in significant research. In support of this commitment, the college will provide housing to participants in this program at one-half the normal cost as well as providing all of the services normally available to Hope College summer students. These services include use of the physical activities center, the career and counseling center, the library, and computer facilities. In particular, each participant will be given exclusive use of a SUN workstation and a PC on the department's network for the ten-week period of the program and full access to all computing resources of the department.

The college supports research efforts of faculty and students through release time for faculty, faculty development grants, travel funds to scientific meetings, acquisition and maintenance of hardware and software, general secretarial and clerical support, and funds for expendable supplies. These will all be provided in support of the activities of this project for both the Hope College faculty mentors and the visiting faculty mentor.

In addition to the eight annual participants supported by the NSF-REU funds, at least three additional undergraduate researchers will be supported by other funds available to Hope College and the faculty mentors. During the twelve year period of previous NSF-REU support, 109 undergraduate researchers have participated in this program with 82 (75%) of them supported by NSF-REU funds and the remaining 27 (25%) supported by other available funds. It is expected that this ratio will continue during the next five years. Sources of the other funds have been NSF (non-REU projects), Howard Hughes Foundation, Sherman Fairchild Foundation, Department of Energy, Department of Defense, NASA, Amway Corporation, and local Hope College funds.

(a) NATURE OF STUDENT ACTIVITIES

Student Involvement

The student participants in this project are expected to spend a minimum of 40 hours per week for 10 weeks on the research project to which they are assigned. Each student is assigned a faculty mentor, two or more students being assigned to each mentor and working as a team. Early in the program, the students work closely with their mentors, but as they gain experience they will be encouraged to work more independently. Each student does library research in addition to the laboratory research so that they become familiar with techniques for searching and using research literature. Students are required to produce a written report, an oral presentation, a poster presentation, and a web poster presentation of their research work, to present their work at their home institutions, to present it at an undergraduate research conference, and, if the quality of their work merits, present it as a submission to a research journal or conference.

Student Orientation

The P.I. serves as the program coordinator and is responsible for the administrative details including housing arrangements, stipend payments, mentor assignments, scheduling of starting dates for students, the seminar program, organizing social activities, and submission of progress reports. It is particularly important for the P.I., with assistance from the Hope College student participants, to provide an orientation to the campus and the department

for the non-Hope student participants. All students receive an orientation to the departmental laboratory facilities, both hardware and software, and the library facilities, particularly the use of various research tools.

During the orientation period, each mentor also provides her students with the specific information needed to carry out the assigned project.

2.1 Weekly Seminars

Each week a seminar will be held that will be attended by all students and faculty. Early in the project period, a seminar is devoted to each student or team describing the nature of the problem being investigated and presenting a research plan. Near the midpoint of the summer, a seminar is scheduled where the undergraduate teams give progress reports on their work, explaining how their objectives have changed, difficulties they have encountered, and a revised plan for the remainder of the summer. At the end of the project period, each team presents the results of its research project in a formal talk. During all student presentations, outside attendees will be invited. These will include computer science professors and students from neighboring institutions, other Hope College computer science students, and Hope College professors from other disciplines. Student presentations will be video recorded and used by the mentors to improve student presentation skills. Each student will receive a copy of the recording of her final presentation.

In addition to these student presentations, other seminars include faculty presentations on research methods, technical writing and presentation, and the use of various computer resources. Alumni of Hope summer research who are currently attending graduate school in computer science present seminars and informally meet with the undergraduate participants to describe the nature of graduate study in computer science. Each year, one such meeting is held on the campus of a graduate institution so that the undergraduates can also talk with graduate faculty and visit research laboratories. Other speakers from external organizations will be included when available. In the recent years, speakers from Microsoft and the National Institute of Health have made presentations.

Student-Faculty Communication

In order to achieve the goals of this project, it is vitally important that there be extensive communication between each undergraduate participant and her faculty mentor. This will take place in the following ways:

- Prior to the summer the mentor will email to the participant instructions on how to prepare for the research prior to arrival.
- During the summer the mentor will meet with her research team a minimum of twice each week. Past experience has shown that these meetings actually occur much more frequently.
- Undergraduate participants will be required to maintain a daily web journal describing their activities, summarizing papers and other resources reviewed, and results obtained. This journal will be reviewed regularly by the faculty mentors.
- All faculty mentors and all undergraduate participants will attend each weekly seminar meeting.
- A weekly lunch or other social event will be scheduled that includes all faculty mentors and all undergraduate participants.
- A visit to a neighboring graduate school and other field trips will be scheduled that include faculty mentors and undergraduates participants.
- After the 10 week summer period, the faculty mentor will continue to work with undergraduate participants in the preparation of post-summer presentations and papers.

Student-Student Communication

In addition to the weekly seminars, there will be other activities and events that involve student-student communication.

- All student workstations will be in the same laboratory.
- Students will be housed in the same apartment building and, when possible share the same apartment or live in neighboring apartments.
- Weekly student-initiated social activities will be scheduled for the computer science undergraduates.

Social activities will be available that include students in all disciplines that are doing research on the Hope College campus. This includes over 100 students in six science disciplines. In the past these activities have included weekly ice cream socials, beach volleyball competitions, and scavenger hunts.

Research Projects

The problems described below represent research interests of Hope faculty that could be made available to undergraduate students as research projects in this program. Each project is designed to require the student to apply experience and information gained in formal classroom instruction. These projects are only representative of those that might be conducted. The projects directed by faculty from partner institutions will be determined according to the interests of the faculty selected.

Project 1: Automated Animation of Abstract Data Types

Herbert L. Dershem

Recent research has established a number of criteria for effective instructional animations. This project seeks to apply the results of that research to develop automatic animations that result in effective learning of a wide range of abstract data types. This work will extend prior work by Dr. Dershem and undergraduate researchers that establishes an approach to animations of linked lists and arrays that is convenient and easy to use by both student and instructor. Studies will be conducted to determine the effectiveness of this approach.

Project 2: Text Formatting to Enhance Code Understanding

Ryan L. McFall

Many Integrated Development Environments and text editors provide a capability to format language keywords differently than the rest of the program text. This capability is thought to aid in reducing syntax errors, since the lack of formatting on a portion of the code that you think should be modified by the system indicates a syntax error. A perhaps more interesting method of formatting code would be to attempt to facilitate semantic, rather than syntactic, understanding of the code. In this case, the process of writing code becomes more like word processing than text editing. Important sections of the code can be formatted in bold; procedures that make up a logical portion of the code can be given similar formatting characteristics, and so on.

This project will design and execute two experiments. The first experiment will evaluate whether the use of syntax highlighting really does reduce the frequency of syntax errors in programs. The second experiment will investigate whether writing manually formatted code can lead to better semantic understanding of a program by a reader who is not the author of the program. The experiments will be run on a trial basis using the REU participants as subjects; they will then be modified and prepared for use on a larger sample during the academic year.

Project 3: Using Field Programmable Gate Arrays

Michael J. Jipping

Field Programmable Gate Arrays (FPGAs) are chips containing collections of unconnected gates and an interconnection mechanism. This project will experiment with a combination of software and hardware that will produce workable logic circuits. We will produce a series of reference circuits, from simple adders to more complicated CPU designs.

Project 4: Using readability measures to estimate software complexity

Herbert L. Dershem

Previous student research has developed several measures of software complexity based on formulas used to estimate the readability of English text. This project would extend the work done in the following ways: (1) obtain empirical data based on comparisons of new metrics with traditional metrics on sample software; (2) experiment with changes in parameters in the readability metrics to further refinement their accuracy; and (3) implement parsers to evaluate these metrics in a variety of languages.

Project 5: Experimenting with Java on Handheld Devices

Michael J. Jipping

Most monitor handheld PDA devices produced currently are equipped with Java virtual machines. Some utilize PersonalJava (Java 1.1.8) and some implement J2ME (Java 2 Mobile Edition). Choosing between these platforms and native, C++ applications can be a tradeoff between ease of programming and application performance. This project will experiment with and gather data on programming ease and application performance and will compare the data to reach conclusions about the suitability of each platform for various types of applications.

Project 6: Functional Modeling of Genes and Cellular Processes

Matthew DeJongh

Computer science has played a vital role in the success of the Human Genome Project by providing technology and methods for analyzing the sequence of each of our genes. As the sequencing effort winds up, scientists are turning their attention to discovering the functions of the genes, creating a need for software tools that can be used to model the roles that genes play in the fundamental cellular processes of life. These tools will be used to simulate cellular processes and predict the implications of manipulating gene functions. This project will investigate computer representations of the functions and causal mechanisms of genes that can be used for automating the analysis of gene expression data..

Post-Project Activities

All REU participants are required to submit a final written report on their research activities, a physical poster and a web poster describing their work, and an evaluation of the overall program. The P.I. and the mentor recommend follow-up activities for each participant to carry out during the following academic year. For external students this might involve remote access to Hope College computing facilities as well as communication via electronic mail between student and mentor. For Hope students, this follow-up work may include formal continuation of the project by enrollment in the departmental Senior Project Seminar and/or the Independent Study/Research course. All participants are required to make a presentation of their work at their home institution and to submit it for presentation at an undergraduate research conference. When appropriate, the student's work will be included in a publication submitted to a professional journal or a paper or poster submitted to a professional conference.

Fall Undergraduate Research Celebration

Each fall after the summer research program, Hope College holds a Undergraduate Research Celebration. This event includes poster presentations by Hope College students from all disciplines. All Hope undergraduates who participate in this program will be required to give a poster presentation at this event. Undergraduate participants from other institutions will be encouraged to give poster presentations at similar events on their campuses.

(c) THE RESEARCH ENVIRONMENT

Principal Investigator

The Principal Investigator has been directing undergraduate research projects for all of the 34 years that he has been on the Hope College faculty. He has directed over 100 such projects during that time. In addition, he has served as the director of the Hope College Summer Undergraduate Research Program in computer science in ten of the twelve years that it has existed. He has further administrative experience gained by serving for the past 28 years as the chair of the Hope College Computer Science Department.

He has made numerous presentations and served on a number of panels on undergraduate research. He is currently a Councilor in the Mathematics and Computer Science Division of the Council on Undergraduate Research (CUR). He has also served as a consultant to many colleges and universities on the integration of undergraduate research into their computer science programs.

Faculty Mentors

The department's four faculty members are a good mix of junior and senior faculty. Interest in and ability to participate as a mentor in the summer undergraduate research program is a requirement whenever the department hires new faculty. All four of the faculty hold a Ph.D. in computer science and all are active in computer science research and have experience supervising undergraduate research. Three of the four members of the faculty have been principal investigators of National Science Foundation projects. In addition, they have been the recipients of support for research from other government agencies including the Department of Energy, NASA, DARPA, and the United States Air Force.

In the twelve years of REU programs at Hope, all faculty in the Hope College Department of Computer Science have supervised undergraduate research teams. Faculty participating during the next five years will be Matt DeJongh, Herb Dershem, Mike Jipping, and Ryan McFall. Their qualifications for this project are given in The Biographical Sketches section of this proposal.

Each year, one external faculty mentor is invited to participate in the program. In the past this mentor has been a faculty member at an institution that lacks sufficient infrastructure to support and encourage such research. For the next phase of the project, we propose that this criterion be broadened to permit extending of an invitation to faculty at a variety of types of institutions including research universities, comprehensive universities, liberal arts colleges, and predominantly minority institutions. The availability of this position will be announced via the SIGCSE list server and will also be publicized through informal networks of the Hope College faculty. Each applicant will submit a proposed research project along with her application. From among these applicants, one or more will be chosen to join the program and work with a team of undergraduates during the course of this program. The visiting faculty mentor will be expected to be on the Hope College campus on a regular basis to be available to the undergraduate research team and to participate in all phases of the program. To make this possible, a stipend and housing allowance will be provided to the visiting faculty mentor.

Six external faculty mentors participated in the program from 1998 to 2003. They are:

- Alyce Brady, Kalamazoo College
- Myles McNally, Alma College
- Gary Lewandowski, Xavier University (Ohio)
- Keith Vanderlinden, Calvin College
- Christian Trefftz, Grand Valley State University
- William Fitzgerald, Kalamazoo, College

As a result of these past collaborations, two papers have been published and six conference presentations made by the faculty and students at these institutions. In addition, through the relationships established with these other institutions through this program, one institution has received equipment from the Hope Computer Science Department, another institution has used Hope faculty as consultants for their Computer Science program. In addition, a joint research symposium has been held with faculty and students from Hope and one of the partner institutions during a year other than the year of the partnership. One faculty member from a partner institution remained on the Hope campus for the academic year following the summer of his participation for further collaboration with Hope faculty as a part of his sabbatical leave and continues to collaborate with a Hope faculty member.

Institution

Hope College is a four-year liberal arts college (enrollment of approximately 3000 students) that is known for excellence and a historical commitment to undergraduate research in science and mathematics. The Hope College faculty and administration are convinced that the training of future scientists is best achieved through a research-rich curriculum built upon collaborative research between faculty and undergraduate students. Hope College currently holds five NSF-REU grants in the disciplines of biology, chemistry, computer science, mathematics, and physics. In 2002, Hope was identified by the US News & World Report as one of the top five institutions in undergraduate research.

In the period from 1995 to 2000, the Natural Science Division of Hope College received 90 external grants totaling more the \$5.5 million. The Division is identified by Project Kaleidoscope as a model "Program that Works," based upon the research-rich culture that is the focus of the division's program. Hope College is one of only ten undergraduate institutions recognized by the NSF with an Award for Integration of Research and Education (AIRE).

The Computer Science Department has received over one million dollars in external grants in the period from 1993-2003. During the twenty-year period from 1983-2003, the Hope College Computer Science Department has graduated 268 majors. Of those, 53 (20%) attended graduate or professional school immediately after graduation and 193 (72%) participated in a Research/Independent Study project during their time at Hope. Of those Hope students who have participated in the summer research program over the past twelve years, 42% have attended graduate school immediately upon graduation.

Hope College also supports undergraduate research through faculty development funding. The college provides each new tenure-track faculty member with one summer's support to establish an undergraduate research program. In addition, the college funds a number of cooperative faculty-student research projects each summer through its Faculty Development program.

Facilities and Equipment

The participants in this project and their mentors have exclusive use of the computer science department's computing facilities during the summer as there are no other activities going on within the department. In addition, each undergraduate participant will have exclusive use of a SUN workstation and a PC.

The Computer Science Department's hardware facilities currently consists of 4 servers (Sun Ultra Enterprise 450, Sun Ultra Enterprise 250, and two Gateway P133 Blades), 30 Workstations (13 SunBlade 100s, 12 SunBlade 150s, 4 Linux PCs, and 1 Apple F4 Dual Processor), 25 Compaq tablet PCs, and 28 handheld devices (12 Sharp Linux PDAs, 12 Psion netBook PDAs, 2 Compaq Ipaqs, and 2 Nokia Communicator 9290s). All Sun Workstations have embedded SunPCI cards.

Lab software includes the standard Sun operating system and documentation, windowing system, and reference material. Unbundled components include C and C++ compilers, Java development environment, network management and protocol implementations, word processors, and code debugging environments. Many public domain tools are in use.

The lab is currently administered by two individuals. About 7 hours per week are devoted to lab administration. Both software and hardware administration is handled by these individuals. Operator duties, e.g., file system backups and preventative maintenance are mostly automated. The department handles maintenance of its facilities by itself. It negotiates maintenance contracts, keeps on hand supplies for its printers and other peripherals, provides the "raw materials" (e.g., cable, connectors, etc.) and tools for hardware maintenance, and maintains a "spare parts machine" for computer hardware maintenance.

In addition, the participants in this program will have access to the Hope College TechLab, which is located in the same building complex as the computer science laboratories. This lab contains digital cameras, digital video cameras, a poster printer, a CD burner, and a large collection of multimedia and publishing software.

(d) Student Recruitment and Selection

Recruitment of Participants

Hope College Students

The summer research program in computer science will be announced in all upper-level computer science classes, in the departmental colloquia, through notices on the departmental bulletin board and all course web pages, and through an electronic mailing to all computer science majors. A packet describing the program, research areas, participant benefits and obligations, and application procedures will be available from the departmental office. Each Hope College professor will present a colloquium describing his research project. Interested undergraduates will be invited to attend these colloquia. Since upper-level classes in computer science are typically smaller than 20 students, the professors will be able to individually encourage especially promising students to apply including women and minorities.

Non-Hope College Students

At least four of the eight participants each summer will be from institutions other than Hope College. A special effort will be made to encourage women and minorities from other institutions to apply.

Extensive use will be made of the Internet for recruiting. Announcements will be distributed to a list of Computer Science Departments via email. This mail list has been constructed from inquiries received during the past twelve years of the Hope College Computer Science REU program. In addition, publicity and application forms will be made available via World Wide Web. Information will also be sent to the listserver for ACM Special Interest Group for Computer Science Education (SIGCSE).

A web page is posted each year that describes the program, contains detailed descriptions of each project, including a video of the professor's colloquium talk describing his project, and a link to an online application form.

Minority Students

Contacts will be made with Computer Science department chairs at institutions which have historically enrolled a large percentage of minority students, inviting faculty to nominate minority students at their institution for participation in the program. In addition, the director of minority student affairs at institutions within a two state radius will be sent materials describing the program.

Past experience has shown that this mailing has resulted in a large number of applications to our program, though we have been less successful in turning those applications into participants. As we examined the assessment data concerning this it was apparent that our failure to convert applicants into participants was for two reasons: (1) minority applicants who were qualified for the program were in high demand and had many other opportunities for undergraduate research from which to choose; and (2) there were also a large number of minority applicants who were not qualified to participate in our program.

In order to address these issues, we are proposing that we reserve at least one undergraduate position each year for a minority participant, who will be offered a two-year appointment to our program. This will address both of the situations described above. In the case of the qualified student, the two-year appointment will make participation in the Hope College summer research program a more attractive option and increase the chance that the student will accept our invitation to participate. In the case of the under-prepared student, during the first summer, in addition to working on one of the research teams, the student will be given background necessary for doing research and provided with a continuing enhancement program for the following academic year that can be carried out on the student's home campus. The second year, that student will be invited back as a qualified participant in the program. Each year, the minority applicant that is judged by the selection committee to be most appropriate for this two-year appointment will be given this offer. More than one undergraduate position each year may be of this nature, but we guarantee that one will be offered. The appointment for the second year will be contingent upon verification by the faculty mentor and the P.I. that the student has shown adequate diligence in the first year of participation. This position will always be filled by a student from an institution other than Hope College

Selection Process

All promotional materials will be distributed by January 15. Applications and transcripts will be due by no later than February 20 and notification of the awards will be made no later than March 1.

There will be eight student participants in the program. Typically there will be four participants from Hope College and four from other institutions. During the application process, the Hope students will be considered as one pool of applicants and the non-Hope students as another. Minority applicants will be a sub-pool of the non-Hope pool for selection of the two-year appointee.

All applicants will be asked to submit a written statement indicating their career goals and the role of research in their future plans. Students from other institutions will also be asked to provide a transcript and a letter of reference from a faculty member. This information will be obtained directly by the P.I. for Hope student applicants.

The criteria considered in the selection of participants within each pool of applicants are the applicant's (1) academic record; (2) demonstrated interest in computer science and research; (3) potential for success in research as indicated by independence, creativity, and motivation; and (4) career plans. The faculty participants in this program comprise the selection committee that makes the final selection of student participants.

The overall aim of this process is to provide flexible guidelines for the selection of participants to ensure that the program has the maximum impact on the participants in their choice of a career in computer science and on the discipline of computer science itself.

Matching Participants with Research Projects

After the student participants are selected, the P.I. will coordinate the assignment of students to specific faculty mentors and research projects. Each applicant, as a part of the application, is asked to submit a first and second choice of project and to describe why they are interested in those projects and any special preparation they have related to their choices. Each faculty mentor will be asked to select from the participants those students whose interests and qualifications match the requirements of one of the mentor's research projects. The P.I. and the faculty mentors will meet together to finalize the assignments. Assignments are usually made that honor the student's selection of first choice for the project on her application. In no case will a student be assigned a project that is not one of her top two choices. No assignment will be made that is not enthusiastically supported by both the mentor and the student participant.

(e) Project Evaluation and Reporting

As a result of extensive evaluation of the first twelve years of NSF-supported undergraduate research, we have discovered what works well and what doesn't work well and made many improvements. Among the areas of the project that have been shown to need improvement is the evaluation process. Such improvements are highlighted in the descriptions below that are listed according to the objective being assessed.

- *to encourage and motivate undergraduate participants to pursue careers in computer science research*

In the past, all students completed an exit survey upon completion of their summer participation and they were asked to complete another survey three years following their participation. In addition, all participants were tracked to monitor their future academic and career activities.

These activities will be continued, but upon assessment, we discovered that in order to determine the role of this program in motivating students, we need to have some measure of the students' interest in computer science research before the program begins. Therefore, in the present project we will conduct three surveys of student attitude and accomplishment: before the summer program, at the end of the summer program, and three years after the summer program. These surveys will determine the level of impact that this program has on students' interest in research through a comparison of individual responses across time.

This objective will also be evaluated by the quality of the presentations, papers, and posters produced by the participants. All of these will be recorded digitally and available for later review.

- *to provide a model for computer science undergraduate research for other primarily undergraduate institutions*
This has been and will continue to be evaluated through the number of participants of this program who appear in panels at national or regional meetings, the number of articles written by participants encouraging undergraduate computer science research and the number of positions held by participating faculty on committees and groups that encourage and support undergraduate research.

- *to increase the number of undergraduates from groups underrepresented in computer science research who are considering such careers*

Data will be collected that quantifies the participation of underrepresented groups in our program. Also, the results of the surveys will be separately tallied for underrepresented participants to indicate impact on this group.

- *to support and enhance undergraduate research and instruction in the Hope College Computer Science Department*

This has been evaluated by the amount of research activity as measured by grants received, articles published, and papers presented by the students and faculty at Hope College. This has proven to be a suitable measure so we will continue to evaluate this objective in the same way.

- *to encourage and support undergraduate research at institutions that presently lack the infrastructure to support such research*

The success of research programs at institutions of the external faculty mentors has been measured by grants, articles, and papers, and by the undergraduate research activity at these institutions following the faculty mentor's participation in this project. We will continue to use this measurement.

We will continue to use our evaluation results to improve the program throughout the duration of this project. In particular, this informed improvement will be applied to evaluation as well as all other aspects of the project.

(f) RESULTS FROM PRIOR NSF SUPPORT

Grant Number	CDA-9200118	CDA-9423943	CDA-9732339	CDA-0097464
Amount of Award	\$86,550	\$114,393	\$146,700	Initial:\$146,700 Revised:\$163,213
Support Period	April 1, 1992 to September 30, 1995	March 1, 1995 to February 28, 1998	February 1, 1998 to January 31, 2000	February 1, 2000 to January 31, 2004
Title	REU: An Undergraduate Research Participation Program in Computer Science			

General Results

With support from the National Science Foundation, Hope College has hosted a Computer Science REU site program each of the summers from 1992-2003. During this time, REU has supported 87 participants, while an additional 25 undergraduate researchers have been supported by other funds. These additional funds have been provided through grants awarded to the faculty and the institution by sources that include NASA, NSF RUI, Pew Memorial Trust, Howard Hughes Foundation, the United States Department of Energy, and the United States Air Force. The student participants have completed 58 projects, the most recent of which are listed later in this proposal.

The evaluation of the previous projects has taken two forms, survey and statistical. To obtain this data, all past participants are contacted every three years and participate in a survey. In addition to collecting updated statistical data, this survey asks these past participants to evaluate the impact that their participation in the Hope College Undergraduate Research Program has had on them and their careers. The complete text of all of the responses to the 2003 survey is found at <http://www.cs.hope.edu/~dershem/reu/surveyresults.html>. A few quotes from the responses are included here.

"I guess the important thing to my career about the REU was that it encouraged me by saying that I am capable of doing research, and even being published."

"My experiences taught me how to formulate interesting research problems, find and implement solutions to those problems, and communicate the problem and solution to others."

"My participation in the Hope College NSF-REU program with the Computer Science department helped to drive my interest in further computer science studies and in computer science research. Having first-hand knowledge and experience of computer science research sharpened my technical abilities, attracted attention to my resume as a potential employee and increased my confidence in pursuing post-Bachelor studies in Computer Science."

"Hope College's REU program gave me an introduction to research and provided me with a supportive community of other Computer Science students. This combination helped me decide that I was capable of continuing onto graduate school and that doing so was something I wanted as part of my future."

"The program exposed me to the essentials of scholarly research. I gained hands-on research skills as well as a broader understanding of computer science research. I gained confidence in my potential as a scholar and realized that research was something I would really enjoy doing on a professional level."

The table below provides data about the participants in this program over the past twelve years

	Participants		Females		Minorities		Still under grads	Grad School attendees	
	Total	REU	#	%*	#	%*		#	%*
1992-1994	24	18	5	24	1	5	0	7	33
1995-1997	24	18	4	19	1	5	0	11	52
1998-2000	28	22	10	37	3	11	0	11	41
2001-2003	37	25	11	32	3	9	19	6	40
Total	112	87	29	29	8	8	19	33	40

*Some participants participated in multiple years. Percentages are calculated based on unique participants.

There are several important observations regarding this information.

- In the most recent three years, the proportion of participants funded by non-REU funds has grown to approximately one-third.
- The participation by females remains at about 1 in 3.

- Minority participation has remained essentially unchanged at around 10%.
- The percentage of participants entering graduate school upon graduation has held steady at 40%.

It should also be noted that the percentage of graduated participants entering graduate school is 50% for both female and minority participants. Also, 50% of the non-Hope College participants have entered graduate school compared with 38% of the Hope College participants.

Additional data on graduate school attendance is found in the table below:

Years since graduation	Total	Attended Grad School	Still in Grad School	Received M.S.	Received Ph.D.
More than 7	25	10 (40%)	0	10 (40%)	7 (28%)
More than 3	54	23 (43%)	7	23 (43%)	7
More than 0	80	35 (44%)	18	27	7

This table shows that the 43% of students who have been out long enough to get a masters degree have completed one and 28% who have been out long enough to reasonably complete a Ph.D. or other terminal degree have done so. This table also indicates that the percentage of participants attending graduate school has been steadily increasing in recent years.

Graduate schools attended by project alumni include Southern California, Iowa State, Georgia Tech, Duke, Clemson, Illinois, Michigan State, Utah, Texas A&M, Michigan, Colorado, UMass-Lowell, UMass-Amherst, Texas, Virginia, Indiana, and William & Mary. Many students who did not attend graduate school have gone on to pursue research-related careers in computer science. Among the employers of project alumni are Hewitt Associates, Bell Labs, Evans & Sutherland, Crowe Chizek, Microsoft, Ford, UsAir, Macromedia, Max Planck Institute, and IBM.

Recruitment

In mid January of each year, announcements of the Hope College REU program are distributed. Email announcements are sent to computer science department chairs at colleges and universities throughout the United States. In addition, announcements are sent via the United States Postal Service to Minority Affairs Officers at large universities throughout the midwest. Announcements are also sent to the ACM SIGCSE mail list server. Chairs of computer science departments at over 50 predominantly minority institutions are contacted individually via email to especially encourage their students to apply. At the same time, an announcement is distributed in all computer science classes at Hope College. The application numbers for the six years of summer undergraduate research supported by the above two grants are given in the following table:

Application Profile	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
External applicants	82	59	65	67	57	62	52	39	44	43	44	92
External participants	3	3	3	3	3	2	5	5	2	5	5	4
Hope applicants	7	11	12	17	15	17	20	14	13	10	10	21
Hope participants	3	3	3	3	3	4	3	3	3	3	3	6
Undergrad researchers not supported by NSF-REU	2	3	2	2	0	1	2	2	2	4	3	4

While we had observed little change in the number of applicants to our program prior to 2003, we experienced more than a 100% jump in both the internal Hope College applications and the applications from students at other institutions. While we might like to attribute this to the quality of the program and the increased interest among undergraduates in computer science research, we are sure that the tighter job market had some influence as well. It is also noteworthy that whereas in some years we experienced an acceptance rate from applicants offered positions of as low as 50%, our acceptance by undergraduates of offers to our program in 2003 was 88%.

Hope College Computer Science Summer Research Projects, 1992-2003

Year	Projects	Faculty Mentor	Undergraduate Researchers * indicates non-REU funded
1992-1997	22 Projects were conducted during the first six years of the Hope College Program.	Five individuals served as mentors.	45 student participants, 36 with REU support

1998	Dynamic Anomaly Detection	Michael J. Jipping	Bob Murillo, Nate Oostendorp
	ALAN: The Algorithm Animator	Herbert Dershem	Dave Christian
	Java Development Environment	Gordon Stegink	Jon Pater*, Daron Vroon
	Synchronize Implementation of Classes	Alyce Brady	Matt Hahnfeld*, Ilya Lipkin
	The Function Visualizer	Herbert Dershem	Erin Parker, Becky Weinhold
	WALDO: Web Accessible Learning Design Options	Michael Jipping	Andy Aardema*, Patti Marcoux
1999	Exploring Thin Client Technology on Handheld Computers	Michael Jipping	Karl Rasche*, Marcia Zangrilli
	Supporting Classroom Interaction By Handheld Computers	Michael Jipping	Maria Casipe, Jessica Hovater
	Algorithm Visualization on the Web	Herbert Dershem	Chris Rowland, Tim Vroom*
	Program Execution Animation and Visualization	Herbert Dershem	Josiah Dykstra, Keith Suppes
	Learning Algorithms Applied to Game Playing	Myles McNally	Jessie Link, Daron Vroon
2000	Supporting Classroom Interaction By Handheld Computers	Michael Jipping	Sam Sandro, Josh Krikke, Sarah Dieter
	Smart(?) Lego Robots	Andrew VanPernis	Mike Branstein, Ben Wing*
	Timetable Construction and Student Course Scheduling	Gary Lewandowski	Abby Walker, Prakash Ojha*
2001	Infrastructure Design for a Mobile Ad Hoc Network for Parallel Processing	Michael Jipping	Matt Boes, Mike VanHemert*
	Electronic Readers & Software: Textbooks of the Future	Ryan McFall	Sarah Allen, Carrie Halvorsen
	Obvis: The Object Visualizer	Herbert Dershem	Hark Connell, Derek Augsburger*
	One-to-Many Cryptography	Ryan McFall	Tim Kelley
	Serving User Documentation with Dynamic Web Pages	Keith Vanderlinden	Joe Ku
	Enhancing a GUI Event Recorder to Support the Automated Creation of User Documentation	Keith Vanderlinden	Shen Liu*
	Hardware Design and Testing over a LAN	Michael Jipping	Steve Marlowe, Alex Sherstov
	JVALL: Java Visual Automated Linked List	Herbert Dershem	Ngozi Uti
2002	Electronic Textbooks	Ryan McFall	Carrie Halvorsen, Marty Kane
	Precedence Network Technique Tool Development	Ryan McFall	Chad Kettner, Mike Kopchick*
	Static Analysis Tool Development for C++ Programs	Rose Shumba	Shen Liu*, Christina Niemerg
	SIMD Implementation of Computational Geometry Algorithms	Christian Trefftz	Ben Occhipinti, Joshua Rowe
	A Platform for Network Analysis Using Handheld Computers	Michael Jipping	Agata Bugaj, Lily Mihalkova*, Don Porter
	Distributed Visualization of Graph Algorithms	Herbert Dershem	Alex Sherstov*
2003	Automated Visualization of Abstract Data Types	Herbert Dershem	Daniela Banu*, Nick Sumner
	Electronic Textbook Development	Ryan McFall	Josh Morse, Dan Hansens*, Chris Johnson, Liz Dahm*
	Wireless Network Analysis Using Handheld Computers	Michael Jipping	Nathan Kooistra, Andrew Kalafut, Kathleen Ludewig
	Functional Modeling of Genes and Cellular Processes	Matthew DeJongh	Pam VanDort, Benjamin Ramsay
	Speech and Dialog on Small Devices	William Fitzgerald	Jordan Kairys, Aaron Phillips

Each summer, the participants were present on the Hope College campus for ten weeks of research. Those participants supported by non-REU funds are indicated by an *. In addition to the research work that was carried out, the following activities were also held in some or all of the summers:

- Weekly seminars where students present their research work
- Field trip to a University graduate computer science department (most recently Michigan State and Purdue)
- Weekly seminar for preparation for the computer science GRE examination
- Field trip to computer trade show when one is held nearby
- Faculty-led workshops on topics that are pertinent to all projects

- Workshop on how to give technical presentations
- Workshop on how to do technical writing
- Workshop on how to prepare a research poster
- Workshop on research ethics held in conjunction with the Hope College Physics and Engineering REU project

Students are required to make a formal final presentation of their research during the final week of the project and to submit a final research report. In addition, all students are required to prepare an electronic poster of their research. These posters are then placed on the World Wide Web. Participants are also required to present their results in a colloquium at their home institution and to submit it for presentation and/or publication to a journal or conference.

Several non-REU supported participants have provided an interesting and diverse environment for the summer research program. These have included one high school student, one student from a university in Mexico, and one education major.

Post-Summer Results: Presentations and Papers (* indicates undergraduate co-author)

Papers presented

- McFall*, R. 1992. Using the Computer to Visualize and Simulate Abstract Models of Computation. Pew Midstates Consortium Undergraduate Research Symposium. Grinnell, IA., October
- Shu*, M. 1992. An Object-Oriented Application/Programmer Interface. Pew Midstates Consortium Undergraduate Research Symposium. Grinnell, IA.
- Matthews*, E. and M. Shield*. 1992. Photosynthesis: An Object-Oriented Test Bed for Parallel Ray Tracing. Argonne Symposium on Undergraduate Research. Argonne, IL.
- Howell*, J., R. Wohlfarth*, and M. Shu*. 1993. An Object-Oriented Application/Programmer Interface for Network Programming. Symposium on Applied Computing. Indianapolis, IN.
- Engel, G., H. Dershem, R. McFall*, A. Lopez, and S. Wiltz. 1993. Research Experience for Undergraduates Panel. SIGCSE Technical Symposium on Computer Science Education. Indianapolis, IN.
- Nelson*, R. and B. Showers*. 1993. The Genetic Algorithm Parallel Programming Project. Pew Midstates Consortium Undergraduate Research Symposium. Chicago, IL.
- Barth*, W. and C. Bowsher*. 1993. AdaVision and THREADS: Algorithm Animations and Experimental Laboratories for Teaching a Data Structures Course in Ada. Argonne Symposium for Undergraduate Research. Argonne, IL.
- Dershem, H. 1993. Algorithm Animation for Data Structures. United States Air Force Academy Computer Science Colloquium. USAF Academy, CO.
- Jipping, M., S. Hallyn*, M. Crider*, N. Rahn*, and J. Beard. 1993. An Empirical Case Study of Software Integration Techniques. NASA Langley Space Flight Center Symposium. Langley, VA.
- McFall*, R. and H. Dershem. 1994. Finite State Machine Simulation in an Introductory Lab. SIGCSE Technical Symposium on Computer Science Education. Phoenix, AZ.
- Dershem, H., Barth*, W., Bowsher*, C., and D. Brown*. 1996 "Data Structures with Ada Packages, Laboratories, and Animations," First Annual Australasian Conference on Computer Science Education, Sydney, AU.
- Penney*, J. and D. Blood*. 1997. Persistent Annotation of HTML Documents. Pew Midstates Undergraduate Research Symposium. Chicago, IL.
- Van Engen*, A., Bradshaw*, M., and N. Oostendorp*. 1998. "Extending Java to Support Shared Resource Protection and Deadlock Detection in Threads Programming", ACM Student Posters, SIGCSE Technical Symposium, Atlanta, GA.
- Dershem, H. and P. Brummund*. 1998. "Tools for Web-Based Sorting Animation," SIGCSE Technical Symposium, Atlanta, GA.
- Dershem, H. and J. Vanderhyde*. 1998. "Java Class Visualization for Teaching Object-Oriented Concepts," SIGCSE Technical Symposium, Atlanta, GA.
- Dershem, H., Parker, D.E.*, and R. Weinhold*. 1999. "A Java Function Visualizer," Computing Consortium for Small Colleges: Rocky Mountain Conference, Colorado Springs, CO.
- Dykstra, J.*, Dershem, H., and K. Suppes*. 2000. "An Abstract Window Toolkit Visualizer for Computer Science Instruction," Midwest Instruction and Computing Symposium, Minneapolis, MN.
- Vroom, T.* and C. Rowland*. 2000. "Salsa: A Tool for Teaching and Learning Algorithms through Animation," National Conference on Undergraduate Research, Missoula, MT.

- Jipping, M.J., Dieter*, S., Krikke*, J., and S.Sandro*, 2001. "Using Handheld Computers in the Classroom: Laboratories and Collaboration on Handheld Machines," SIGCSE Technical Symposium, Charlotte, NC.
- Walker, A.*, Wanner*, J., and Ojha*, P., 2001. "Empirical Study of Course Scheduling Methods", 9th ACM International Student Research Contest, Charlotte, NC.
- Uti*, N., 2001. "JVALL: Java Visual Automated Linked List," CCSC Midwest Conference Undergraduate Paper Presentation, Bourbonnais, IL.
- Marlowe*, S. and A. Sherstov*, 2001. "Hardware Design and Testing over a LAN," CCSC Midwest Conference Undergraduate Paper Presentations, Bourbonnais, IL.
- Augsburger*, D. and H. Connell*, 2001. "Obvis: The Object Visualizer," CCSC Midwest Conference Undergraduate Poster Presentations, Bourbonnais, IL.
- Allen*, S. and C. Halvorsen*, 2001. "Electronic Readers and Software: The Textbooks of the Future," CCSC Midwest Conference Undergraduate Poster Presentation, Bourbonnais, IL.
- Kelley*, T., 2001. "One-to-Many Cryptography," CCSC Midwest Conference Undergraduate Paper Presentations, Bourbonnais, IL.
- Boes*, M. and M. VanHemert*, 2001. "Infrastructure Design for a Mobile Ad Hoc Network for Parallel Processing," CCSC Midwest Conference Undergraduate Poster Presentations, Bourbonnais, IL.
- Jipping, M.J., Marlowe*, S., and Sherstov*, A., 2002. "Using Java to Design and Test Hardware Circuits Over a Classroom Network", SIGCSE Technical Symposium, Cincinnati, KY..
- Dershem, H., N. Uti*, 2002. "Animation of Java Linked Lists", SIGCSE Technical Symposium, Cincinnati, KY.
- Lewandowski, G., Ojha, P., Rizzo, J., and A. Walker, 2002. "An Average Case Approximation Bound for Course Scheduling by Greedy Bipartite Matching," International Conference on the Practice and Theory of Automated Timetabling, Gent, Belgium.
- Halvorsen*, C. and M. Kane*, 2002. "Electronic Textbooks," CCSC Midwest Conference Undergraduate Poster Presentation, Marion, IN.
- Kettner*, C. and M. Kopchick*, 2002. "Precedence Network Technique Tool Development," CCSC Midwest Conference Undergraduate Poster Presentation, Marion, IN.
- Ku*, J., 2002. "Serving User Documentation with Dynamic Web Pages," CCSC Midwest Conference Undergraduate Poster Presentation, Marion, IN.
- Liu*, S., 2002. "Enhancing a GUI Event Recorder to Support the Automated Creation of User Documentation," CCSC Midwest Conference Undergraduate Poster Presentation, Marion, IN.
- Occhipinti*, B. and J. Rowe*, 2002. "SIMD Implementation of Computational Geometry Algorithms," CCSC Midwest Conference Undergraduate Paper Presentation, Marion, IN.
- Sherstov*, A., 2002. "Visualization and Distributed Algorithms using DISVIZ," CCSC Midwest Conference Undergraduate Paper Presentation, Marion, IN.
- Sherstov*, A., 2002. "Streamlining Distributed Application Development," IASTED International Conference Applied Modeling and Simulation, Cambridge, MA.
- Jipping, M.J., Bugaj*, A., Mihalkova*, L., and Porter*, D., 2003. "Introductory networks: Using Java to teach networking concepts with a programmable network sniffer", SIGCSE Technical Symposium, Reno, NV.
- Bugaj*, A., Mihalkova*, L., and Porter*, D., 2003. "Using Java to Teach Networking Concepts With a Programmable Network Sniffer," 11th ACM International Student Research Contest, Reno, NV.
- Sherstov*, A., 2003. "Distributed visualization of graph algorithms", 2003. SIGCSE Technical Symposium, Reno, NV.
- Sherstov*, A., 2003. "Streamlining Distributed Application Development," 11th ACM International Student Research Contest, Reno, NV

Papers Published

- Howell*, J., R. Wohlfarth*, and M. Shu*. "An Object-Oriented Application/Programmer Interface for Network Programming," Proceedings of the 1993 Symposium on Applied Computing, 1993.
- McFall*, R. and H. Dershem. "Finite State Machine Simulation in an Introductory Lab," SIGCSE Bulletin, 26,1 (1994), pp. 126-130.
- Dershem, H., Barth*, W., Bowsher*, C., and D. Brown*. "Data Structures with Ada Packages, Laboratories, and Animations," Proceedings of the First Australasian Conference on Computer Science Education, Sydney, Australasian, July 3-5, 1996, pp. 32-38.

Van Engen*, A., Bradshaw*, M., and N. Oostendorp*. "Extending Java to Support Shared Resource Protection and Deadlock Detection in Threads Programming", Crossroads, 4,2(Winter 1997), 9-17.

Dershem, H. and P. Brummund*. "Tools for Web-Based Sorting Animation," SIGCSE Bulletin, 30,1(Mar 1998), 222-226.

Dershem, H. and J. Vanderhyde*. "Java Class Visualization for Teaching Object-Oriented Concepts," SIGCSE Bulletin, 30,1(Mar 1998), 53-57.

Dershem, H., Parker, D.E.*, and R. Weinhold*, "A Java Function Visualizer," Journal of Computing in Small Colleges, 15,1(Oct 1999), 221-230.

Dykstra, J.*, Dershem, H., and K. Suppes*, "An Abstract Window Toolkit Visualizer for Computer Science Instruction," Proceedings of the 33rd Midwest Instruction and Computing Symposium (CD-ROM), April 14-15, 2000, Minneapolis, MN.

Jipping, M.J., Dieter*, S., Krikke*, J., and S.Sandro*, "Using Handheld Computers in the Classroom: Laboratories and Collaboration on Handheld Machines", SIGCSE Bulletin, 33,1 (March 2001), 169-173.

Jipping, M.J., Marlowe*, S., and Sherstov*, A., "Using Java to Design and Test Hardware Circuits Over a Classroom Network", SIGCSE Technical Bulletin, 34,1(March 2002),162-166.

Dershem, H., McFall, R., and N. Uti*, "Animation of Java Linked Lists", SIGCSE Technical Bulletin, 34,1(March 2002),53-57.

Dershem, H., McFall, R., and N. Uti*, "A Linked List Prototype for the Visual Representation of Abstract Data Types," Interactive Multimedia Electronic Journal of Computer-Enhanced Learning, 4,2(Oct 2002).

Sherstov*, A., "Streamlining Distributed Application Development," Proc. IASTED Conference on Applied Modeling and Simulation, (Nov 2002).

Jipping, M.J., Bugaj*, A., Mihalkova*, L., and Porter*, D., "Introductory networks: Using Java to teach networking concepts with a programmable network sniffer", SIGCSE Technical Bulletin, 35,1(Feb 2003), 120-124.

Sherstov*, A., "Distributed visualization of graph algorithms", SIGCSE Technical Bulletin, 35,1(Feb 2003), 376-380.

Awards won by Undergraduate Researchers

Josiah Dykstra and Keith Suppes, best student paper award at Midwest Instructional and Computing Symposium 2000.

Josiah Dykstra, best student research award at CCSC Midwest Conference 2001.

Alexander Sherstov and Steve Marlowe, best student poster award at CCSC Midwest Conference 2001.

Ngozi Uti, best student paper award at CCSC Midwest Conference 2001.

Ngozi Uti, top ten papers award at SIGCSE 2002.

Alexander Sherstov and Steve Marlowe, top ten papers award at SIGCSE 2002.

Josiah Dykstra, recipient of the Van Tamelen Prize for excellence in scientific research, a campus-wide Hope College award, 2002.

Alexander Sherstov, best student paper award at CCSC Midwest Conference 2002.

Alexander Sherstov, top five in Undergraduate Research Competition at SIGCSE 2003.

Alexander Sherstov, finalist for CRA Outstanding Undergraduate Award, 2002.

Alexander Sherstov, recipient of the Van Tamelen Prize for excellence in scientific research, a campus-wide Hope College award, 2003.

Biographical Sketches

Principal Investigator: Herbert L. Dershem

(i) Professional Preparation

B.S. University of Dayton, 1965

M.S. (Computer Science) Purdue University, 1967

Ph.D. (Computer Science) Purdue University, 1969

(ii) Appointments

Hope College, Assistant Professor, 1969-1974, Associate Professor, 1974-1981,
Professor, 1981-present, Chair, Computer Science Dept, 1976-2003.

Oak Ridge National Laboratories, Visiting Research Scientist, 1977-1978

Boston University Overseas Program, Visiting Professor, 1982-1983

United States Air Force Academy, Distinguished Visiting Professor, 1993-1994

(iii) Publications

Up to 5 publications most closely related to the proposed project:

Dershem, H.L., McFall, R.L., and N. Uti*, "A Linked List Prototype for the Visual Representation of Abstract Data Types," *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning*, 4,2(Oct, 2002).

Dershem, H.L., McFall, R.L., and N. Uti*, "Animation of Java Linked Lists," *SIGCSE Bulletin*, 34,1(Mar, 2001), 53-57.

Dershem, H.L., Dykstra*, J., and K. Suppes*, "An Abstract Window Toolkit Visualizer for Computer Science Instruction," *Proceedings of the 33rd Midwest Instruction and Computing Symposium (CD-ROM)*, April 14-15, 2000, Minneapolis, MN.

Dershem, H.L., Parker*, D.E., and R. Weinhold*, "A Java Function Visualizer," *Journal of Computing in Small Colleges*, 15,1(Oct, 1999), 221-230.

Dershem, H.L. and J. Vanderhyde*, "Java Class Visualization for Teaching Object-Oriented Concepts," *SIGCSE Bulletin*, 30,1(Mar, 1998), 53-57.

Up to 5 other significant publications, whether or not related to the proposed project:

Dershem, H.L. and P. Brummund*, "Tools for Web-Based Sorting Animation," *SIGCSE Bulletin*, 30,1(Mar, 1998), 222-226.

Dershem, H.L., Barth*, W., Bowsher*, C., and D. Brown*, "Data Structures with Ada Packages, Laboratories, and Animations," *Proceedings of the First Australasian Conference on Computer Science Education*, July, 1996, 32-38.

Dershem, H.L. and M.J. Jipping, *Programming Languages: Models and Structures: Second Edition*, PWS Publishing Co., 1995.

McFall*, R. and Dershem, "Finite State Machine Simulation in an Introductory Lab," *SIGCSE Bulletin*, 26,1(Mar 1994), 126-140.

(iv) Synergistic Activities

a. Previous grants awarded:

Co-director, "Introduction of the Computer in the Statistics Curriculum", NSF Office of Computing Activities, 1971-1973, \$45,800.

Director, "A Modular Approach to the Introductory Course in Computer Science", NSF Local Course Improvement Program, 1978-1980, \$14,200

Co-Director, "A Microcomputer Laboratory for use in Teaching Statistics", NSF Instructional Scientific Equipment Program, 1979-1980, 10,315.

Director, "CSNET Membership in Support of Computer Science Research", NSF RUI Program, 1987-1990, \$9,375.

Director, "Computer Science Undergraduate Research Program", NSF REU Program, 1992-1994, \$86,550; 1995-1997, \$114,393; 1998-2000, \$146,700; 2001-2003, \$163,213.

Director, "Use of Ada, Laboratories, and Visualization in the Teaching of Data Structures and Discrete Mathematics", DARPA Curriculum Development Grant, 1993- 1994, \$23,010.

Director, "Curriculum and Textbook Development Using Ada 9X for the Teaching of Object-Oriented Concepts", US Air Force Contract, 1995-1996, \$34,464.

Co-Director, "An Integrated Classroom/Laboratory for Introducing Students to Object Oriented Concepts", NSF ILI Program, 1996-1998, \$46,356.

b. Councilor for the Council on Undergraduate Research:

Councilor, Division of Mathematics and Computer Science, 1994-2000, 2003-present.

Member of consultants committee, 1996-present.

Leader at CUR Proposal Writing Institute, 2002.

c. Member of panels related to undergraduate research:

Dershem, H., with Engel G., McFall*, R., Lopez, A., and S. Wiltz*. "Research Experiences for Undergraduates," Twenty-fourth SIGCSE Technical Symposium on Computer Science Education, Indianapolis, IN, March, 1993.

Dershem, H., with Bard, G., and D. Berque. "Finding and Developing Research Experiences for Undergraduates in the Small College Setting," Third Annual CCSC Midwestern Conference, Greencastle, IN, October, 1996.

Dershem, H., with Sanders, D., Eller-Meshreki, R., and G. Pitts. "Undergraduate Research - Welcome to the 21st Century," Twenty-eighth SIGCSE Technical Symposium on Computer Science Education, San Jose, CA, February, 1997.

Dershem, H., with Hedges, H. "Birds of a Feather Session on NSF-REU Program for Computer Science," Twenty-ninth SIGCSE Technical Symposium on Computer Science Education, Atlanta, GA, March, 1998.

Dershem, H. with McGuffee, J., Lankewicz, L., Lewandowski, G., Lopez, D., and O. Slotterbeck. "Managing Undergraduate CS Research," Thirty-third SIGCSE Technical Symposium on Computer Science Education, Cincinnati, KY, 2002.

d. Summary of undergraduate research involvement

In the past 12 years, Dr. Dershem has supervised 25 students in undergraduate research projects.

(v) Collaborations and Other Affiliations

a. Collaborators and Co-Editors

A list of scientists collaborated with on projects over the last 48 months would include: Scott Grissom (Grand Valley State University), Michael Jipping (Hope College), Ryan McFall (Hope College), Myles McNally (Alma College), Thomas Naps (University of Wisconsin-Oshkosh), Samuel Rebelsky (Grinnell College), Henry Walker (Grinnell College).

b. Graduate and Postdoctoral Advisors

Robert E. Lynch (Purdue University)

c. Thesis Advisor and Postgraduate-Scholar Sponsor

None

Biographical Sketches

Principal Investigator: Matthew DeJongh

(i) Professional Preparation

B.S. The Ohio State University, 1985

M.S. (Computer Science) The Ohio State University, 1986

Ph.D. (Computer Science) The Ohio State University, 1991

(ii) Appointments

LION bioscience Inc. (formerly NetGenics, Inc.), Senior Software Engineer,
1998-2002.

Hope College, Assistant Professor, 2002-present.

(iii) Publications

Up to 5 publications most closely related to the proposed project:

McEntire, R., et al. , "An Evaluation of Ontology Exchange Languages for Bioinformatics," in *Proceedings of the Eighth International Conference on Intelligent Systems for Molecular Biology*, pp. 239-250, AAAI Press, Menlo Park, CA, 2000.

Up to 5 other significant publications, whether or not related to the proposed project:

Johnson, K., Johnson, T., Smith, J., DeJongh, M., Fischer, O., Amra, N., and Bayazitoglu, A., "RedSoar-A System for Red Blood Cell Antibody Identification," in *Proceedings of the Fifteenth Annual Symposium on Computer Applications in Medical Care* , pp. 664-668, McGraw Hill, Washington, D.C., 1991.

DeJongh, M. and Smith, J., "Integrating Models of a Domain for Problem Solving," in *Proceedings of the Eleventh International Conference on Expert Systems and Their Applications*, pp. 125-135, Avignon, France, 1991.

(iv) Synergistic Activities

a. Previous grants awarded:

Co-Director, "Bioinformatics in the Computer Science Curriculum", ACM SIGCSE Special Projects Grant, July 2003 to present, \$5000.

b. Summary of undergraduate research involvement

In the summer of 2003, Dr. DeJongh supervised 2 students in undergraduate research projects.

(v) Collaborations and Other Affiliations

a. Collaborators and Co-Editors

A list of scientists collaborated with on projects over the last 48 months would include: Mark LeBlanc (Wheaton College, MA), Michael Jipping (Hope College), Ryan McFall (Hope College), Herb Dershem (Hope College), Maria Burnatowska-Hledin (Hope College).

b. Graduate and Postdoctoral Advisors

Jack W. Smith and B. Chandrasekaran (The Ohio State University).

c. Thesis Advisor and Postgraduate-Scholar Sponsor

None

Biographical Sketches

Co-Principal Investigator: Michael J Jipping

(i) Professional Preparation

B.S. Calvin College, 1981

M.S. (Computer Science) University of Iowa, 1984

Ph.D. (Computer Science) University of Iowa, 1986

(ii) Appointments

Hope College, Assistant Professor, 1987-1995, Associate Professor, 1995-2003, Professor, 2003-present, Chair, Computer Science Dept, 2003-present.

NASA Langley Research Center, Research Fellow, 1992

University of Iowa, Assistant Professor, 1986-1987

(iii) Publications

Up to 5 publications most closely related to the proposed project:

Jipping, M.J., Bugai, A. *, Mihalkova, L. *, and Porter, D. *, "Using Java to Teach Network Concepts Using a Programmable Network Sniffer," proceedings of the 2003 SIGCSE Technical Symposium on Computer Science Education, *SIGCSE Technical Bulletin*, 36, 1, (March, 2003).

Jipping, M.J., Marlowe, S. *, and Sherstov, A. *, "Using Java to Design and Test hardware Circuits Over a Classroom Network," proceedings of the 2002 SIGCSE Technical Symposium on Computer Science Education, *SIGCSE Technical Bulletin*, 35, 1, (March, 2002).

Jipping, M.J., Dieter, S. *, Krikke, J. *, and Sandro, S. *, "Using Handheld Computers in the Classroom: Laboratories and Collaboration on Handheld Machines," proceedings of the 2001 SIGCSE Technical Symposium on Computer Science Education, *SIGCSE Technical Bulletin*, 31, 1, (March, 2002).

Up to 5 other significant publications, whether or not related to the proposed project:

M.J. Jipping, *Symbian OS Communications Programming*, Symbian Press by J. Wiley and Sons, 2002.

M.J. Jipping, K. Bruce, "Imperative Language Paradigm", chapter 94 in *The Computer Science Engineering Handbook*, A. Tucker, Ed., CRC Press, 1997. pp, 1983-2005.

Dershem, H.L. and M.J. Jipping, *Programming Languages: Models and Structures: Second Edition*, PWS Publishing Co., 1995.

M.J. Jipping, "Using Tcl as a ToolTalk Encapsulation Mechanism", *Proceedings of the 1993 Sun User Group Conference*, December 1993, pp. 161-174.

D.E. Eckhardt, M.J. Jipping, C.J. Wild, S.J. Zeil, and C.C. Roberts, "Open Environments to Support Systems Engineering Tool Integration: A Study Using the Portable Common Tool Environment (PCTE)", NASA Technical Memorandum 4489, NASA Langley Research Center, September 1993.

(iv) Synergistic Activities

a. Previous grants awarded:

Director, "Implementing and Simulating Hardware in Computer Architecture Classes", NSF CCLI Program, Grant # 0310757, 2003-2005, \$158,252.

Director, "Using Handheld Computers in the Hope College Computer Science Curriculum", NSF CCLI Program, Grant # 9980790, 2000-2003, \$83,000.

Co-Director, "An Integrated Classroom/Laboratory for Introducing Students to Object Oriented Concepts", NSF ILI Program, Grant # 9550902, 1996-1998, \$46,356.

Director, "A New Course in Parallel Programming for Undergraduates", NSF ILI Program, Grant # 9050417, 1990-1992, \$54,761

Director, NASA /JOVE Augmentation Award, June 1995 - September, 1996, \$17,600.

Director, "Building a Software Infrastructure for Parallel Software Design", NASA Langley Research Center, NAG-1-1480, February 1993 - January 1996.
Recipient of a NASA Joint Venture Award, June 1992 - May 1995.

b. Summary of undergraduate research involvement

In the past 12 years, Dr. Jipping has supervised 28 students in undergraduate research projects.

(v) Collaborations and Other Affiliations

a. Collaborators and Co-Editors

A list of scientists collaborated with on projects over the last 48 months would include: Joel Adams (Calvin College), Alyce Brady (Kalamazoo College), Kim Bruce (Williams College), Robert Cupper (Allegheny College), Herbert Dershem (Hope College), Scot Drysdale (Dartmouth University), Max Hailperin (Gustavus Adolphus College), Charles Kelemen (Swarthmore College), Andrea Lawrence (Spelman College), Gary Lewandowski (Xavier College), Ryan McFall (Hope College), Takis Metaxas (Wellesley College), Robert Noonan (College of William and Mary), Rhys Price-Jones (Rochester Institute of Technology), G. Michael Schneider (Macalaster College), Allen Tucker (Bowdoin College), Henry Walker (Grinnell College).

b. Graduate and Postdoctoral Advisors

None

c. Thesis Advisor and Postgraduate-Scholar Sponsor

None

Biographical Sketches

Faculty Mentor: Ryan L. McFall

(i) Professional Preparation

B.S. (Computer Science and Mathematics) Hope College, 1993
M.S. (Computer Science) Michigan State University, 1995
Ph.D. (Computer Science) Michigan State University, 2000

(ii) Appointments

Hope College, Visiting Instructor, 1995-96, Assistant Professor, 2000-present

(iii) Publications

Up to 5 publications most closely related to the proposed project:

Dershem, H.L., McFall, R.L., and N. Uti*, "A Linked List Prototype for the Visual Representation of Abstract Data Types," *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning*, 4,2(Oct, 2002).

Dershem, H.L., McFall, R.L., and N. Uti*, "Animation of Java Linked Lists," *SIGCSE Bulletin*, 34,1(Mar, 2001), 53-57.

Up to 5 other significant publications, whether or not related to the proposed project:

McFall, R.L. and Stegink, G., "Introductory Comput Science for General Education: Laboratories, Textbooks and the Internet," *SIGCSE Bulletin*, 29,1(Mar, 1997), 96-100.

McFall, R.L., Urban-Lurain, M. and Weinshank, D.J., "A Web-To-Database System for Collecting Student Data," *Proceedings of IEEE Frontiers in Education 2002*, November, 2002, F1E14-F1E18.

McFall, R. L. and Dershem, H.L., "Finite State Machine Simulation in an Introductory Lab," *SIGCSE Bulletin*, 26,1(Mar 1994), 126-140.

(iv) Synergistic Activities

a. Previous grants awarded:

Principal Investigator, "Student and Instructor Centered Electronic Textbooks in the Hope College Computer Science Curriculum", NSF CCLI program, 2001-present, \$74,967.

b. Summary of undergraduate research involvement

In the past 8 years, Dr. McFall has supervised 14 undergraduate research students for summer projects and 11 students doing independent research projects during the academic year.

(v) Collaborations and Other Affiliations

a. Collaborators and Co-Editors

A list of scientists collaborated with on projects over the last 48 months would include: Mark Urban-Lurain (Michigan State University), Don Weinshank (Michigan State University), Michael Jipping (Hope College), Herb Dershem (Hope College), Alyce Brady (Kalamazoo College), Dave Berque (DePauw University).

b. Graduate and Postdoctoral Advisors

Matt W. Mutka (Michigan State University)

c. Thesis Advisor and Postgraduate-Scholar Sponsor

None

SUMMARY PROPOSAL BUDGET

YEAR 1

ORGANIZATION Hope College				FOR NSF USE ONLY			
				PROPOSAL NO.	DURATION (months)		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
				CAL	ACAD	SUMR	
1. Herbert L Dershem - PI				0.00	0.50	2.00	\$ 3,500
2. Matthew DeJongh - Faculty Mentor				0.00	0.00	2.00	2,000
3. Michael J Jipping - Faculty Mentor				0.00	0.00	2.00	2,000
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.50	6.00	7,500
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (1) POST DOCTORAL ASSOCIATES				0.00	0.00	2.00	5,000
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0
3. (0) GRADUATE STUDENTS							0
4. (0) UNDERGRADUATE STUDENTS							0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0
6. (0) OTHER							0
TOTAL SALARIES AND WAGES (A + B)							12,500
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							1,750
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							14,250
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT							0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							3,000
2. FOREIGN							0
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS \$ 33,600							
2. TRAVEL 1,000							
3. SUBSISTENCE 3,000							
4. OTHER 0							
TOTAL NUMBER OF PARTICIPANTS (8) TOTAL PARTICIPANT COSTS							37,600
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES							1,000
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							3,200
3. CONSULTANT SERVICES							0
4. COMPUTER SERVICES							0
5. SUBAWARDS							0
6. OTHER							1,000
TOTAL OTHER DIRECT COSTS							5,200
H. TOTAL DIRECT COSTS (A THROUGH G)							60,050
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% of student stipends (Rate: 25.0000, Base: 33600)							
TOTAL INDIRECT COSTS (F&A)							8,400
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							68,450
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 68,450 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

1 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

YEAR 3

ORGANIZATION Hope College				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				AWARD NO.	Proposed	Granted
				A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		
	CAL	ACAD	SUMR			
1. Herbert L Dershem - PI	0.00	0.50	2.00	\$	3,500	\$
2. Michael J Jipping - Faculty Mentor	0.00	0.00	2.00		2,000	
3. Ryan L McFall - Faculty Mentor	0.00	0.00	2.00		2,000	
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.50	6.00		7,500	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL ASSOCIATES	0.00	0.00	2.00		5,000	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0	
3. (0) GRADUATE STUDENTS					0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					12,500	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					1,750	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					14,250	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT					0	
E. TRAVEL	1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				3,000	
	2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS	\$	33,600				
2. TRAVEL		1,000				
3. SUBSISTENCE		3,000				
4. OTHER		0				
TOTAL NUMBER OF PARTICIPANTS (8)				TOTAL PARTICIPANT COSTS	37,600	
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES					1,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					3,200	
3. CONSULTANT SERVICES					0	
4. COMPUTER SERVICES					0	
5. SUBAWARDS					0	
6. OTHER					1,000	
TOTAL OTHER DIRECT COSTS					5,200	
H. TOTAL DIRECT COSTS (A THROUGH G)					60,050	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% of student stipends (Rate: 25.0000, Base: 33600)						
TOTAL INDIRECT COSTS (F&A)					8,400	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					68,450	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)					0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$ 68,450	\$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY		
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

3 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION Hope College				FOR NSF USE ONLY			
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				PROPOSAL NO.	DURATION (months)		
				AWARD NO.	Proposed	Granted	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer	Funds granted by NSF (if different)
	CAL	ACAD	SUMR				
1. Herbert L Dershem - PI	0.00	0.50	2.00	\$	3,500	\$	
2. Matthew DeJongh - Faculty Mentor	0.00	0.00	2.00		2,000		
3. Michael J Jipping - Faculty Mentor	0.00	0.00	2.00		2,000		
4.							
5.							
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0		
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	0.50	6.00		7,500		
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)							
1. (1) POST DOCTORAL ASSOCIATES	0.00	0.00	2.00		5,000		
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00		0		
3. (0) GRADUATE STUDENTS					0		
4. (0) UNDERGRADUATE STUDENTS					0		
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0		
6. (0) OTHER					0		
TOTAL SALARIES AND WAGES (A + B)					12,500		
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					1,750		
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					14,250		
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)							
TOTAL EQUIPMENT					0		
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)					3,000		
2. FOREIGN					0		
F. PARTICIPANT SUPPORT COSTS							
1. STIPENDS	\$	33,600					
2. TRAVEL		1,000					
3. SUBSISTENCE		3,000					
4. OTHER		0					
TOTAL NUMBER OF PARTICIPANTS (8) TOTAL PARTICIPANT COSTS					37,600		
G. OTHER DIRECT COSTS							
1. MATERIALS AND SUPPLIES					1,000		
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					3,200		
3. CONSULTANT SERVICES					0		
4. COMPUTER SERVICES					0		
5. SUBAWARDS					0		
6. OTHER					1,000		
TOTAL OTHER DIRECT COSTS					5,200		
H. TOTAL DIRECT COSTS (A THROUGH G)					60,050		
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% of student stipends (Rate: 25.0000, Base: 33600)							
TOTAL INDIRECT COSTS (F&A)					8,400		
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					68,450		
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)					0		
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$	68,450	\$	
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$			
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY			
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION			
				Date Checked	Date Of Rate Sheet	Initials - ORG	

SUMMARY PROPOSAL BUDGET

YEAR 5

ORGANIZATION Hope College				FOR NSF USE ONLY		
				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				AWARD NO.	Proposed	Granted
				A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)		
				CAL	ACAD	SUMR
1. Herbert L Dershem - PI				0.00	0.50	2.00 \$ 3,500
2. Matthew DeJongh - Faculty Mentor				0.00	0.00	2.00
3. Ryan L McFall - Faculty Mentor				0.00	0.00	2.00
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00 0
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.50	6.00 7,500
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL ASSOCIATES				0.00	0.00	2.00 5,000
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00 0
3. (0) GRADUATE STUDENTS						0
4. (0) UNDERGRADUATE STUDENTS						0
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						0
6. (0) OTHER						0
TOTAL SALARIES AND WAGES (A + B)						12,500
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						1,750
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						14,250
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						0
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						3,000
2. FOREIGN						0
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ 33,600						
2. TRAVEL 1,000						
3. SUBSISTENCE 3,000						
4. OTHER 0						
TOTAL NUMBER OF PARTICIPANTS (8) TOTAL PARTICIPANT COSTS						37,600
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						1,000
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						3,200
3. CONSULTANT SERVICES						0
4. COMPUTER SERVICES						0
5. SUBAWARDS						0
6. OTHER						1,000
TOTAL OTHER DIRECT COSTS						5,200
H. TOTAL DIRECT COSTS (A THROUGH G)						60,050
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% of student stipends (Rate: 25.0000, Base: 33600)						
TOTAL INDIRECT COSTS (F&A)						8,400
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						68,450
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)						0
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						\$ 68,450 \$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY		
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

5 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

Cumulative

ORGANIZATION Hope College				FOR NSF USE ONLY	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				PROPOSAL NO.	DURATION (months)
				AWARD NO.	
A. SENIOR PERSONNEL: PI/PD, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)					
	CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. Herbert L Dershem - PI	0.00	2.50	10.00	\$ 17,500	\$
2. Matthew DeJongh - Faculty Mentor	0.00	0.00	8.00	8,000	
3. Michael J Jipping - Faculty Mentor	0.00	0.00	6.00	6,000	
4. Ryan L McFall	0.00	0.00	6.00	6,000	
5.					
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00	0	
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	2.50	30.00	37,500	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)					
1. (5) POST DOCTORAL ASSOCIATES	0.00	0.00	10.00	25,000	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	0.00	0	
3. (0) GRADUATE STUDENTS				0	
4. (0) UNDERGRADUATE STUDENTS				0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)				0	
6. (0) OTHER				0	
TOTAL SALARIES AND WAGES (A + B)				62,500	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)				8,750	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)				71,250	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)					
TOTAL EQUIPMENT				0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)				15,000	
2. FOREIGN				0	
F. PARTICIPANT SUPPORT COSTS					
1. STIPENDS \$	168,000				
2. TRAVEL	5,000				
3. SUBSISTENCE	15,000				
4. OTHER	0				
TOTAL NUMBER OF PARTICIPANTS (40) TOTAL PARTICIPANT COSTS				188,000	
G. OTHER DIRECT COSTS					
1. MATERIALS AND SUPPLIES				5,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION				16,000	
3. CONSULTANT SERVICES				0	
4. COMPUTER SERVICES				0	
5. SUBAWARDS				0	
6. OTHER				5,000	
TOTAL OTHER DIRECT COSTS				26,000	
H. TOTAL DIRECT COSTS (A THROUGH G)				300,250	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)					
TOTAL INDIRECT COSTS (F&A)				42,000	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)				342,250	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)				0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)				\$ 342,250	\$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$	
PI/PD NAME Herbert L Dershem				FOR NSF USE ONLY	
ORG. REP. NAME*				INDIRECT COST RATE VERIFICATION	
				Date Checked	Date Of Rate Sheet
				Initials - ORG	

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

Budget Justification

A1. Project Director

The Project Director receives \$1,500 for time spent during the academic year in creating and distributing publicity, directing the application process, and making arrangements for housing and other resources prior to the arrival of the participants. In addition, the Project Director will be the mentor to two undergraduate participants and will receive the standard stipend for that responsibility.

A2-3. Faculty Mentor Stipends

Each faculty mentor is expected to meet regularly with their students and be available for guidance on a daily basis. The mentor receives a stipend of \$1,000 for each student participant. This is compensation for the time spent with the student. It is expected that the mentor's research work will be supported by funds other than those provided by this project.

B1. Post Doctoral Associates

This stipend of \$5,000 each year is to provide support for the external faculty mentor. This mentor is provided a larger stipend because it is anticipated that she will be required to forego some potential sources of funding by being away from her home campus.

C. Fringe Benefits

Fringe benefits for Hope College faculty are calculated at the following percentage rate:

FICA	6.20%
Medicare	1.45%
Retirement	10.5%
Total	18.15%

Fringe benefits for external faculty mentor are calculated as above without retirement contributions for a basic rate of 7.65%

E1. Domestic Travel

This is provided for the external faculty mentor to provide support for travel from her home institution and housing while in residence during the program. It is anticipated that these expenses may include travel expenses for the mentor's family.

F1. Participant stipends and fringe benefits: 8 students @ \$4,200 per student.

The students will receive a stipend of \$3,900 with benefits of \$300 to cover the college contribution to FICA and Medicare. This is the same student stipend that we have used for the past two years of the program.

F2. Participant Travel: 4 students @ \$250 per student

These funds are used to provide travel support for non-Hope College students to travel from their homes to the Hope campus and for student travel to conferences to present the results of their research.

F3. Participant Subsistence

One half of the student housing is provided by Hope College. The total cost of housing is approximately \$500 for the ten weeks. The amount budgeted is \$250 per student per week for a total of \$2,000.

Each week there will be a group meal provided. This is budgeted at \$100 per meal for a total of \$1,000.

G1. Materials and Supplies

Supplies include copying, software, books, and poster supplies needed for recruiting and research projects.

G2. Publication Costs/Documentation/Dissemination

This will provide support for student travel to and participation in conferences where they will present their research. This is budgeted at \$400 per student.

G6. Other

Visit to graduate school: \$500

Stipend for communication skills workshop leaders: \$300

Travel expenses for visit of former Hope REU participants: \$200

I. Indirect costs

25% of student stipends

Institutional Commitment

Hope College will provide one-half of the cost of each student's housing for the summer. This is a total commitment of \$2,000 each summer.

Hope College will provide each student participant with exclusive access to one workstation in the department lab for the ten-week period along with full access to the departmental network.

Hope College will provide all student participants with full access to campus library and recreational facilities for the ten-week period.

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: **Herbert Dershem**

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: **REU: An Undergraduate Research Participation Program in Computer Science**

Source of Support: **NSF REU**

Total Award Amount: \$ **342,250** Total Award Period Covered: **01/01/04 - 12/31/08**

Location of Project: **Hope College**

Person-Months Per Year Committed to the Project. Cal: **0.00** Acad: **0.50** Sumr: **2.00**

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Matthew DeJongh	Other agencies (including NSF) to which this proposal has been/will be submitted.
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Support: <input type="checkbox"/> Current <input checked="" type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title: REU: An Undergraduate Research Participation Program in Computer Science	
Source of Support: NSF REU	
Total Award Amount: \$ 342,250 Total Award Period Covered: 01/01/04 - 12/31/08	
Location of Project: Hope College	
Person-Months Per Year Committed to the Project. Cal: 0.00 Acad: 0.00 Sumr: 2.00	

Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title:	
Source of Support:	
Total Award Amount: \$ Total Award Period Covered:	
Location of Project:	
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	

Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title:	
Source of Support:	
Total Award Amount: \$ Total Award Period Covered:	
Location of Project:	
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	

Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title:	
Source of Support:	
Total Award Amount: \$ Total Award Period Covered:	
Location of Project:	
Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:	

Support: <input type="checkbox"/> Current <input type="checkbox"/> Pending <input type="checkbox"/> Submission Planned in Near Future <input type="checkbox"/> *Transfer of Support	
Project/Proposal Title:	
Source of Support:	
Total Award Amount: \$ Total Award Period Covered:	
Location of Project:	
Person-Months Per Year Committed to the Project. Cal: Acad: Summ:	

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: **Michael Jipping**

Other agencies (including NSF) to which this proposal has been/will be submitted.

Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: **REU: An Undergraduate Research Participation Program in Computer Science**

Source of Support: **NSF REU**

Total Award Amount: \$ **342,250** Total Award Period Covered: **01/01/04 - 12/31/08**

Location of Project: **Hope College**

Person-Months Per Year Committed to the Project. Cal: **0.00** Acad: **0.00** Sumr: **2.00**

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: **Implementing and Simulating Hardware in Computer Architecture Classes**

Source of Support: **NSF CCLI**

Total Award Amount: \$ **52,743** Total Award Period Covered: **09/01/03 - 08/31/04**

Location of Project: **Hope College**

Person-Months Per Year Committed to the Project. Cal: **0.00** Acad: **2.00** Sumr: **2.00**

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

Current and Pending Support

(See GPG Section II.D.8 for guidance on information to include on this form.)

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.

Investigator: Ryan McFall	Other agencies (including NSF) to which this proposal has been/will be submitted.
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Support: ☐ Current ☒ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: **REU: An Undergraduate Research Participation Program in Computer Science**

Source of Support: **NSF REU**

Total Award Amount: \$ **342,250** Total Award Period Covered: **01/01/04 - 12/31/08**

Location of Project: **Hope College**

Person-Months Per Year Committed to the Project. Cal:**0.00** Acad:**0.00** Sumr: **2.00**

Support: ☒ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title: **Student and Instructor Centered Electronic Textbooks in the Computer Science Curriculum**

Source of Support: **NSF CCLI**

Total Award Amount: \$ **74,967** Total Award Period Covered: **06/01/02 - 12/31/03**

Location of Project: **Hope College**

Person-Months Per Year Committed to the Project. Cal:**0.00** Acad:**2.25** Sumr: **2.00**

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Sumr:

Support: ☐ Current ☐ Pending ☐ Submission Planned in Near Future ☐ *Transfer of Support

Project/Proposal Title:

Source of Support:

Total Award Amount: \$ Total Award Period Covered:

Location of Project:

Person-Months Per Year Committed to the Project. Cal: Acad: Summ:

*If this project has previously been funded by another agency, please list and furnish information for immediately preceding funding period.

2003 Hope College Computer Science REU Alumni Survey Results

Impact

The Hope College REU program made me seriously explore the idea of obtaining an advanced degree in computer science or involving the field of computer science. In addition, it greatly helped me prepare for the advanced GRE in Computer Science which I found to be a daunting part of the applying to graduate school process. In large part, due to the work and experience I had at Hope College, I am planning on attending graduate school beginning in the fall of 2004 for a Ph.D. in computer science with the intent of becoming a professor at a university or college. The REU program re-inforced the non-work force after undergraduate school option which was not often vocally encouraged at my school.

The REU gave me a good opportunity to consolidate what I had learned in the classroom, build my level of confidence in my ability as a computer scientist, and exposure to the research process.

My participation in the Hope REU program has had a phenomenal impact on my education (haven't got to the career stage just yet). It provided me with my first real research experience and helped me in deciding to go to graduate school. Additionally, Dr Dershem's GRE prep course helped me to get serious about school and served as a great preparation for the real thing. I have no doubt that without the research experience and publications that resulted from my summer at Hope, I would not have been a contender for spots in the top programs across the country.

In addition to the technical aspect of the program, I have been extremely pleased with the social experience as well. With the students living together and participating in planned social activities, I was able to get to know many of my fellow participants rather well. In summary, I had a blast over the course of the summer, got to experience a new part of the country, made a life-long friend, got serious about grad school, acquired the credentials to get accepted to top-notch programs and of course learned a lot of computer science. All-in-all Hope's REU program gets an A in my book.

It helped me to learn how to work in a team, and I made good friends.

During my REU research experience at Hope I had the opportunity for the first time to work on a large software development project from conception through implementation. This experience initially sparked my interest in software development, which has been my chosen career path since then. Working with talented students and professors was inspiring and helped me to realize and prepare for my career goals. I feel very fortunate to have had such a great research/work experience as an undergraduate.

Hope College's summer research program really helped me to decide on going to graduate school after I got my B.S. It was very nice to actually participate in a research and to know what research life is going to be like in graduate school while I was still a undergraduate student. It also helped me to decide what field that I liked the most in

computer science.

My time in summer research really helped to open my eyes and give me ideas of all the sorts of cs programs that are out there. In addition to a summer of work that was fun as well as rewarding, I was able to attend a conference of cs educators, which I felt really helped me get a grasp on the field and the industry that it supports.

Hope College REU was a tremendous experience for me, not just for the programming skills acquired and being able to participate in the process of researching and working on whitepapers. The contacts and social network that summer research provided has been extremely influential in my personal and professional life. Very rarely does one get the chance to work with and enjoy the company of a very smart and talented bunch.

I guess the important thing to my career about the REU was that it encouraged me by saying that I am capable of doing research, and even being published. I would have gone to grad school even if I hadn't done the REU, but I might have collapsed under the pressure at Georgia Tech if I didn't already have this confidence.

When selecting an undergraduate institution to attend, the opportunity to engage in research at the undergraduate level was one of the principal reasons why I chose to attend Hope College. As it turns out, I was given the opportunity to participate in the summer research program at Hope College as early as the second semester of my freshman year. From helping to chart the direction of our efforts through presenting the results of our research at NASA Langley and Argonne Labs, the personal growth and discovery encouraged by this experience served as a solid foundation for my rewarding career in software engineering and computer science research. Furthermore, I have remained very close friends and colleagues with many of the peers I met through the summer research program.

I believe that the opportunities provided to undergraduate students through the summer research program comprise an absolutely invaluable formative experience for creating the software engineers and computer scientists of today and tomorrow.

Although I did not matriculate from Hope College (due in no small part to a unique opportunity to study in the newly former Soviet Union), I feel as though the positive experiences in the summer research program have directly contributed to my present-day research efforts on behalf of the Office for Naval Research (ONR), Defense Advanced Research Projects Agency (DARPA), Army Research Institute (ARI), US Army Tank Automotive Research Development and Engineering Center (TARDEC), Air Force Research Laboratories (AFRL), Office of the Secretary of Defense (OSD), and others.

For enabling those experiences, I would like express the deepest gratitude to the National Science Foundation, the faculty of the Hope College Department of Computer Science, and my fellow classmates.

It helped me get some intensive time in with one project, which I didn't really get before. Particularly, it helped me learn some discipline in working on a large project when I didn't have a close-by deadline to keep me motivated. It also helped me learn my limits in terms of what kinds of things I could pull off in a given amount of time with a certain set of tools.

And if nothing else, it helped me realize that I wasn't ready for grad school right then!

My participation in the Hope College Computer Science research program during the summer of 1999 has played a significant role in my career. My research project introduced me to Java before it became a major player in the web market. Because of this experience with Java, I not only stood out in the job applicant pool, I have also been able to more quickly earn promotions within the organization that employs me. While working on my summer research project I learned more than just new technologies; I learned how to be a productive member of a team. It is my sincere hope that future students are allowed the opportunity to participate in the Hope College Computer Science Research program.

My participation in the summer research program at Hope College has had enormous impact on my career and my understanding of Computer Science research. My experiences taught me how to formulate interesting research problems, find and implement solutions to those problems, and communicate the problem and solution to others. My first summer of research resulted in a paper publication in the ACM's Symposium on Computer Science Education. Writing and presenting this paper and participating in the conference were especially invaluable to my understanding of the process of Computer Science research.

In addition to doing research, the Hope College summer research program provided educational talks and a visit to Michigan State to learn more about graduate school. The talks addressed such issues as how to give technical talks, and still have enormous impact on how I do research today. Our visit to Michigan State gave me a taste of what graduate school is like, and had a large part to play in my decision to get my PhD.

The summer research program also had a large impact on my career. I have no doubt that my experiences in Hope College's summer research played an indispensable role in getting me accepted to such CS graduate schools as the University of Wisconsin, Georgia Tech, the University of British Columbia, the University of Chicago, and the University of Colorado.

The field of Computer Science can be a little overwhelming in that there are so many possible career paths. One of my goals during college was to try as many of the areas in CS as I could to determine what I enjoyed. The summer research program gave me the opportunity to work in a team, learn about new technologies and develop applications using them, co-write and publish a paper, and present our group's results to others. In addition, presentations by other teams gave me some insight into the technologies with which they were working. The experience helped me pinpoint what I might like to do after graduating.

Now into my second job search since graduating, I see how often experience working in a team or the ability to communicate effectively with others, for example, are asked for specifically in job descriptions. I appreciate that I was able to be involved in the research program even more now than I did at the time.

After participating in the REU at Hope College, I knew that I definitely wanted to go to graduate school. This summer program also helped me to realize which area of study I wanted to pursue.

The summer REU program at Hope College afforded me an opportunity to learn first hand what it means to do research and in the process affirmed my desire to attend graduate school. Compared with my previous summer's research experience, I preferred the Hope College REU program because we worked in pairs and I was surrounded by other students in the same stage of life. Discussing the prospects of graduate school and interacting with other undergraduates my age made the experience more enjoyable than my previous research experience.

Of perhaps greater importance, was the impact the Hope College REU had on my admittance into graduate school. During the summer program, a weekly study session was offered to help us practice and prepare for the subject GREs. Because of the close interaction I had with my advisor throughout the summer research project, my advisor was an obvious choice for me to write recommendations for my graduate school applications. The strength of his recommendation and my research experience at Hope College certainly played a significant role in my admittance into graduate school. When I was called by the admissions director for computer science at William and Mary, I was told that my summer research experience was the strong factor in deciding to accept me, a student from a small undergraduate college, into their program.

My participation in the Hope College Summer Research program has had significant impact on me and my career. The experience taught me key skills which have been extremely valuable to my employers, and have proven to be very valuable to me both on a personal level, and as a business owner. Through the Hope College Summer Research Program, I was able to develop project management skills, while learning how to work both independently and as part of a team. It also taught me presentation skills through the presentation of our team project to other teams, and through symposium presentations at Argonne National Laboratory. Most importantly, the experience taught me to grow in my computer skills and knowledge, and to persevere in a project through to the end, rising to the many challenges which it presented. The research experience itself has also had a key impact on my career path, as it has proven to be very attractive to employers, and has significantly contributed to my being selected for positions which I applied.

Besides probably helping me to land subsequent jobs, the summer research program also helped me in other ways. It was a chance not only to work as a team, but also to prepare for the daily rigors of employment, such as meeting deadlines, giving regular updates to supervisors, and presenting findings to a group.

The Hope College summer research program gave me a first look at what is involved in doing research. I have since gone on to hold a position as a graduate student research assistant, publish a few research papers in the field of natural language processing, and perform professional research and development as an employee of Attensity. I believe that my participation in Hope's summer research program helped me begin to form an understanding of research that serves as a foundation for my current interests and pursuits.

The summer research was a great way to jump into the world of research. Although it was only 10 weeks long, it was the perfect amount of time to see what research is about.

Getting a paper published and being able to present the research at a conference was one of the most exciting parts of the entire program.

I learned how to work together with people who were essentially strangers. And the invaluable benefits of building personal relationships. The research provided an opportunity to learn new aspects of computer science.

REU gave me a quick, accurate, and early view of what computer science research is all about. That research experience has been valuable as a respected part of my resume and has helped me secure job placement and academic scholarships.

It gave me a glimpse into one avenue of CS and helped shape what kind of career I want to have in the future.

My participation in the Hope College NSF-REU program with the Computer Science department helped to drive my interest in further computer science studies and in computer science research. Having first-hand knowledge and experience of computer science research sharpened my technical abilities, attracted attention to my resume as a potential employee and increased my confidence in pursuing post-Bachelor studies in Computer Science. As a result, I have been developing software for IBM for 5 years, have completed a Master's degree from the University of Texas at Austin and hope to one day pursue a Ph.D. in Computer Science. Without my experience in the NSF-REU program at Hope College, I doubt that I would have continued on to a Master's degree and might not have been as successful in my post-graduation job search.

It has a very large impact on me. It showed me what research is like, and told me (once and for all) that I want to keep going as far as possible in the field of Computer Science. It was the best summer that i've ever had!

Tought me how to dig into things on my own and when to ask questions. I needed to do plenty of both then, and this is a skill I continue to use.

Most importantly, the summer research program allowed me to experience research first hand. My being part of a team, meeting with my advisor regularly, and having a sufficiently difficult problem to work on allowed me to get a feel for what research entails and helped me realize that I would greatly enjoy going to graduate school. The summer research program also increased my confidence in my ability as a computer scientist, and the fact that I was successful at it encouraged me to take up some challenging projects during the folloing academic year.

If not for REU, I might be doing physics right now! It's hard to tell these things, but I think it was more responsible for teaching me to find my own answers than any other part of my education. In addition, it offers a chance to work for a longer time on a larger project than is really possible in a class setting. If I ever end up teaching computer science, I hope to make REU a part of the department's program.

My experience in the Hope College REU in computer science encouraged and validated my pursuit of the BA in computer science that I did achieve in 2000.

I enjoyed the challenge of continuing and expanding the work of a previous student researcher within a collaborative and sharing environment. The ability to make headway on a project while learning a new language or two is one that I enjoyed developing. Although my graduate studies focused on math rather than computer science, the two disciplines can frequently meet and it is those meetings I enjoy most.

The REU program at Hope gave me the opportunity to see if graduate school and a career in research would be right for me.

Suggestions

more work on preparing students for the advanced GRE in computer science

More independence in choosing a topic and seeing the paper through to publication. In subsequent projects these were the two most challenging areas.

be sure to keep the gre review dont let it get too big -- the personal contact is wonderful i feel like i could have used some experience in gathering background research, but not too much to take away from doing my own stuff. im talking about stuff like how/where to find related papers, etc maybe a basic unix commands tutorial would be good for some people who are unfamiliar dont be afraid to take people from random, unknown schools (like sewanee)

More advisor involvement.

More seminars with outside professionals in the computer field would have been great.

GRE & Presentation seminars are the best part of this summer research program, in my opinion. It will be even better, if we can have a few seminars about conducting scientific research (in the field of CS) and composing scientific report/paper.

none.

Looking back, I wish I had worked harder on my papers -- they are really the most important aspect of the research process.

No ideas; sorry.

If the Department has not already, Hope College should form partnerships with specialized research institutes associated with other learning institutions (for example, the Institute for Creative Technologies at USC) and exchange students through the summer research program, to permit broader exposure to varied fields of study. Along those lines, Hope College should consider either soliciting matching funds from industry or co-sponsoring research efforts with industry as part of the summer research program.

There are a lot of things I wish I'd done differently about my college career as a whole, but I can't think of anything that should change about the REU program as I knew it.

It would be good to bring in a few alumni of the program who are in graduate school to

present their research and talk about life as a graduate student.

- Our group presented our research at a conference, which I missed, unfortunately. But I think it would have been a good experience to go to another school during that next fall and show what we had done.
- The building could be air conditioned a little less... :)

I had attended an REU program at the University of Massachusetts (CIIR) the following summer. I felt that there was more interaction between the students because we were all from different locations. 1-2 from UMass, and then the rest scattered from the Eastern US. We also had a few days of social bonding when we arrived before we started our projects. This helped to increase inter-personal communication greatly. Also, by having students from all different schools, we had a peer network to fall back upon once we were done working for the day. We found ourselves hanging out every night and on the weekends. I felt that this type of atmosphere was lacking at Hope because I was one of 2 people who were not from Hope. The native Hope students had their routine and friends during the summer, making it more difficult for us to establish an out-of-work relationship with them.

I think the Hope College Summer Research Program is wonderful, and I hope that it may continue so that other students may have the opportunity to participate in it!

More pizza! Just kidding. Well, no, I'm not. I seem to recall that perhaps some of the summer research participants actually submitted papers for publication in various journals or conferences, but I don't think that my group did. If I have one suggestion for improving the program, it would be to encourage (perhaps even require) all participants to submit the results of their work for publication in a scholarly journal or conference. Writing a paper or journal article for peer review is one of the best ways of forcing oneself to look critically at one's own work, and to focus the aims and goals of the research in a clearly demonstrable way. And it's a great confidence booster if the paper/article actually gets accepted!

Since the program was over a year ago, I don't remember everything that went on. I do think that more organized activities would have been fun. Also, more resources would have been helpful - I remember that Don struggled last year with trying to find information about wireless and had to end up going to B&N to find what he needed. I'm not sure how that can be improved upon, though.

Try to draw from a greater geographic area. Collaborating with students and faculty from outside Hope College and Michigan is important for networking in the field, information sharing, and diverse ideas.

I wish I could think of something, but I can't--it was excellent.

- Make the experience more like real graduate school, if possible...for example:
 1. Include more direct teaching of how to read research papers and do literature surveys. This is an essential skill for continued research and graduate school. Maybe this can be done with a weekly reading group on the subject that the research project is in.
 2. Include/encourage study groups for the CS subject GRE exam.

3. In addition to the faculty directed projects, encourage each student to come up with a small individual project of their choosing that would be relevant, fit the time they have and would be interesting. Since many graduate courses involve choosing your own project in the subject area, this is a critical skill to learn and understand what project is feasible, yet interesting for the time you have allotted.

4. A workshop on grant or fellowship writing would be helpful, as this is needed later (often soon after graduation, if someone is applying for a graduate fellowship).

5. A paper-writing seminar - how to write papers and get them published would also be helpful.

- Hold group gatherings with all NSF-REU students at Hope. It seemed that the Peale students (biological sciences) had their own world. With more research becoming cross-discipline, maybe there are areas of research collaboration that could be fostered by crossing the divide between Peale and Van Zoeren. I think it would be very valuable to have gatherings (social, presentations, etc.) for all NSF-REU participants.

- Holding some collaborative gatherings with other CS NSF-REU participants at other universities (U of M, Mich State?) would also be helpful to get the large college vs. small college idea. Maybe arrange to do practice runs of research presentations to each other part-way through the summer.

- Involve potential participants or Seniors headed to grad school in the grant-submission process for NSF. This could be a great learning experience and might generate some new and original research ideas.

I don't know... find a way to make it last another week or two, maybe?

* It would be nice to tell the students a little bit about the process of research at the beginning of the program so that they know what to expect by the end and what to pay attention to.

* At the end of the program students tend to start doing software development rather than research. It would be good if professors helped them keep focused, for example by encouraging them to read more advanced papers concerning their work.

I loved it exactly as it was.

None. It was a good experience, both as an academic pursuit and as a taste of computer science outside the normal classroom experience.

Proposal Information

Proposal Number **0353566**
Proposal Title **REU Site: An Undergraduate Research Participation Program in Computer Science**
Received on **09/12/03**
Principal Investigator **Herbert Dershem**
Institution **Hope College**

This Proposal has been Electronically Signed by the Authorized Organizational Representative (AOR).

Program Information

NSF Division **Division of Computer and Network Systems**
Program Name **RSCH EXPER FOR UNDERGRAD SITES**
Program Officer **Lawrence Burton**
Telephone **(703) 292-8950**
E-Mail **lburton@nsf.gov**

Proposal Status

Status As of Today Dated: **03/11/04**

A program recommendation for award was concurred with by the cognizant Division/Directorate on **03/11/04**. However, no award is ensured and the recommended duration is **12 months** with an effective date of **04/01/04** are subject to change. The grantee institution assumes any pre-award costs at its own risk. NSF may request additional information.

Award Duration: (months)

Reviews

All of the reviews of your proposal that have been released to you by your NSF program officer can viewed below.

Please note that the Sponsored Research Office (or equivalent) at your organization is NOT given the capability to view your reviews.

Click the button to view the review text.

Document	Release Date
Panel Summary #1	Feb 12 2004 4:26PM
Review #1	Feb 12 2004 4:26PM
Review #2	Feb 12 2004 4:26PM
Review #3	Feb 12 2004 4:26PM

If you would like further information about the evaluation of your proposal, please contact Lawrence Burton or Harriet Taylor, Division of Computer and Network Systems, CISE Directorate, by e-mail at reu.cise@nsf.gov or by telephone at (703) 292-8980.

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Review #1

PROPOSAL NO.: 0353566

INSTITUTION: Hope College

NSF PROGRAM: RSCH EXPR FOR UNDERGRAD SITES

PRINCIPAL INVESTIGATOR: Dershem, Herbert L

TITLE: REU Site: An Undergraduate Research Participation Program in Computer Science

RATING: Multiple Rating: (Excellent/Very Good)

REVIEW:

What is the intellectual merit of the proposed activity?

I particularly like the small size of the research. This can be critical in students who are starting out in research. In many cases the closeness with faculty can help students when they meet the inevitable "bump in the road."

What are the broader impacts of the proposed activity?

There are set asides for minorities and woman, which mean some impact on a field without many of either group. This could eventually impact the number and the directions of these groups.

Summary Statement

I think the smallness of the group and scope of this project makes it an excellent candidate for approval in teaching and supporting researchers in this area.

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Review #3

PROPOSAL NO.: 0353566

INSTITUTION: Hope College

NSF PROGRAM: RSCH EXPR FOR UNDERGRAD SITES

PRINCIPAL INVESTIGATOR: Dershem, Herbert L

TITLE: REU Site: An Undergraduate Research Participation Program in Computer Science

RATING:Excellent

REVIEW:

What is the intellectual merit of the proposed activity?

The proposal is to support eight students, at least four of whom will not be from Hope, for each of five summers in a 10-week program. The students will work in teams supervised by four faculty mentors on projects related to the mentors' research. The research topics are in the areas of bioinformatics, algorithms, wireless networks, and programming environment research.

The Hope College Summer Research Program in Computer Science under Professor Dershem has been successful in the past. The current proposal builds on past success and has been modified in small, but significant, ways based on experience. The sample projects proposed are all accessible by undergraduates, while they address important computer science questions. The 10-week length of the program allows time for meaningful work to be done. The PI and faculty mentors are qualified. The facilities and selection process are appropriate. Daily web journals will enhance communication with faculty mentors. Weekly seminars, a research plan, a revised research plan at the halfway point, and a final presentation all work together to facilitate student success.

What are the broader impacts of the proposed activity?

Meeting with alumni of the Hope Summer Research Program who are currently in graduate school will provide both motivation and information for the current participants. Visiting a graduate institution so the undergraduates can visit laboratories and talk to faculty members is also a good opportunity for the students.

Sponsoring a minority student for two summers to increase the likelihood of his or her participation and to guarantee his or her strong preparation for the second summer was a good idea. Requiring web posters, as well as papers and physical posters, aids in dissemination and provides good experience for the students. Requiring students to present their work at their home institutions encourages others to participate in research also.

Sponsoring a faculty mentor, each summer, who is not from Hope spreads knowledge of and expertise in conducting research with computer science undergraduates.

The proposal includes a thorough program evaluation plan. Conducting a survey of student attitudes before the summer program, immediately after it, and three years after it, will help determine the role of the program in motivating student interest in computer science research.

Review #4

PROPOSAL NO.: 0353566

INSTITUTION: Hope College

NSF PROGRAM: RSCH EXPR FOR UNDERGRAD SITES

PRINCIPAL INVESTIGATOR: Dershem, Herbert L

TITLE: REU Site: An Undergraduate Research Participation Program in Computer Science

RATING:Excellent

REVIEW:

What is the intellectual merit of the proposed activity?

The proposed activity is very important in advancing knowledge and understanding in this field. The research topics that are presented are timely and have the potential for significant contributions in the field. More importantly, they offer interesting and motivating research opportunities for undergraduate students. The topics are rather narrow, which is a reflection of the expertise of the faculty participants.

The faculty members who would be involved with this project are highly qualified from the perspective of past REU projects. They have been actively involved in undergraduate research for quite some time, as reflected on their biographical sketches. Perhaps one area of weakness is that most of their research is published in proceedings and not journal articles. It seems that after 12 years of working on related research projects that there would be a level of maturity to their research that would warrant publication in higher quality journals. The proposal appears to be relying on past history in terms of what works. In this regard, there appears to be relatively few innovative and creative concepts posed for motivating students. However, one of the strengths of the proposal is that the faculty team continues to build on their past successes. This is reflected by the number of student authored/coauthored publications and graduate degrees.

The major strength of the proposal is that it is based on a long history of REU projects. It appears that each step in their REU process framework is well planned and organized. There are sufficient resources and committed faculty to support the student researchers.

What are the broader impacts of the proposed activity?

The faculty team has promoted the dissemination of student research quite effectively. The number of student co-authored publications has been increasing each year. The number of student awards for outstanding research has also been increasing at a steady rate. The faculty participants have continued to disseminate their undergraduate research experiences through publications and presentations.

The proposal clearly identifies how minority students will be recruited. Past history shows a strong participation by female students. Perhaps a weakness of the proposal is that there are no female faculty proposers. In the past, only one external faculty participant was female.

The proposers do not specifically address the significance of this project from a societal perspective. One could infer from past REU projects that the benefits are great. There is clearly an outreach to female participants when the number of females in IT and CS are low. The number of students that continue with a graduate education are strong, which could also be viewed as a significant societal benefit.

Summary Statement

Review #5

PROPOSAL NO.: 0353566

INSTITUTION: Hope College

NSF PROGRAM: RSCH EXPR FOR UNDERGRAD SITES

PRINCIPAL INVESTIGATOR: Dershem, Herbert L

TITLE: REU Site: An Undergraduate Research Participation Program in Computer Science

RATING:Excellent

REVIEW:

What is the intellectual merit of the proposed activity?

Projects proposed appear to have aspects that are doable by most capable undergraduate CS students. Most will produce results that would be publishable in software engineering, empirical studies, or computer science education venues. The projects are extensions of the PIs research programs. The PIs have publication records primarily in computer science education venues. Several of the projects can have an impact on how we teach certain concepts in CS. The program has been well organized in the past and it appears it will be again. There appear to be adequate resources.

What are the broader impacts of the proposed activity?

Past programs at this institution have been successful in engaging student learning and sharing opportunities and information with sister schools in the area. The department has been successful in recruiting women at a rate higher than the usual population ratio. With minorities, it has had respectable success. In this proposal, the PI is trying to ensure the participation of at least one minority participant by reserving a space. The program has been successful in getting students to continue studies at the graduate level. Program has also encouraged participation by faculty outside the institution as mentors. Results are definitely disseminated as evidenced by the long list of publications from previous REU-sponsored programs. Many of the papers are in computer science education venues and may have an impact on CS curricula. General benefit to society is an increased number of students from underrepresented populations continuing on to graduate school in CS.

Summary Statement

Department has a track record of success in the REU program. This proposal will continue an already successful program.

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SUMMARY PROPOSAL BUDGET

YEAR 2

ORGANIZATION Hope College				FOR NSF USE ONLY				
				PROPOSAL NO.	DURATION (months)			
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				AWARD NO.				
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months				
				CAL	ACAD	SUMR	Funds Requested By proposer	Funds granted by NSF (if different)
1. Herbert L Dershem - PI				0.00	0.50	2.00	\$ 3,500	\$
2. Matthew DeJongh - Faculty Mentor				0.00	0.00	2.00	2,000	
3. Ryan L McFall				0.00	0.00	2.00	2,000	
4.								
5.								
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00	0	
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.50	6.00	7,500	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)								
1. (1) POST DOCTORAL ASSOCIATES				0.00	0.00	2.00	5,000	
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00	0	
3. (0) GRADUATE STUDENTS							0	
4. (0) UNDERGRADUATE STUDENTS							0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)							0	
6. (0) OTHER							0	
TOTAL SALARIES AND WAGES (A + B)							12,500	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)							1,750	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)							14,250	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)								
TOTAL EQUIPMENT							0	
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)							5,000	
2. FOREIGN							0	
F. PARTICIPANT SUPPORT COSTS								
1. STIPENDS \$ 16,800								
2. TRAVEL 1,000								
3. SUBSISTENCE 3,000								
4. OTHER 0								
TOTAL NUMBER OF PARTICIPANTS (4) TOTAL PARTICIPANT COSTS							20,800	
G. OTHER DIRECT COSTS								
1. MATERIALS AND SUPPLIES							880	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION							3,200	
3. CONSULTANT SERVICES							0	
4. COMPUTER SERVICES							0	
5. SUBAWARDS							0	
6. OTHER							1,000	
TOTAL OTHER DIRECT COSTS							5,080	
H. TOTAL DIRECT COSTS (A THROUGH G)							45,130	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% of student stipends (Rate: 25.0000, Base: 16800)								
TOTAL INDIRECT COSTS (F&A)							4,200	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)							49,330	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.j.)							0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)							\$ 49,330	\$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$				
PI/PI NAME Herbert L Dershem				FOR NSF USE ONLY				
ORG. REP. NAME* Tracey arndt				INDIRECT COST RATE VERIFICATION				
Date Checked		Date Of Rate Sheet		Initials - ORG				

2 *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

SUMMARY PROPOSAL BUDGET

YEAR 4

ORGANIZATION Hope College				FOR NSF USE ONLY		
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR Herbert L Dershem				PROPOSAL NO.	DURATION (months)	
				AWARD NO.	Proposed	Granted
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)						
				NSF Funded Person-months		Funds Requested By proposer
				CAL	ACAD	SUMR
1. Herbert L Dershem - PI				0.00	0.50	2.00
2. Matthew DeJongh - Faculty Mentor				0.00	0.00	2.00
3. Michael J Jipping - Faculty Mentor				0.00	0.00	2.00
4.						
5.						
6. (0) OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)				0.00	0.00	0.00
7. (3) TOTAL SENIOR PERSONNEL (1 - 6)				0.00	0.50	6.00
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (1) POST DOCTORAL ASSOCIATES				0.00	0.00	2.00
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)				0.00	0.00	0.00
3. (0) GRADUATE STUDENTS						
4. (0) UNDERGRADUATE STUDENTS						
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)						
6. (0) OTHER						
TOTAL SALARIES AND WAGES (A + B)						
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)						
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)						
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT						
E. TRAVEL 1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						
2. FOREIGN						
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS \$ 33,600						
2. TRAVEL 1,000						
3. SUBSISTENCE 3,000						
4. OTHER 0						
TOTAL NUMBER OF PARTICIPANTS (8) TOTAL PARTICIPANT COSTS						
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES						
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION						
3. CONSULTANT SERVICES						
4. COMPUTER SERVICES						
5. SUBAWARDS						
6. OTHER						
TOTAL OTHER DIRECT COSTS						
H. TOTAL DIRECT COSTS (A THROUGH G)						
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE) 25% of student stipends (Rate: 25.0000, Base: 33600)						
TOTAL INDIRECT COSTS (F&A)						
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)						
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.)						
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)						
M. COST SHARING PROPOSED LEVEL \$ 0						
AGREED LEVEL IF DIFFERENT \$						
PI/PI NAME Herbert L Dershem				FOR NSF USE ONLY		
ORG. REP. NAME* Tracey arndt				INDIRECT COST RATE VERIFICATION		
				Date Checked	Date Of Rate Sheet	Initials - ORG

SUMMARY PROPOSAL BUDGET

Cumulative

ORGANIZATION				FOR NSF USE ONLY		
Hope College				PROPOSAL NO.	DURATION (months)	
PRINCIPAL INVESTIGATOR / PROJECT DIRECTOR				AWARD NO.	Proposed	Granted
Herbert L Dershem						
A. SENIOR PERSONNEL: PI/PI, Co-PI's, Faculty and Other Senior Associates (List each separately with title, A.7. show number in brackets)				NSF Funded Person-months		Funds Requested By proposer
	CAL	ACAD	SUMR			Funds granted by NSF (if different)
1. Herbert L Dershem - PI	0.00	2.50	10.00	\$	17,500	\$
2. Matthew DeJongh - Faculty Mentor	0.00	0.00	8.00		8,000	
3. Michael J Jipping - Faculty Mentor	0.00	0.00	6.00		6,000	
4. Ryan L McFall	0.00	0.00	6.00		6,000	
5.						
6. () OTHERS (LIST INDIVIDUALLY ON BUDGET JUSTIFICATION PAGE)	0.00	0.00	0.00		0	
7. (4) TOTAL SENIOR PERSONNEL (1 - 6)	0.00	2.50	30.00		37,500	
B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS)						
1. (5) POST DOCTORAL ASSOCIATES						
2. (0) OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.)	0.00	0.00	10.00		25,000	
3. (0) GRADUATE STUDENTS	0.00	0.00	0.00		0	
4. (0) UNDERGRADUATE STUDENTS					0	
5. (0) SECRETARIAL - CLERICAL (IF CHARGED DIRECTLY)					0	
6. (0) OTHER					0	
TOTAL SALARIES AND WAGES (A + B)					62,500	
C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS)					8,750	
TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A + B + C)					71,250	
D. EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$5,000.)						
TOTAL EQUIPMENT					0	
E. TRAVEL					25,000	
1. DOMESTIC (INCL. CANADA, MEXICO AND U.S. POSSESSIONS)						
2. FOREIGN					0	
F. PARTICIPANT SUPPORT COSTS						
1. STIPENDS	\$	168,000				
2. TRAVEL		5,000				
3. SUBSISTENCE		15,000				
4. OTHER		0				
TOTAL NUMBER OF PARTICIPANTS (40)				TOTAL PARTICIPANT COSTS	188,000	
G. OTHER DIRECT COSTS						
1. MATERIALS AND SUPPLIES					5,000	
2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION					16,000	
3. CONSULTANT SERVICES					0	
4. COMPUTER SERVICES					0	
5. SUBAWARDS					0	
6. OTHER					5,000	
TOTAL OTHER DIRECT COSTS					26,000	
H. TOTAL DIRECT COSTS (A THROUGH G)					310,250	
I. INDIRECT COSTS (F&A)(SPECIFY RATE AND BASE)						
TOTAL INDIRECT COSTS (F&A)					42,000	
J. TOTAL DIRECT AND INDIRECT COSTS (H + I)					352,250	
K. RESIDUAL FUNDS (IF FOR FURTHER SUPPORT OF CURRENT PROJECTS SEE GPG II.C.6.J.)					0	
L. AMOUNT OF THIS REQUEST (J) OR (J MINUS K)					\$ 352,250	\$
M. COST SHARING PROPOSED LEVEL \$ 0				AGREED LEVEL IF DIFFERENT \$		
PI/PI NAME				FOR NSF USE ONLY		
Herbert L Dershem				INDIRECT COST RATE VERIFICATION		
ORG. REP. NAME*				Date Checked	Date Of Rate Sheet	Initials - ORG
Tracey arndt						

C *ELECTRONIC SIGNATURES REQUIRED FOR REVISED BUDGET

F3. Participant Subsistence

One half of the student housing is provided by Hope College. The total cost of housing is approximately \$500 for the ten weeks. The amount budgeted is \$250 per student per week for a total of \$2,000.

Each week there will be a group meal provided. This is budgeted at \$100 per meal for a total of \$1,000.

G1. Materials and Supplies

Supplies include copying, software, books, and poster supplies needed for recruiting and research projects.

G2. Publication Costs/Documentation/Dissemination

This will provide support for student travel to and participation in conferences where they will present their research. This is budgeted at \$400 per student.

G6. Other

Visit to graduate school: \$500

Stipend for communication skills workshop leaders: \$300

Travel expenses for visit of former Hope REU participants: \$200

I. Indirect costs

25% of student stipends

Institutional Commitment

Hope College will provide one-half of the cost of each student's housing for the summer. This is a total commitment of \$2,000 each summer.

Hope College will provide each student participant with exclusive access to one workstation in the department lab for the ten-week period along with full access to the departmental network.

Hope College will provide all student participants with full access to campus library and recreational facilities for the ten-week period.

From: Tracey Arndt <arndt@hope.edu>
To: bultmanj@hope.edu, dershem@hope.edu, gentile@hope.edu, jipping@hope.edu,
kraay@hope.edu
Cc: mervau@hope.edu
Subject: FWD: Award Id : 0353566, PI: Dershem
Date: Mon, 12 Apr 2004 10:59:34 -0400

Congratulations Herb!

Tracey

>===== Original Message From bmannion@nsf.gov =====
Award Date:
Award No.
Proposal No.

April 2, 2004
CNS-0353566
CNS-0353566

Dr. James E. Bultman
President
Hope College
35 E. 12th Street
Science Center, Room 2000
Holland, MI 49423-9000

Dear Dr. Bultman:

The National Science Foundation hereby awards a grant of \$91,570 to Hope College for support of the project described in the proposal referenced above as modified by revised budget dated March 1, 2004.

This project, entitled "REU Site: An Undergraduate Research Participation Program in Computer Science," is under the direction of Herbert L. Dershem.

This award is effective April 1, 2004 and expires March 31, 2005.

This is a continuing grant which has been approved on scientific / technical merit for approximately 5 years. Contingent on the availability of funds and the scientific progress of the project, NSF expects to continue support at approximately the following level:

FY 2005	\$49,330
FY 2006	\$70,450
FY 2007	\$70,450
FY 2008	\$70,450

This grant is awarded pursuant to the authority of the National Science Foundation Act of 1950, as amended (42 U.S.C. 1861-75) and is subject to NSF Grant General Conditions (GC-1), dated 07/02.

The attached budget indicates the amounts, by categories, on which NSF has based its support.

The cognizant NSF program official for this grant is Lawrence Burton, (703) 292-8950. The cognizant NSF grants official contact is Andrea R. Kline, (703) 292-8212.

Sincerely,

Brian J. Mannion

FWD: Award Id : 0353566, PI: Dershem

Grants and Agreements Officer

CFDA No. 47.070
arndt@hope.edu

FWD: Award Id : 0353566, PI: Dershem

SUMMARY PROPOSAL BUDGET

CNS-0353566
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Person MOS	cal	acad	sumr	Funds granted By NSF
A. (3.00) Total Senior personnel	0.00	0.50	6.00	\$7,500
B. Other Personnel				
1. (1.00) Post Doctoral associates	0.00	0.00	2.00	\$5,000
2. (0.00) Other professionals	0.00	0.00	0.00	\$0
3. (0.00) Graduate students				\$0
4. (0.00) Secretarial-clerical				\$0
5. (0.00) Undergraduate students				\$0
6. (0.00) Other				\$0
Total salaries and wages (A+B)				\$12,500
C. Fringe benefits (if charged as direct cost)				\$1,750
Total salaries wages and fringes (A+B+C)				\$14,250
D. Total permanent equipment				\$0
E. Travel				
1. Domestic				\$5,000
2. Foreign				\$0
F. Total participant support costs				\$54,400
G. Other direct costs				
1. Materials and supplies				\$1,120
2. Publication costs/page charges				\$3,200
3. Consultant services				\$0
4. Computer (ADPE) services				\$0
5. Subcontracts				\$0
6. Other				\$1,000
Total other direct costs				\$5,320
H. Total direct costs (A through G)				\$78,970
I. Total indirect costs				\$12,600
J. Total direct and indirect costs (H+I)				\$91,570
K. Residual funds / Small business fee				
1. Residual funds (if for further support of current projects GPM 252 and 253)				\$0
2. Small business fee				\$0
L. Amount of this request (J) or (J-K1+K2)				\$91,570
M. Cost sharing				\$0

Assistant to the Dean of Natural Sciences
 Federal Grants Coordinator
 Hope College
 35 E. 12th St, SC 2000
 Holland, MI 49423
 616-395-7316
 616-395-7923 fax
 arndt@hope.edu