IGEM

An Investment in Idaho's Future
2012-2013 Year-End Report

BOISE STATE UNIVERSITY

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2012-2013 Annual Report

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IGEM – An Investment in Idaho's Future

Computer Science at Boise State University

2012-2013 Year-End Report

Project Summary:

The Idaho Global Entrepreneurial Mission (IGEM) and State Board of Education Higher Education Research Council (HERC) have provided three years of funding to expand and restructure the Boise State University Computer Science Department to help meet compelling state economic development, research, and workforce needs. The five-year Idaho Strategic Research Plan for Higher Education identifies Information Management and Software Development as a strategic research area that has tremendous potential to drive future economic growth within the state. Responding to this need, Boise State identified the expansion of the Computer Science Department as an institutional priority.

Task Performance Summaries:

The project plan identified three primary strategies to achieve this goal:

1) *Hiring Faculty;*
2) *Tighter Industry Integration;*
3) *Enhancing the Student Pipeline*.

Progress to date toward implementing these strategies is detailed in this report.

Strategy One: Hiring Faculty - IGEM funding provides support for Boise State to recruit four additional tenure/tenure track faculty members to the Computer Science Department. Software engineering is an area that is extremely important to local industry and was one of the two areas of faculty recruitment identified in the Boise State IGEM proposal. The other area identified was databases. To date, the Computer Science Department has recruited four new faculty members (one full professor, one associate professor, one assistant professor and one clinical faculty) – Dianxiang Xu, Vijay Dialani, Elena Sherman and Jim Conrad. Three of the new faculty are in the area of software engineering while one is in the area of databases. These new faculty demonstrate a commitment to excellence in teaching, a desire to make significant contributions in research, and an interest in collaborating with faculty and local industry to develop and sustain high-profile funded research programs.

Jim Conrad

Jim Conrad earned his PhD in computer science from the University of Idaho in 2010. He also earned a MS in computer science from University of Idaho and a BS in Electrical Engineering from the University of Missouri, Rolla. Jim has more than 25 years of industry experience,

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including 7 years as a senior software design engineer at Hewlett Packard (HP) and 9 years as the research & development manager for HP.

In addition to his extensive industry experience, Jim has a broad range of academic experience, including senior systems analyst at Missouri University of Science and Technology. Jim has also taught for Boise State University as an adjunct since 2004.

Jim's industry experience and contacts at HP fill a critical need for the program in piloting an undergraduate senior capstone design course where teams of 3 to 4 Computer Science seniors will work on industry-sponsored projects. Jim was hired as a visiting lecturer for the 2012-13 academic year and will become a clinical faculty starting in fall of 2013. Additional information on Jim Conrad can be found in his attached CV.

Elena Sherman

Elena Sherman joined the department in January 2013. She received her PhD Thesis in Computer Science from the University of Nebraska at Lincoln (UNL) in December 2012. She earned a MS in Computer Science from UNL in August 2008, and a MS in Astronomy from Moscow State University, the top university in Russia, in January of 2000. Elena's area of expertise is Software Engineering and she comes from an extremely strong research group at UNL.

Elena has two high-quality conference publications in her field. She was involved in writing a successful competitive NASA research grant. Elena has experience teaching at UNL and received excellent teaching reviews. She also has experience as a teaching assistant and has supervised undergraduate students on a CREW funded research project. In addition, Elena has experience working in industry at both Google and NASA.

Her specific area of expertise in software analysis and testing within software engineering will be a good addition to the program curriculum at Boise State University. Additional information on Elena Sherman can be found in her attached CV.

Vijay Dialani

Dr. Vijay Dialani is a new faculty in the Computer Science department starting in fall of 2013. Before joining Boise State, Dr. Dialani was an applied researcher in the Search Sciences group at eBay Inc, where he developed machine-learning models for query rewrites for the eBay Search Engine. Broadly, Vijay works in the fields of Databases, Data mining and Information Extraction and his work has been cited over 400 times. He has over 10 years of experience in the field and has previously held senior research fellow positions at GE Research, Microsoft and IBM Research. His projects deal with processing, management, and archiving of large-scale data and its real time applications. He is known for his work on transparent fault tolerance for web services and his work is the most cited paper in the field. He has been the founding member of the INFOD and DAIS working groups at Global Grid Forum, where he helped develop standards for database services. Dr. Dialani received his PhD in computer science in 2005 from University of Southampton in UK. His CV is attached.

Dianxiang Xu

Dr. Dianxiang Xu received the B.S., M.S., and Ph.D. degrees in computer science from Nanjing University, China. He will join the department starting in fall of 2013. Prior to joining Boise State

University, he was an associate professor of computer science and information assurance at Dakota State University, South Dakota. He was an assistant professor of computer science at North Dakota State University from July 2003 to May 2009, research assistant professor of computer science at Texas A&M University from August 2000 to July 2003, and research associate at Florida International University from May 1999 to August 2000. Before he came to the US in 1999, he was an associate professor and associate department chair of the Department of Computer Science and Technology at Nanjing University. Dr. Xu's research interests include software engineering, software security and safety, software testing, and applied formal methods. He has published more than 100 papers in international journals and conference proceedings, including prestigious venues such as IEEE Transactions on Software Engineering and IEEE Transactions on Dependable and Secure Computing. His work has been funded by NSF, NIH, NASA, and industry. Over the past five years, he is PI or co-PI of six NSF grants. His automated software testing tool MISTA has been adopted by industry. He was the major advisor of more than 20 graduate students, including several Ph.D. graduates who are now tenured/tenure-track professors. Dr. Xu has been serving on the program committee of several international conferences. He is a senior member of the IEEE. Please see his attached CV for more details.

Ads were placed in ACM, IEEE and Computing Research Association job announcements with 173 applications received. The search committee reviewed this strong, diverse group and narrowed down the pool to nine top candidates for on campus interviews which were held in the spring semester of 2013. The focus of the search was in the sub-areas of software engineering and databases, as these sub-areas are critically important for our industrial partners in Idaho. We expect that these new areas will quickly build research programs that will result in a positive economic impact in the region. These new faculty members will lead to an increase in computer science research as well as bring expertise that will help prepare our students for careers in software engineering.

Strategy Two: Tighter Industry Integration - The Computer Science Department has always enjoyed strong ties with the software industry in Idaho. As the faculty and student body grow, it is important to maintain and expand these relationships to members of the community. One effort to meet this strategy has been to expand the Industrial Advisory Board for the Computer Science Department chaired by Jay Larsen, President of the Idaho Technology Council. This board will provide direct feedback from industry to the department. The board has met twice in the last year and has determined to focus on retention, program scalability, and curriculum. Teams have been formed to provide advice and suggestions in these areas and they are actively working on recommendations to the department.

A second effort to increase industry integration has been the creation of a senior capstone design class, COMPSCI 481. This class, taught by Jim Conrad (see above bio), engages students in a fast-paced software development team project with industry partners, applying knowledge acquired throughout the undergraduate Computer Science curriculum (see detailed course description at http://cs.boisestate.edu/~jconrad/cs481/). This two semester project will provide a "real world" project-based environment to the students and aid in their transition from the classroom to a career in industry. Jim Conrad and Amit Jain met with several

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companies during spring semester of 2013 to discuss potential senior capstone projects. These meeting and subsequent follow ups have led to a good set of projects that will be used in the coming year with support from the respective companies.

 A primary outcome of the IGEM effort is to increase funded research activity and technology transfer in collaboration with industry partners. To achieve this goal, the new faculty hires will increase the research capacity of the department and existing faculty members. While the impact of new hires on research productivity is clearly not available at this time, the following shows the research output of the existing faculty. For the time period of this grant, a total of twenty proposals were written and submitted to various institutions. From these submissions, six have been awarded (including the IGEM proposal), six are pending, and eight were not awarded. The following table shows the current pending proposals.

Pending Proposals 7/1/2012 – 5/31/2012				
Faculty	PI/co-PI	Title	Agency	Amount
Andersen, Tim	co-PI	Creation of Models and Drug Screening Methods for Neurological Disorders	NIH	$422,757
Uh, Gang-Ryung	PI	Hazards SEES Type 2: Cam-N-Sense: A Wireless Camera and Sensor Network for Early Wildfire Detection and Monitoring in the Mountain West	NSF	$488,644
Joshi, Alark	PI	Novel Visualization Techniques for Effective Representation of Wireless Data	Idaho Commerce	$218,611
Joshi, Alark	PI	Investigate Integration of OpenCV and IntelliScience Feature Identification to Support On-the-Fly Feature Identification & Algorithm Selection	Idaho Commerce	$192,629
Joshi, Alark Andersen, Tim Jain, Amit Nadelson, Louis Yeh, Jyh-haw	PI	CS 10K: IDoCode: A Sustainable Model for Computer Science in Idaho High Schools	NSF	$992,068
Joshi, Alark Uh, Gang-Ryung	co-PI co-PI	BP: Young Idaho Programming Experiences (YIPEs)	NSF	$599,925

The following proposals were awarded to Computer Science faculty members, totaling $817,677. Note that two of the proposals were awarded in the last week of June in 2012 and were included here as well.

Proposals Awarded 7/1/2012 – 5/31/2012				
Faculty	PI/co-PI	Title	Agency	Amount
Andersen, Tim	co-PI	MRI: Acquisition of a GPU-accelerated High	NSF	$555,384

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		Performance Computing and Visualization Cluster		
Joshi, Alark	PI	Context Providing Techniques for Visualization of Scientific Simulations	DOE	$ 20,000
Joshi, Alark	PI	Development of a Mobile Application for Early Literacy and Early Numeracy	Lee Pesky Learning Center	$ 3,744
Joshi, Alark	co-PI	Badges for Personalized Learning in Science Using 3D GameLab	MacArthur Foundation	$150,000
Uh, Gang-Ryung	PI	Preprocessing for Modulo Scheduling within Open Source ARM Cortex-A8 Compiler	Google Research	$ 37,400
Uh, Gang-Ryung	PI	Development of Virtual Sensor Terminal Environment that Assists Personalized Mobile Application Development	Moneual INC	$ 51,149

Strategy Three: Enhancing the Student Pipeline - The third strategy of the IGEM proposal is to focus on the student pipeline to attract, retain, and graduate a larger number of high-quality students. The Computer Science curriculum in the primary, lower-division courses is challenging, resulting in retention issues. One strategy to improve retention is to allow students more time to absorb the material. The core sequence of COMPSCI 125, 225 and 342 (each a four credit class) has been restructured into COMPSCI 121, 221, 321 and 421 (one four credit and the rest are three credits). The new COMPSCI 121 (Computer Science I) course will also have an associated structured laboratory component. The new courses will start in fall of 2013.

A second retention strategy was to develop a Computer Science Tutoring Center that will employ graduate-level teaching assistants (TAs) to aid undergraduate students in a one-on-one instructional environment. To date, the department has hired nine graduate students who provide tutoring services (50% effort) and aid the faculty with grading.

The tutoring center is housed in a newly remodeled 1200 ft^2 room in the Engineering Building, ENGR 111. The center was constructed over the fall semester and became operational in January of 2013. This new facility has been designed to encourage collaboration and provide access for up to 30 students at a time. As mentioned above, graduate teaching assistants will provide one-on-one instruction to students on a drop-in basis. Using seven TAs allowed for the tutoring center to be available approximately 70 hours per week. The tutoring center was a hit in the spring semester with a strong positive feedback from the freshmen and sophomores that primarily used the facility. It is also in use for summer classes.

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Figure 1: Computer Science Tutoring Center

Demonstrated Economic Development

A new relationship has been developed between the **Boise Angel Alliance** and the Computer Science Department with faculty member Amit Jain as liaison. In this arrangement, the department faculty with relevant experience/knowledge will help the Angel Alliance with evaluating startups for funding. Amit Jain evaluated one startup company this year.

As previously mentioned, external funding is trending upwards with a total of $817,677 thus far this year with an additional $2,914,634 pending. With the addition of new faculty this year, this will continue to grow.

Future Plans

Work will continue on the planned tasks while focusing on mentoring the new hires for the department. Plans are underway to step up the department's involvement with industry including continued outreach to local companies for the senior design projects as well as research and development projects. A pilot version of the senior design project was run this year but next year will be the first full offering. The department is also reaching out to industry to offer specialized advanced courses in fall of 2013 that include Mobile App Development (by the CTO of Z Studio Labs, a local software company) and Web Development (by a senior software engineer from Keynetics). Discussions are also under way to offer a software entrepreneurship course in the spring of 2014.

Commercialization   **Report**
There is no commercialization revenue to report at this time.

Expenditure Report

The table below reflects the modified budget approved earlier this year. Expenditures below don't include some of the costs that will incur during this summer.

Category	Salary	Tuition	Fringe	Recruiting	Total
Faculty	$262,199.84	–	$81,646.18	-	$343,846.02
Graduate Students	$97,936.21	$38,670.00	$1,533.79	-	$138,140.00
Staff	$43,201.09	-	$16,880.68	-	$60,081.77
Other Expenses	-	-	-	$11,093.52	$11,093.52
Total					$552,161.31

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