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HFES Student Executive Council

Haneen Saqer  Nicole Werner  Brian Taylor  Adam Emfield  Daniel Roberts  Erik Nelson  William Miller  Philip Jones
President  Vice President  Treasurer  Secretary  Webmaster  NEM Co-Chair  NEM Co-Chair  CHI  President

The Archie  -  Fall 2010
Greetings! I am honored to serve as the HFES Executive Council President for the 2010-2011 academic year. This year we welcome new faculty member Tyler Shaw Ph.D. to the department along with six new doctoral students and 16 masters students. Fall 2010 has been filled with many successful events that we hope you have been able to experience first-hand. From the beginning, the members of the executive council have exhibited great amounts of dedication by donating numerous hours to the planning and execution of our activities to date. In addition to professional development and social events, we have accomplished many of our outreach goals. We participated in the USA Science and Engineering Festival and have demonstrated the impact of distracted driving to local high school students (see page 4). The high school demonstration was well-received and has garnered interest since being highlighted in the local news. Also, the Arch Lab/HFES Student group has now joined the world of social networking (like us on Facebook - fb.com/gmuhfes, follow us on Twitter @gmuhfes, and join our LinkedIn group). Currently in the works is a Human Factors Blog that we hope will encourage any and all users of the Internet to post their favorite good and bad human factors designs - so stay tuned! This Spring will have no shortage of activities. We are bringing back the tradition of the annual ski trip and are planning a Career Fair for graduating students and those seeking summer internships. We are currently soliciting speakers for this event, so please contact me if you have any interest in participating. I also encourage any comments or suggestions regarding the HFES student group: please contact me at hsaqer@gmu.edu. Again, I can’t emphasize enough the gratitude I have for our committed Executive Council: Adam Emfield, Philip Jones, William Miller, Erik Nelson, Daniel Roberts, Brian Taylor, and Nicole Werner. Thanks again for such a wonderful job; your hard work does not go unnoticed!

Semester Highlights

Beginning of the year barbecue at Deborah Boehm-Davis’ house.

First year doctoral student Wendy Baccus with Carryl Baldwin at the beginning of the year happy hour.
The Center of Excellence in Neuroergonomics -- a multi-million dollar collaboration between GMU and The Air Force Research Laboratory (AFRL) -- was launched this year. This summer, ten GMU faculty members and students traveled to Dayton, Ohio to tour research facilities and meet with researchers from the Human Effectiveness Directorate (RH) in the 711th Human Performance Wing. The visit was the first of many meant to foster collaboration between the partnership institutions. The research focus of the labs included: information visualization, adaptive interfaces, cognitive teams, spatial audio research, multi-modal communication, and applied biotechnology. A highlight of the lab tours was a visit to the Auditory Localization Facility where faculty and students were allowed to enter the geodesic sphere which measures more than 4 meters in diameter and contains 277 Bose speakers. The speakers can present 16 sounds (either single or multiple sounds) from any location on the sphere to simulate complex real-world auditory environments. The sphere allows for the study of spatial hearing, measurement of head-related transfer and development of 3-D audio systems. The second day of the site visit included talks by GMU faculty, Drs. Parasuraman, Baldwin and DeJong describing current research efforts related to neuroergonomics, computational modeling and trust in automation. The meeting was well attended; because of lack of space in the main hall, an overflow space with closed-circuit TV had to be provided.

The formal kick-off meeting took place at GMU on September 13th and 14th and included guided lab tours and research presentations. Approximately 20 AFRL visitors toured the driving simulator, the neuroadaptive learning lab and a UAV simulation lab. Dr. Jim Thompson also gave an in-depth presentation on multi-modal neuroimaging. Subsequently, the visitors were taken for a tour of the robotics lab in the Engineering Building. The day ended with presentations by Dr. Sean Luke on the MASON simulation, an evolutionary computational modeling tool, and Dr. Bill Kennedy on the use of MASON in modeling the potential for conflict over scarce resources. The following day, seven CENTEC members from the GMU Arch Lab and GMU Krasnow Insitute presented current work to a packed audience in the Johnson theater.

CENTEC research is in full swing with ten GMU graduate students from multiple departments currently involved in various research projects. For example, HFAC Doctoral student Andre Garcia spent the summer working with AFRL researchers Benjamin Knott, Greg Funke, and Joel Warm on team vigilance. Brian Falcone and Ryan McKendrick are currently working under the supervision of Dr. Parasuraman on the effects of transcranial direct current stimulation (tDCS) on cognitive functioning and effectiveness of “emphasis change” as a training method for skill acquisition in dual tasks, respectively. Andre Garcia continues his research under the supervision of Dr. Baldwin on topics related to EEG, driving, and simulator sickness.

Also working with Dr. Baldwin, David Kidd is working on driver alarm research. Finally, William Miller and Nicole Werner are investigating interrupted task and multitasking performance under the supervision of Dr. Boehm-Davis.

In less than a year, CENTEC has resulted in multiple collaborations and innovate research in the exciting field of neuroergonomics. We look forward to the new developments. Stay tuned to future newsletters for updates!

More information regarding CENTEC can be found at centec.gmu.edu
GMU Student Chapter Highlights
Dangers of Distracted Driving

By Haneen Sager & Nicole Werner
[Reprinted from HFES Bulletin, March 2011]

Last October, the Federation of Associations in behavioral & Brain Sciences (FABBS) partnered with the George Mason University (GMU) Student Chapter to highlight the human factors profession at the USA Science and Engineering Festival. GMU Student Chapter members, with FABBS, wanted to develop a demonstration that would be interactive enough to draw a crowd while highlighting the science of human factors/ergonomics. Because the festival’s target audience was school-age children and their parents, we chose to use a simple driving simulation video game to draw in the crowd and illustrate the cognitive principles involved as well as the dangers of distracted driving.

In this simulation, children of all ages—and some parents too—sat in the simulator and drove a simple course. Once the child was comfortable with driving, a GMU student running the simulator handed him or her an actual cell phone and asked the child to text a parent to say he or she would be late coming home. Onlookers could watch from the projection screen as children attempted to take their attention away from driving and send a text message. Almost immediately, each child veered from the lane, and most of them crashed into the side wall. Judging from the reaction of the crowd, it was clear that both participants and onlookers were getting the message about the dangers of text messaging while driving. This provided GMU Student Chapter members the opportunity to explain why distracted driving is dangerous and to tie in current research in this area.

With the two-day festival attracting more than 500,000 people, the distracted-driving-demonstration was never without a crowd. Even former National Highway Traffic Safety Administration (NHTSA) Human Factors Division Chief Michael Perel took notice of our booth. Since retiring from NHTSA, Perel has been working as a volunteer with the Fairfax County Police Department to educate teen drivers about traffic safety. After seeing the success of the driving demo at the festival first-hand, he introduced the idea to the traffic safety officers in Fairfax. The officers are now including Perel and GMU Student Chapter members in their Department of Motor Vehicles education class at a large local high school. It will be a one-hour presentation focusing on distraction and attention using the driving simulator.

The experience was very rewarding for the participating GMU faculty and student volunteers. It was an opportunity to encourage young adults about science, educate them about basic Human Factors principles, and share with them the many research and professional opportunities available. It was also inspiring to be part of a historic event that included 1,500 booths of science and engineering-related sponsors. Due to the success of the first festival, another Festival is planned for Spring 2012.

Special thanks to Erik Nelson and William Miller, NEM Co-Chairs, for their efforts in making the event a huge success. Thanks also to faculty and student volunteers: Jane Barrow, Adam Emfield, Brian Falcone, Christian Gonzalez, Bill Kennedy, David Kidd, Brian Kidwell, Ryan McKendrick, Bill Miller, Erik Nelson, Stephanie Pratt, Dan Roberts, Geoffrey Robertson, Jon Strohl, Ross Thornton, and Ewart de Visser.

For more details, pictures, and video of the festival please visit: http://www.fabbs.org/fabbs-foundation/foundation-events/usa-science-and-engineering-festival/.
Celebrating 30 Years of COHSI

By Stephanie M. Pratt

On December 2nd, 2010, the Committee on Human-Systems Integration (COHSI, part of the National Research Council) held an event as a celebration of inception 30 years ago. The big news for COHSI at the event was that it has now become the Board on Human-Systems Integration (BOHSI). Raja Parasuraman (a past president of COHSI), Carryl Baldwin, Deborah Boehm-Davis (a member of BOHSI), and myself attended.

Donald Norman, of the Nielson Norman Group, was a fantastic keynote speaker. He spoke about the large gap between research and practitioners in the Human-Systems Integration field. He suggested that the problem is the difference between specialists (deep and narrow knowledge) or generalists (broad and shallow knowledge). He spoke of how there should somehow be a mixture of the two and that the practitioners generally are on the generalist side while researchers are on the specialist side. Other points he addressed was the need for better management in HSI as well as for people to stick with projects and keep them going (instead of consulting on them and stepping away from them). Overall, Donald Norman’s lecture was very thought provoking; it was a great experience to see him speak in person.

David Dinges, from the University of Pennsylvania School of Medicine, was also a dynamic keynote speaker. He spoke about potential interventions for fatigue as it relates to shift workers. He stated that people are awake more of the time and fatigue creates a lack of attention, focus, and stability. His research indicates that lack of sleep interferes with speed, not learning. Sleep loss is cumulative and people are not aware of how much it is affecting their performance. He suggested that this could lead to the development of an alert system that indicates levels of fatigue management.

The Board of Human-Systems Integration is a valuable organization comprised of many successful human factors professionals. For more information, visit http://www7.nationalaca.demies.org/dbasse/index.html

Semester Highlights

The HFES and CHI student groups co-sponsored a website building night with dinner in the new CENTEC room so all HFAC students had assistance building their sites.
Valerie Gawron Gives Students a Tour of HF Careers

By Nicole Werner and Megan Kaminski

This Fall the ARCH lab was privileged to have Valerie Gawron, Ph.D. speak to us about the myriad careers available to Human Factors professionals. Gawron currently serves as a Senior Principal Multi-Discipline Systems Engineer at MITRE’s Center for Advanced Aviation System Development. For over three decades Valerie has provided technical leadership in RDT&E of small prototype systems through large mass produced systems, fielded computer aided engineering tools to government agencies and industry, and applied the full range of evaluation tools from digital models through human-in-the-loop simulation to field operational tests for military, intelligence, and commercial systems. She has been a member of the Air Force Scientific Advisory Board and the Army Science Board and has served on the Naval Research Advisory Committee and National Research Council.

Valerie captivated the audience with stories of her experiences in Human Factors in a wide variety of settings. From conducting aviation studies in a two-nosed airplane, to developing new safety standards for vehicle restraint systems, she revealed to students the endless opportunities available. Her interactive speaking style kept audience members on their toes as she went around the room involving every member with questions throughout the presentation.

She also inspired the students, encouraging us to use our knowledge of Human Factors to make meaningful safety changes. Valerie leads by example, providing humanitarian aid by volunteering with Engineers without borders and facilitating safety changes such as in re-designing crash barriers. She also helped in the aftermath of Hurricane Katrina by using Unmanned Aerial Vehicles to locate missing children. Today she continues her humanitarian efforts in various countries around the world.

Megan Kaminski met with Valerie after the talk to find out more details:

MK: Is an MBA necessary? Who would you suggest get one?
VG: An MBA is useful if you want to be a program manager, a personnel manager, or start your own consulting firm.

MK: What is the best advice you have for graduate students?
VG: Build your networks – people, organizations, companies.

MK: Out of all the projects you have worked on in your career thus far, do you have a favorite or most memorable/rewarding one?
VG: Leading the largest analysis of suicide data ever – over 43 million medical records and almost half a million personnel records.
Semester Highlights

A captivated audience at the new student orientation.

HFES student group receives the Silver Award for the 2009 year.

New Student Corner
The Arch Lab Welcomes the New Students of 2010!

Wendy Baccus (Doctoral Student)
Wendy attended George Mason University where she obtained a B.A. in Psychology in 2010. As an undergraduate she worked with Dr. James Thompson in the Perception and Action Neuroscience Group (PANG) where she completed an honors project investigating the influence of visual perception, recognition, and physical practice on motor learning. Wendy is continuing her research with Dr. James Thompson, focusing on using fMRI and EEG, to examine action perception, motor learning, and the integration of form and motion with respect to biological motion.

Will Benson (Masters Student)
Will attended SUNY Oneonta where he obtained a B.S. in Psychology. As an undergraduate he worked with Dr. Doreen Comerford-Roman on the filled distance effect in relation to GPS navigational displays used by aircraft pilots. Will is currently doing research with Dr. Debbie Boehm-Davis on data communications, party line loss, and trajectory based operations.
<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
<th>Institution</th>
<th>Years</th>
<th>Research Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thomas Connolly</td>
<td>Masters Student</td>
<td>Rensselaer Polytechnic Institute</td>
<td>2009</td>
<td>Measures of Semantic Relatedness in predicting human behavior</td>
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<tr>
<td>Jesse Eisert</td>
<td>Doctoral Student</td>
<td>Penn State Erie, The Behrend College</td>
<td>2009</td>
<td>Effects of cell phone use on driving performance</td>
</tr>
<tr>
<td>Brian Falcone</td>
<td>Doctoral Student</td>
<td>New Mexico State University</td>
<td>2010</td>
<td>BCI (Brain Computer Interface)</td>
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<tr>
<td>Christian Gonzalez</td>
<td>Masters Student</td>
<td>University of Central Florida</td>
<td></td>
<td>Pilot spatial disorientation in visually impoverished environments</td>
</tr>
<tr>
<td>Thomas Connolly</td>
<td>Masters Student</td>
<td>Rensselaer Polytechnic Institute</td>
<td>May 2009</td>
<td>Measures of Semantic Relatedness in predicting human behavior</td>
</tr>
</tbody>
</table>
Thomas Huggins (Masters Student)
Thomas attended Auburn University where he obtained a B.A. in Psychology. As an undergraduate he worked with Dr. Ana Franco-Watkins where he researched how individual differences in working memory effect explicit and implicit awareness of strategy allocation when learning a predetermined hierarchical system. Thomas is currently working with Dr. Boehm-Davis researching usability of flight deck systems and the implementation of NextGen technology into Air Traffic Management systems, as well as increasing usability in Human-Computer/Human Machine interactions.

Brian Kidwell (Masters Student)
Brian attended the University of Illinois Urbana-Champaign where he obtained a B.S. in Aviation Human Factors in 2008. After graduation, he worked as an airplane flight instructor. Brian is currently working with Dr. Raja Parasuraman on researching automation; he also has interests in aviation human factors and vigilance.

Bridget Lewis (Masters Student)
Bridget attended Virginia Tech where she obtained a B.S. in Psychology. She is currently volunteering with Dr. Carryl Baldwin researching distracted driving.

Ryan McKendrick (Doctoral Student)
Ryan attended Rutgers University where he obtained a B.A. in Psychology, a B.A. in Philosophy and a minor in Cognitive Science in 2009. As an undergraduate he worked with Dr. Zenon Pylyshyn researching visual attention, leading to a thesis on Illusory Contours and Multiple Object Tracking. He also researched demonstrative reference and distributed representations with Dr. Jerry Fodor leading to a thesis chronicling the Connectionist vs. Classicalist debate within Cognitive Science. As a post-bachelorette Ryan worked with Dr. Nick Turk-Browne at Princeton University, researching Statistical Summary Representations with visual Psychophysics and the neuro-anatomical correlates of Statistical Learning with fMRI. Currently Ryan is working with Dr. Raja Parasuraman researching working memory, mental resource allocation, cognitive training, team cognition, neuroergonomics, and cognitive neurogenetics.
New Student Corner
The Arch Lab Welcomes the New Students of 2010!

William D. Miller, Jr. (Doctoral Student)

William attended the University of Dayton where he obtained a B.S. in Psychology in 2010. As an undergraduate he researched overconfidence, synesthesia, and visual attention. Since 2008 he has also worked at the Air Force Research Lab. Bill is currently working with Dr. Debbie Boehm-Davis and Dr. Jim Thompson on multitasking, interruptions, brain-computer interface, adaptive aiding and workload.

Masoud Mortazavi (Masters Student)

Masoud attended George Mason University where he obtained a B.S. in Psychology. As an undergraduate he studied virtual spatial cognition with Dr. Maria Kozhevnikov. Mason is currently studying working memory using a financial task simulation based on ACT-R.

Jaris Oshiro (Masters Student)

Jaris attended Willamette University where he obtained a B.A. in Psychology. As an undergraduate he researched Terror Management Theory, psycho-physical numbing, synaesthesia, visual working memory, change detection and inattentitional blindness. After this he worked as an Assistant Project Director for SMS Marketing and Research Inc. Jaris is currently working with Dr. Jim Thompson and Dr. Raja Parasuraman using fMRI to investigate spatial memory, spatial navigation, working memory, and attention.

Stephanie M. Pratt (Masters Student)

Stephanie attended Hollins University where she obtained a B.A. in Psychology and a minor in Economics in 2009. She wrote an Honors Thesis titled “Effect of writer gender and typeface used in a personal statement on interpersonal ratings” as well as a paper on the effects of age and facial maturity on interpersonal perceptions. She is currently working at Aptima, Inc. as a Cognitive Systems Engineering Intern. Stephanie also volunteers in Dr. Carryl Baldwin's lab working with driving simulators. Her research interests are usability, human computer interaction, and decision making.
Allie Sleeman (Masters Student)

Allie attended Mary Washington University where she obtained a B.S. in Psychology in 2010. As an undergraduate her research focused on the effects of mood on cognitive processes. Currently Allie is volunteering with Dr. Carryl Baldwin, again researching the effects of mood on cognitive processes.

Jonathan Strohl (Masters Student)

Jonathan attended the University of Dayton where he obtained a B.A. in psychology with a minor in business administration in 2006. As an undergraduate he worked with Dr. Susan Davis researching implicit and explicit memory, overconfidence and self-efficacy, and aesthetic preferences based on the golden ratio. As a post-bachelorette he worked in direct-care of teens with behavioral and mental health issues. Jon is currently working with Dr. Pam Greenwood and Dr. Raja Parasuraman researching on cognitive aging. Specifically he is investigating the influence of genotype on cognitive changes in older populations and the potential for cognitive training as an intervention for those at risk for developing dementia/Alzheimer's disease. In addition to cognitive assessment he is also using DTI to measure white-matter integrity and connectivity. Jon is also assisting Dr. Maren Strenziok using fMRI to research spatial working memory.

Michael Ross Thornton (Masters Student)

Michael attended Flagler College where he obtained a B.A. in Psychology. He is currently working with Debbie Boehm-Davis on the FAA's NextGen project, specifically with Distance Education and also Data Comm. He is also working with Greg Trafton on procedural error prediction, and hopes to do cognitive modeling in the future.
A Review of Halo HUD Designs

By Brian Falcone

Video game entertainment is currently a booming industry and one in which human factors research plays a major role. What makes a game great goes far beyond whether it uses cutting-edge graphics or has an engrossing story line. If the game has a confusing or clunky interface, players will quickly become frustrated and lose interest. Some of the greatest games in the past were created on a low budget, and were presented in below average graphics. However, these games were loved by fans because it is the quality of game play that really matters. Production companies realize this, and look for experts to design their games and make adjustments to optimize the player’s gaming experience. Halo - a popular first-person shooter video game released by Bungie Studios - is one such series.

The HUD contributed to the success of the Halo series, which now has four releases. The following is a comparison of the HUDs used in the original Halo: CE to the most recent release, Halo: Reach, and how human factors has played a role in its evolution.

Overview
Although the original HUD design from Halo: CE was efficient and had some positive characteristics, the new design is far superior. Designers made the elements of the new HUD more salient by increasing the luminance and size, as well as outlining each display with a fine bright outline. One might argue that this would increase the chances of cognitive tunneling on displays, but the in-game action is so visually demanding that this is not an issue.

Radar
The radar, located in the bottom left, allows the player to see when enemies or allies are present, relative to their own location. This increases the player’s situational awareness and reduces the amount of time that the player would have to spend surveying the area manually. The new radar is outlined to increase salience, and dot representations of enemies and allies are more to scale, which allows for more precise estimations of the enemy location. The decreased size of the dots also allows for the accurate display of multiple enemies and eliminated the issue of overlapping dots, allowing for a more accurate count of enemies.

Shield Energy Bar and Health Bar
The most important displays of the HUD are the health

Halo: Combat Evolved Display

Halo is a prime example of how human factors concepts are being used in the video game world today. The first title, Halo: Combat Evolved (CE), was met with great success because it had a smooth and uncomplicated interface. A key to the success of this interface was its use of a heads-up display (HUD) which provides the player with all of the situational information needed. This enables optimal situational awareness within the first-person perspective virtual environment while reducing effort. First person shooter games like Halo can cause a heavy cognitive workload because of the large amount of object tracking and spatial working memory involved. An efficient HUD can help reduce the cognitive workload and make it easier for both expert and non-expert players to more easily handle the multi-tasking involved in these types of games.
and energy bars. Previously located on the top right of the screen, these were moved to the center to increase visibility by requiring less eye movement. Additionally, the two bars are nested within each other, integrating the two types of information into one display for simultaneous viewing.

Halo: Reach Display

**Weapons**
In the first version of Halo, available ammunition was represented by dashmarks on the top left of the screen. This allows the player to observe the rate of depletion of the ammunition in their peripheral vision as opposed to having to fixate on a number representation of clips remaining. The new design includes graphical representations of the primary and secondary weapons available, so that the secondary weapon did not need to be stored in working memory.

**Grenades**
The new grenade symbols were made larger and brighter in the new design. Additionally, both the type and quantity of grenade available were presented in the same display. The previous design only showed the count for one grenade type at a time, relying on the user’s memory for the other grenade. Another modification was to make the position of the symbol for the selected grenade type nearer to the aim reticule than the non-selected grenade type symbol. This was done to reduce the distance of eye movements allowing the player to keep their eyes on the reticule.

**Additions**
Two additional displays were added to the Reach HUD that were not in any of the previous Halo titles.

*Compass* – A compass was added to the top of the screen to assist in team communication. This allows teammates to be able to reference the location of enemies or objectives relative to their own positions.

*Location Callouts* – Located just to the right of the radar is the callout name for a particular location referring to areas within the map. This allows players to quickly relay information to teammates via headsets. This is important considering there are four people communicating to each other through one channel.
Six faculty and staff members along with 18 current students traveled to beautiful San Francisco to attend the 54th Annual Meeting. This year the HFES student group was able to fund the conference registration fees for six students for a total of $900. The Arch Lab was well-represented in attendance and in presentations. Additionally, Arch Lab faculty participated in several interesting discussion panels including a panel on the future of human factors education by Dr. Deborah Boehm-Davis, and a panel on the basic versus applied research dilemma which included Dr. Raja Parasuraman.

Captain Chesley B. “Sully” Sullenberger presented the key note address on the opening day of the conference. Captain Sully played a transcript of the events immediately after US Airways Flight 1549 hit a large flock of birds, disabling both engines. Sully and his copilot acted swiftly to safely land the aircraft on the Hudson River, saving the lives of the crew and 150 passengers. In his speech, Sully recounted the key role that his crew-resource management training played in those critical moments.

A fun and fruitful addition to this year’s annual meeting was a joint networking happy hour put on by the Healthcare and Product Design technical groups. The happy hour was crowded with attendees interested in fostering the integral relationship between human factors in healthcare and product design. The students that attended were able to network with professionals in these areas of expertise and took away important career pointers. The happy hour was such a success that a larger one is currently being planned for next year’s meeting.

The annual alumni dinner was a success this year. So many alumni showed up to reminisce and meet the new students that our group of 50 almost didn’t fit into the tiny (but delicious) Italian restaurant in San Francisco’s North Beach neighborhood.

We are already looking forward to next year’s meeting in Las Vegas and hope to see you all there!


of sensor modeling perception experiments. SPIE Defense, Security, and Sensing.


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**Patents**


Arch Lab Awardees


Yi-Fang Tsai: Secretary's Transportation Safety Award, National Distracted Driving Initiative Team

Semester Highlights

Tyler Shaw and Chris Monk at the Alumni Dinner in San Francisco.

Tyler Shaw and Carryl Baldwin discuss what to order at the orientation Happy Hour.

Raja Parasuraman and HFAC alumni moving and grooving after the alumni dinner.

Your contributions help us continue to improve the Psychology program at George Mason University. If you would like to make a financial contribution, visit http://supportingmason.gmu.edu. Be sure to specify either Psychology Department or Psychology Scholarships! Thank you for your generosity.

For information about Alumni Affairs go to: http://www.gmu.edu/alumni. Be sure to keep your information up to date.