The GMI™ LAB

by
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This report outlines the contribution of the GMI lab for last three years, and future projections for next three year based on the recently approved EAS Policy: EAS-FAC-0008 which specifies the following criteria (i) ICR generating grants, number and quality of external research grants, (ii) Student research training as it pertains to thesis, projects which include GMI Portfolio credit hours generated, and (iii) Instruction.

The GMI Lab (i) has produced $28,307 which includes $22,307 as ICR generating grants. This does not include approximately $2000 funding which KidReports had approved and submitted for approval with OSP. GMI Consortium membership and EAS GEV support for CoView Data Lab totaled $6000. In addition, GMI Lab participated in NSF and DoEd proposal, with ICR, submissions worth $14.5M, and others.

GMI/CoView Data lab were featured in local Gazette UCCS initiative aims to engineering funds, businesses, and jobs (http://www.gazette.com/articles/initiative-128785-jobs-colorado.html). GMI Lab and consortium members organized three Crossover applications conference (with two articles in UCCS-Communique and reprint in Colorado Department of Education newsletter). Dr. Pamela Shockley-Zalabak, UCCS Chancellor opening the first conference in 2010 mentioned “This is exactly the thing UCCS should be involved.” Other notable research efforts supported by the GMI Lab are: (a) Recycled Braille Project; (b) GMI Consortium research partnership with local industry; (c) Free 3D Games donation based download for the Visually Impaired web-site launched -- (http://www.cs.uccs.edu/~ssemwal/poker_game_description.pdf; https://www.cu.edu/content/semwalteamingtechnologyimproveeducationblind) with games developed by UCCS student.

(ii) GMI Lab supported student research training for 20-25 students. See attached list of students which include PhD-CS, MSCS, MSCS-GMI students, and GMI Portfolios. In addition, GMI lab supports the independent studies for CS and BI-GDD undergraduate students. Four MSCS and MSCS-GMI thesis were completed in 2012. GMI Lab produced its first successful production teaming with TheatreWorks™ (Inspector General and Seagulles 2010).

(iii) GMI Lab directly supports the instruction of graduate and undergraduate students through at least 8 courses in a two-year period cycle offered by Computer Science department, and in its recent

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1 GMI is Masters of Science in Computer Science Focus Media Convergence Games and Media Integration Interdisciplinary program. Contact Dr. Semwal (ssemwal@uccs.edu) if interested.
incarnation was supported by $50,000 Intel Grant in 2002, and small EAS grants. In 2012, 41 students enrolled in classes supported by the GMI lab. This is in addition to students in (ii) above. Three significant papers and five other reviewed papers were published in refereed international conferences in Europe and US. GMI Lab supports the GMI Presents InDepth Lecture series which also added to instruction of students.

GMI Lab’s projections for next three years are included in this report as well.

The GMI™ Lab

The GMI™ Lab operating from ENG 143 has the following three main components, ordered by space usage as follows:

(a) GMI™ Graduate Teaching and instructional Lab
(b) GMI™ Research Lab
(c) UALR-UCCS CoView Data Lab™
(d) CS-Unix Instructional Lab

CS-Unix Instructional Lab, which occupies estimated twenty percent of the space in ENG 143 is maintained directly by CS department and will not be explained in this report.

Assets of the GMI™ Lab

GMI Lab has a projection system for small device such as phone, Augmented Reality eye-glasses, PHANToM force feedback device, Dual Core GPU Process, magnetic motion tracker, 8 chamber aroma device, and several PCs, Old SGI system and 1 Mac system. Some of these systems, magnetic trackers and SGI systems are offline at this time due to space limitation and age.

(a) GMI™ Graduate Teaching and Instruction Lab: Intel donation $50,000 (2002)

The GMI Lab directly supports all instructional needs the Masters of Science in Computer Science: Focus GMI Program (MSCS – GMI). The Graphics Lab, operating from ENG 140, and the VR lab, operating from ENG 143, has been in existence in Computer Science department since 1987, and 1991 respectively. These two labs were supporting the instructional need for all courses in the area of graphics and VR within the Computer Science Department and the Masters of Engineering program in Media Convergence, Games and Media Integration (now MSCS – GMI). A grant of $50,000 Intel donation in 2002 upgraded the equipment. In Spring 2011, Dr. Wiener consolidated these two labs in one in ENG 143. With partnership with UALR and support by Dean Dan Dandapani, and Joe Swaty, CoView Data Lab began its work in Summer 2011.

The GMI Lab today directly supports the instruction of the following courses:

- Introduction to Graphics (CS4800/5800);
- Advanced Computer Graphics (CS5810);
- Geometric Modeling (CS5760);
- Computational Geometry (CS5750);
- Animation and Visualization (CS5770);
- HCI and VR (CS6770).
- Wearable computing and complex systems (CS5790)
- 3D Games and Digital Contents Creation (CS5780).
- Design and Analysis of Algorithms (CS4720/5720).
- All CS 7020 (GMI Portfolio); MS CS Thesis and Projects.

In 2012, following courses were taught:

CS 4780/5780 (9 students); CS 6770 (4 students); CS 4720/5720 (15 students); CS 2060 (10 students); CS5720/4720 (56 students); CS 4800/5800 (23 students). Total enrollment 117 over six courses with 18-20 students per class. GMI Lab supported 46 out of 117 students in 2012, and the PhD/MS thesis and portfolios as indicated below.

Current List of 18 MS/PhD thesis Students supported by the GMI Lab:

Following is the 2012 list:

Following students have asked for being their thesis/graduate advisor (2013):

In addition: Mike Bolei, Bill Fitzpatrick, Ryan Thomas, Kaila Smith, Chris Guthrie completed their independent study in 2012.

Following student graduated in 2012: Bill Fitzpatrick (GMI); Tim Ploey (MS CS); Mounika Numburu (MSCS); Andrea Brunner (MSCS)

(b) GMI Research Lab

ICR Generating Grants:

2. UCCS-DMNS (Denver Museum Dome Project) ($12,000) (2009). CS/GMI
students work with Denver Museum’s vPresent openSource software in their dome environment.

ICR Generating Grant which was not signed

3. UCCS-KidReports project approved by KidsReports Company, Colorado Springs, was submitted with completed paperwork to Office of Sponsored Research but ultimately not signed, as company felt contract signing took too long. ($2000).

Grants (not generating ICR) but providing direct funding for the GMI Lab

1. CoView Data Lab™ with University of Arkansas, Little Rock (UALR), Private Donations raised by GEV Enterpreneural Activities support by EAS Dean Dr. Dan Danapani funding ($5000) with a total funding for UCCS-UALR Universities for a total of ($10,000). Two students (Bill Fitzpatrick, and James Caban-Tomski) were supported Summer 2011. CoView Data Lab™ interaction was covered by local newspaper (Gazette telegraph: http://www.gazette.com/articles/initiative-128785-jobs-colorado.html).

2. Consulting on ISLET Project with ACGE, ONR, Sep 2010-June 2012, 1/6th Consulting and student support estimated at $30,000 with ACGE on ISLET (Integrated System for Language Education and Training) through ONR. ISLET was an $8.4 Million ONR funded project which was awarded to ACGE and ended in 2011. The student support estimated at project supported a GMI student Nick Sterling (approximately 20 hrs/wk, $40/hr between June 2010-August 2011. ISLET project manager Mr. Tony Beld, hired the student, after seeing a demo in the GMI Lab.

3. GMI Consortium receiving $1000 membership donation from D-Soft technology (2012) for 2013 Silver Membership.

$10.5M NSF Proposals with ICR budget submitted (not funded) over last three years.

<table>
<thead>
<tr>
<th>Code</th>
<th>Proposal Title</th>
<th>ICR Amount</th>
<th>Funder</th>
<th>Project Period</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIS</td>
<td>SoCs: Social-Computation System to Deter Bullying and Novel Contents Creation for the Visually Impaired and the Blind Community (2012)</td>
<td>$249,511</td>
<td>NSF</td>
<td></td>
<td>Declined</td>
</tr>
<tr>
<td>DGE</td>
<td>NSF Graduate STEM fellows: Crossover Applications Research for the Visually Impaired and the Blind Students in K-12 Education in Colorado (2011)</td>
<td>$2.5M</td>
<td>NSF</td>
<td></td>
<td>Declined</td>
</tr>
<tr>
<td>CBET</td>
<td>Mobile Concierge with Beads-Interface for the Blind and Visually Impaired (2010)</td>
<td>$356,015</td>
<td>NSF</td>
<td></td>
<td>Declined</td>
</tr>
</tbody>
</table>

$4.12M Department of Education (DoEd 2012) proposal with ICR budget (not funded): 2012
1. Four Corners Research and Rehabilitation Center (FCRRC) for the Visually Impaired and the Blind, Department of Education, $4.12M budget (2012).

PRESS/INTERNET/NEWSPAPER COVERAGE

-- Crossover Applications Conference, May 14, 2011 Coverage:
https://www.cu.edu/content/semwalteamingtechnologyimproveeducationblind

-- Colorado Department of Education: Dr. Tanni L Anthony, PhD and Ms. Bonnie Snyder:

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CoView Data Labs UCCS Initiative aims to Engineer Funds: November 19, 2011:
http://www.gazette.com/articles/initiative-128785-jobs-colorado.html
Also, CoView Data Labs™ mentioned in Tech News:

GMI LAB PARTNERS WITH THEATREWORKSTM EXHIBIT – Inspector General and The Seagull – FIRST TIME COLLABORATION

March 2011: GMI program portfolio exhibit will start along with the showing of two great Russian plays this spring at Bon Vivant Theater in Colorado Springs, celebrating Maslenitsa, the melting of the snows -- The Inspector General by Nicolai Gogol and The Seagull by Anton Chekhov. The team of -- Nicholas Sterling, Mike Bolei, Professor SK Semwal, Prof Kevin Landis, and Murray Ross -- have been planning it since last semester. The exhibit will be set in the lobby of TheatreWorks, and will use five screens to show the google maps of the series of events in the life of Nicolai Gogol and Anton Chekhov’s life. (Semwal’s eMail excerpt).

GMI LAB PUBLICATION LIST (SINCE 2009-2012)

4. Mike Bolei and Sudhanshu Kumar Semwal, “Evolving patterns of human interactions, pp. 1-6, accepted for publication at The 2-12 International Conference on Collaboration


Dr. Pamela Shockley-Zalabak, UCCS Chancellor opening the first conference in 2010 stated “This is exactly the thing UCCS should be involved.” Since then there have been three such symposiums here at UCCS. EAS Dean Dr. Dandapani was present during the opening ceremony for all three symposiyms. Dr. Tani Anthony, state consultant for the blind/low vision who is an international expert, followed the Chancellor with her suggestion that a global partnership is necessary. Lou Tutt, Executive Director of AER (Association for Education and Rehabilitation of the Blind and Visually Impaired) who was the Director of Colorado School of the Blind and Visually Impaired until April 2011, suggested that how technology can help the Blind and the visually impaired.
Dr. Gary Bishop, Professor, University of North Carolina joined as a keynote speaker. Everyone in the audience felt that his tarheel reader and his work was amazing. Pedro Milliet followed from Sao Paulo Brazil with an interesting discussion on Braille text books being published by Neville Foundation.

Five tracks were simultaneously presented with volunteers leading a small group of attendees to different tracks. Track 1 was organized by Dr. Thiene and Jim Olson on low vision options. Track 2 was presented by Ron McEwan on Mac VoiceOver keystrokes and iPhone.

Mike Bolei presented haptic game, Keith Johnson presented a virtual environment with aroma, haptics, sound and graphics showing solving 3D matching game. Barbara Traecy presented a haptic memory game and Bonnie Snyder presented her surprise package - mobile phone applications.

During lunch the 2nd GMI Crossover applications awards were awarded. Dr. Richard Doyle and Dr. Trajan Boughan were awarded our first GMI award for his volunteer-work to help a student in one of the mechanical engineering class in Spring 2011.

Nick Sterling and Mike Bolei were the recipients of GMI awards for first GMI movie with TheatreWorks™ which premiered in Spring 2011 at TheatreWork’s Anton Chekov’s Seagull Lands and Nikolai Gogul’s inspector General.
Figure 2: Dr. Richard Doyle (left) and Dr. Baughan (Figure 2right, third from left) receiving award Drs. Dandapani and Semwal. Dr. TMike Bolei receives award. Photo Credit: Joe Swaty.

Colarao Department of Education, 3DSoft (David Hollenbach, silver level support), MagniSight, BeyodSight, CSDB, The GMI Program, UCCS, Disability Services Office, UCCS, and Engineering and Applied Science (EAS, gold-level support) UCCS.

Figure 3: 1st GMI Crossover Applications 2010 attendees –May 15, 2010.
GMI LAB PLAN FOR NEXT THREE YEARS: Jan 2013- Dec 2015

1. MANUSCRIPTS under preparation

Following research papers are under preparation and will be submitted for publications:

- Aesthetic Emergence in Synesthetic Sculptures with Adrian Johnson Manuscript under preparation.
- Dome Displays and Vpresent with Nick Steling, Jonathan Metzgar et al.
- Interactive haptic mesh sculpting with Rudolpho Ortiz
- Memory Games for the Blind with Barbara Tracey
- Modeling Ink flow with Ben Wood
- OpenVGF: An Open Source Video Game Framework with Daron Anderson
- Target Tracking a non-linear path using Kalman predictive Algorithm with Dennis Musick et al
- Using IPhone for context aware notification with Kelly Whitcare
- "haptic objects editing" with Michael Rudolph
- Haptic medical visualization with John Magby, Mike Bolei, Karl Reinig
- Voice Recognition with Tony Beld

2. PROPOSALS WITH ICR BUDGET 2013-2015 PROJECTIONS

GMI Lab will continue its aggressive funding attempts and participate in funded proposal writing with OSP at the same level or more as last three year. GMI Lab will be engaged with Dr. Qing Yi and her group in proposal writing in common area of systems and VR/Graphics.


GMI Lab is hosting the first international crossover application conference as part of CTS 2013 conference, supported by ACM, IEEE, and IFIP. Dr. Semwal is the general Chair of the conference. Web Site for the Emergence, Presence in Crossover Applications – Media Convergence, Games and Media Integration with Focus of Visually Impaired is a reviewed conference with regular, short, poster, tutorial being presented at the conference in San Diego in May 2013, and replaced the Crossover applications symposium at UCCS.

4. GMI LAB will engage and create a Enrichment Center (Sunday 10-12noon) every week for the Blind and Visually Impaired community to engage in technology learning with family. One family a week is planned. GMI Lab will support.

5. GMI Lab will continue to support the GMI Consortium (http://www.cs.uccs.edu/~ssemwal/MICL/GMIConsortium_Info.pdf)
6. RESEARCH PARTNERSHIPS TO BE FORMED WITH LOCAL INDUSTRIES

Following are research partnerships which are expected to continue:

a) Touch of Life, interactive medical applications – GMI Lab worked with this company in the past, the company was very impressed by our work and has hired the student (Jon Magby). ToL is interested in funding, need based, research with the GMI lab.

b) DSoft partnered with us in the Department of Ed proposal in 2012. They are our first silver level industry member, and will continue their support.

c) We are planning to sign a MOU between GMI Lab and Sanborn, a world leader in mapping technology.

d) ACGE, Inc, who hired Dr. Semwal as consultant, has contacted us as recently as last week, for possible proposal writing. ACGE wrote and won $6.4 Million ONR contract and hired GMI lab student earlier.

e) Joe Swaty has left from UCCS to UALR (2012), and helped form UCCS-UALR CoView Data Lab in 2011. Dr. Edi Tuderaneu and UALR team has won a $5Million donation. GMI Lab is in contact with Joe and Edi for possible summer funding support for a student and Professor Semwal.

7. High Quality GMI Presents InDepth Lecture Series to return

High quality GMI Presents innovative series which is 6-8 week long series on the current topic of the day. These series allow students working in GMI lab to learn new topics in depth and detail which are not covered in the courses. For example, workings of Maya animation package, MEL, Unity 3D and UDK game engines had been the topics in the past (2009-2010). Information on these series is attached with this report as addendum.

8. GMI Lab Instruction and graduate student training

GMI Lab will continue to offer Graduate Instruction and Graduate thesis, project, portfolio, independent studies as outlined earlier.

Appendix

Attached pdf file for GMI Presents InDepth Lecture Series on Maya and UDK.