

# Access Computing

## NEWS

from the Alliance for Access to Computing Careers

Increasing opportunities in computing for people with disabilities

January 2017

### Teaching Accessibility

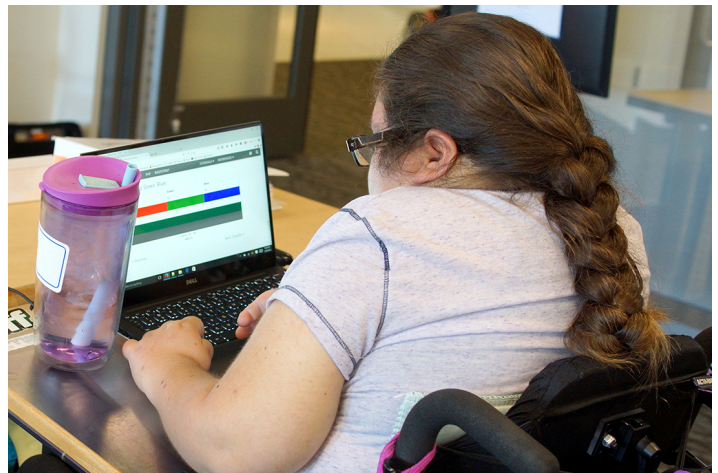
By Richard Ladner, *AccessComputing* PI

*AccessComputing* started a new initiative last year to integrate relevant disability, accessibility, and universal design content into computing courses to increase knowledge and skills among future computing professionals. This will lead to a workforce that is aware of and more capable of addressing accessibility barriers. As part of this effort Andy Ko and Richard Ladner published a paper titled “*AccessComputing* Promotes Teaching Accessibility” in *ACM Inroads* magazine ([dl.acm.org/citation.cfm?id=2968453](http://dl.acm.org/citation.cfm?id=2968453)), a major venue for publishing computer science education practice articles. The article showcases why teaching accessibility is important for today’s students in computing fields. A major argument is the demand for computing professionals with knowledge of technologies that support access for people with disabilities, as documented by the Teach Access initiative ([teachaccess.org/](http://teachaccess.org/)).

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### Engage in *AccessComputing*

#### Students with disabilities

- Internships
- E-mentoring
- *AccessComputing* Team

#### Educators & employers

- Host an intern
- Communities of practice
- E-mentoring
- Presentations
- Minigrants

When more citizens have access to computing opportunities, and when computing fields are enhanced by the perspectives of people with disabilities, we all benefit.

Find more information about these opportunities as well as videos, publications, and other resources on the *AccessComputing* website, [www.uw.edu/accesscomputing](http://www.uw.edu/accesscomputing).

The article then goes on to give examples of strategies to include accessibility and disability topics in courses, either as part of a lecture, an entire lecture, or an entire course. There are already capstone courses that focus on accessibility at MIT, Stanford, Duke, and University of Washington (UW). The article closes with the description of how accessibility was integrated into a web design and development class in the Information School at the UW.

The article “Best Practices for Teaching Accessibility in University Classrooms: Cultivating Awareness, Understanding, and Appreciation for Diverse Users.” by Cynthia Putnam, et al. was published in *ACM Transactions* in May 2016. The article presents a qualitative study of practice teaching accessibility at the university level. The study is based on interviews with 18 practitioners who included accessibility topics in their courses.

At the ACM Special Interest Group on Computer Science Education (SIGCSE) Conference that will be held in Seattle, March 8-11, 2017, Richard Ladner and Matt May from Adobe Corporation will be presenting a special session titled “Teaching Accessibility.” A major part of the special session will present content about accessibility that can be included in many courses that stress application and/or web development.



*Learning about accessibility in computing courses leads to the creation of more accessible products.*

## **AccessComputing Industry Partners**

By Brianna Blaser, *AccessComputing* Staff

*AccessComputing* Industry Partners ([www.uw.edu/accesscomputing/about/industry-partners](http://www.uw.edu/accesscomputing/about/industry-partners)) are companies that are working to make the technical workplace more welcoming and accessible to computing professionals with disabilities. This past fall, we welcomed two new Industry Partners: Microsoft and Lawrence Livermore National Labs. We look forward to our partnership.

In early 2017, we will launch a resume database populated with resumes of computing students and recent graduates with disabilities. *AccessComputing* Industry Partners will be able to access the database to help recruit interns and employees with disabilities. For more information about the Industry Partners or the resume database, email [accesscomp@uw.edu](mailto:accesscomp@uw.edu).

## **Join AccessComputing at SIGCSE**

By Brianna Blaser, *AccessComputing* Staff

The Association for Computing Machinery’s Special Interest Group on Computer Science Education (SIGCSE) will hold its annual conference in Seattle this year on March 8-11. We’re hoping to see many of our partners and friends out here for the meeting and hope you will join us at sessions we’re involved with.

## **Making K-12 Computer Science Accessible Presymposium Session**

Date/Time: March 8, 8:30 a.m. – 5:00 p.m. The cost is free, and attendees can request reimbursement for one hotel night. Register online at [catalyst.uw.edu/webq/survey/blaser/316570](http://catalyst.uw.edu/webq/survey/blaser/316570).

## **Teaching Accessibility Special Session**

Date: March 9, 1:45 - 3:00 p.m.

## **Quorum Programming Language Demo**

Date/Time: TBA

## **Access to Computing Education for Students with Disabilities Birds of a Feather**

Date/Time: TBA

## Team Member Profile: Matthew



I am in my final year of the accelerated BS/MS dual degree program in Computer Science at Rochester Institute of Technology (RIT). I will graduate with a master's degree in computer science in May 2017.

Last summer I worked with Dr. Raja Kushalnagar on a project that attempts to explore the idea of “closed interpreting,” which is similar to closed captioning, but displays an interpreter instead of English text. Such a system could be used to enhance deaf and hard of hearing individuals’ understanding of online videos. This would be especially useful and applicable for online learning, where professors upload videos of their lectures. These lecture videos often are not completely accessible to deaf students. The aim of this project would be to improve accessibility and to give deaf and hard of hearing students an equal opportunity to succeed.

For my project, I created a webpage that displayed the lecture video and an interpreter video alongside it, which could be toggled on and off. I created three different versions: 1) the interpreter video was static and remained next to the lecture video; 2) the interpreter video moves along with the information in the lecture video to help the viewer more easily switch their gaze between the interpreter and the lecture materials; 3) the viewer could adjust and move the interpreter video at their discretion. We recruited deaf and hard of hearing participants from the Rochester, NY area to take part in the experiment and answer survey questions. Eye-tracking data was taken during the experiments to see if it supported the conclusions reached from reviewing the surveys.

My work experience during the last two summers was part of the Research Experience for Undergraduates program in Accessible Multimodal Interfaces (REU AMI). I found out about this opportunity in 2015, from a friend who was in software engineering. I was accepted and participated in the AMI REU during the summer of 2015, which is when I started working on this project. Thanks to *AccessComputing*, I was given funding to continue my work through the summer of 2016.

I submitted my work to the 18th International ACM (Association for Computing Machinery) SIGACCESS (Special Interest Group on Accessible Computing) Conference on Computers and Accessibility (ASSETS 2016), and was accepted to the ACM Student Research Competition (SRC) portion of the conference. I flew to Reno, NV in October 2016 to present my project. My presentation won first place in the undergraduate SRC division.

I absolutely enjoyed working for the REU AMI during the past two summers. It was a great and enriching experience. The work environment was very friendly, accessible, and diverse. Many of my co-workers were deaf or hard of hearing and were fluent in sign language. We also had hearing coworkers, who were all friendly and open to learning about Deaf culture. The AMI site is located at RIT in Rochester, which is an area with a very high deaf population. The REU AMI was my first experience working in the field of human-centered computing (HCC). I learned a lot about HCC and how to recruit and work with participants. Additionally, the program provided me with valuable research experience, which will bolster my applications to Ph.D. programs. I plan to enter a doctorate program, in either computer science or human-centered computing, within the next one or two years.



## December 2016 *AccessComputing* Capacity Building Institute (CBI)

By Kayla Brown, *AccessComputing* Staff

In December 2016 *AccessComputing* held a Capacity Building Institute (CBI) with a focus on making classes, departments, and organizations more welcoming and accessible to students with disabilities and encouraging educators to include accessibility in the computing curriculum. This CBI was a hands-on, project-oriented workshop, where participants created resources to be used in their own classes and shared widely.

Attendees included computing faculty members and graduate students, computing students and professionals with disabilities, disability services professionals, and industry professionals from across the country. Sessions shared information on broader subjects such as accommodations and universal design, IT accessibility, and the experiences of individuals with disabilities; presentations also shared specific outreach activities, strategies for making courses welcoming, and methods for teaching accessibility.

The CBI also facilitated a space for discussion among participants. Through discussing topics such as challenges in increasing the participation of students with disabilities in computing and strategies to increase accessibility content in computing curriculum, participants were able to make tangible plans they can implement at their own institutions. To learn more, view the proceedings when they are released at [www.uw.edu/accesscomputing/resources/capacity-building-institutes](http://www.uw.edu/accesscomputing/resources/capacity-building-institutes).



*Attendees go over discussion questions at the AccessComputing CBI.*



*Jeff Bigham and Carol Frieze pose with Richard Ladner after receiving their Capacity Building Awards.*

## **AccessComputing Capacity Building Award Presented to Two Partners at Carnegie Mellon University**

By Brianna Blaser, *AccessComputing* Staff

Jeff Bigham and Carol Frieze, both of Carnegie Mellon University (CMU) were the recipients of the 2016 *AccessComputing* Capacity Building Awards. Capacity Building Award recipients are collaborators who have forged pathways that significantly advance students with disabilities in computing fields. Through their work and accomplishments, award recipients have changed the way the world views people with disabilities and their potential to succeed in challenging computing careers and activities.

Jeff Bigham is an Associate Professor in the School of Computer Science at CMU. He received the Capacity Building Award for his work engaging students with disabilities in accessibility research and outreach activities. Jeff has hosted multiple *AccessComputing* research interns in the accessibility research that his lab conducts. He has also led computing activities for students at National Federation of the Blind conferences.

Carol Frieze is the Director of Women@SCS and SCS4ALL at CMU. She received the Capacity Building Award for her working making broadening participation programs welcoming and accessible to students with disabilities. Carol has made efforts to include students with disabilities in existing computing outreach activities and expanded efforts to offer workshops and activities for students with disabilities. This fall, Carol planned a Capacity Building Institute at CMU that addressed current and future resources for CMU faculty, staff and students with disabilities and showcased some of the amazing research going on at CMU in the disability arena.

### **Award for AccessComputing Student**

By Brianna Blaser, *AccessComputing* Staff



*AccessComputing* Team Member Kartik was awarded one of the 2016 Queen's Young Leaders Award from Queen Elizabeth. "The Queen's Young Leader Award recognises and celebrates exceptional people aged

18-29 from across the Commonwealth, who are taking the lead in their communities and using their skills to transform lives."

Kartik, a senior at Stanford University majoring in computer science, is interested in artificial intelligence and human computer interaction. He's held a variety of internships including internships with both IBM Research and Microsoft Research. He also co-founded *NextBillion.org*, an organization that connects people with disabilities with industry leaders, who can support them professionally with the goal of improving diversity and accessibility in the global community. Congratulations, Kartik!

### **Capacity Building for Accessibility @ Carnegie Mellon University**

By Carol Frieze, *AccessComputing* Partner

On November 3rd we ran a capacity building workshop at Carnegie Mellon University ([scs4all.cs.cmu.edu/access/](http://scs4all.cs.cmu.edu/access/)). The workshop was sponsored by *AccessComputing*, CMU's Equal Opportunity Services and the School of Computer Science. The goals of this first of its kind workshop for CMU were to increase awareness of current resources for faculty, staff and students with disabilities; look for ways to improve; hear personal perspectives and experiences and recommendations; and showcase cutting edge accessibility related research going on at CMU. The full day workshop was open to faculty, staff and graduate students.

We were delighted to have Dr. Richard Ladner as our keynote speaker. Following Richard's inspiring talk—in which he stressed the need to move from access to access and inclusion—he announced the 2016 *AccessComputing* Capacity Building Awards. To everyone's surprise, they were given to Jeff Bigham and Carol Frieze, both from the School of Computer Science.

We also heard from CMU's Digital Accessibility Committee who discussed the school's work on legal compliance related to accessibility along with current accessibility resources. One of the highlights of the day was the "Perspectives from the Ground" panel, which featured four CMU-affiliated people with disabilities, who discussed and answered questions about their personal experiences. This group, along with the faculty moderator (who also has a disability), stayed throughout the day and contributed to a particularly engaging open floor discussion. It was, as one participant pointed out, essential and enlightening to have the "voices of people with disabilities."



*Using accessible teaching practices makes students with disabilities feel welcomed in computing classes.*

The afternoon was a showcase of accessibility research going on in CMU's School of Computer Science. The talks ranged from "Assistive Wheelchair-Mounted Robot Arms" to a "Cognitive Navigation Assistant for People with Visual Impairments or Blindness." A recent development at CMU has been our campus-wide Bias Busters program, which aims to promote awareness and discussion on unconscious bias. We are fortunate to have an expert in this field among our faculty; in a talk titled Exploring Individual and Community-Level Approaches for Mitigating Unconscious Bias, he discussed how unconscious bias relate to people with disabilities.

The workshop concluded with several lab tours. People left with a commitment to take one specific step towards increasing accessibility and inclusion in their work. The commitments included focusing "more on universal design", "making sure our website meets accessibility rules," "talking to my class about accessibility," and working "to expand the definition of diversity for my peers." Workshop participants also left with a greater sense of community and many commented on how they planned to keep in touch and work together and "continue the conversation." According to one participant, one of the best moments of the day was when someone asked for suggestions for "micro-inclusions," encouraging us all to leave thinking more about ways to improve our behaviors.

## **Designing an Accessible Online Learning Course**

By Sheryl Burgstahler, *AccessComputing* Co-PI

Online courses offer learning opportunities for everyone. Well, maybe not *everyone*.

Some classes inadvertently preclude the participation of students with disabilities. For example, if course videos are not captioned, students who are deaf cannot access the content presented in them. English language learners also benefit from captions on videos. Students who are blind use screen reader technology to read text presented on the screen. However, if a PDF is simply a scanned image, the screen reader cannot read aloud the text because it is embedded in the image. Similarly, students who have dyslexia or other disabilities that impact their ability to read the printed word, use screen reader technology so that they can view the printed word and hear it spoken at the same time; they too are blocked from using content in inaccessible PDFs. There are many assistive technologies that make it possible for students who cannot operate the keyboard because of a physical disability; these technologies do not always fully emulate the mouse. In these cases, users of these assistive technologies cannot access content unless it can be reached using the keyboard alone. These are only a few examples of access challenges faced by potential students, including students with disabilities.

The typical approach to making a course accessible to a specific student with a disability is to offer accommodations. Common accommodations made in online learning courses include captioning videos and accessible PDFs. However, universal design (UD), defined as the "the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design" (Ron Mace, Center for Universal Design), can create more accessible learning environments. UD advocates multiple ways for students to



interact, as well as to gain and demonstrate knowledge and skills. Universal designs are welcoming, accessible, and usable.

There are multiple sources of information about accessible design for online learning—many are presented on the AccessDL website ([www.uw.edu/doit/accessdl](http://www.uw.edu/doit/accessdl)) sponsored by the DO-IT (Disabilities, Opportunities, Internetworking and Technology) Center at the University of Washington. Included is a document, 20 Tips For Teaching an Accessible Online Course ([www.uw.edu/doit/20-tips-teaching-accessible-online-course](http://www.uw.edu/doit/20-tips-teaching-accessible-online-course)), which helps online instructors get started in making courses inclusive of all students. This brochure covers accessibility related to IT, course content, and instructional methods. Some suggestions are easy to implement, like offering a clear syllabus with all class expectations, while others may require additional support, such as captioning videos.

Instructors do not need to implement all UD features at once; they can gradually improve their course design as they learn more about how a course can be made inclusive. The payoff is that more students will feel welcome in their course and instructional strategies and IT used in the course will be more usable to a broader audience.



*Universal design in online learning provides equal opportunities for all students.*

## Joining the *AccessComputing* Staff

By Kayla Brown, *AccessComputing* Staff



My name is Kayla Brown, and I am excited to join the *AccessComputing* staff. I graduated from the University of Washington with a master in social work degree and am passionate about working with students with disabilities and promoting equity in higher education.

For *AccessComputing* I will be working with students one-on-one and assessing what they need to be successful in computing-related fields and organizing activities for computing educators. I believe that the work we are doing is essential to making computing programs and careers more inclusive and diverse.

### Team Member Profile: Josh

I am currently enrolled at the University of Rochester working towards my bachelor of science in computer science. This summer, I participated in a DREU (Distributed Research Experience for Undergraduates) internship at Carnegie Mellon University (CMU). For my project, I created video game prototypes that could be live streamed online, on platforms like Twitch. Viewers could not only watch the game, but also interact and play along. The goal of my research was to determine the level of agency a viewer felt they had in different gaming aspects. My main goal was to create these different game environments for viewers and players to have a brand new experience in gaming at the same time.

I found out about the internship through an email that was sent to the *AccessComputing* team list, and *AccessComputing* connected me with my summer mentor, Jeff Bigham. I had an amazing time with my overall experience.



*Josh*

I was allowed to pick my project and really choose the way I wanted to go. Jeff helped and guided me as needed and put me in contact with many other helpful assistants along the way. All the REU students at CMU met weekly to learn about Master and PhD programs, which really helped me think about what I wanted to do in the future. Finally, along with the great learning experience, I made great friends that will last a lifetime.

My project started out just as a simple experiment to see if gaming could involve both the player and viewer in a single game. I used Twitch Plays, which allows viewers to play along with a computer. I thought it would be fun to try this out, but with a live player instead of the computer. We first created a simple timed maze that involved interactions of players and viewers.

We then raised it to a higher level and had a player play against artificial intelligence (AI) in a racer and shooter game mode while the viewers could be helpers, hurters, both, or gods. We inspected how the different modes in each game made the viewers feel and we made note of the results.

I learned so many new skills during my internship. I learned C++ and Lua in more depth. I created single level gaming prototypes that I hope will become the future of gaming. I worked on Lumberyard, a new gaming engine owned by Amazon. They worked with me throughout the summer—it was a great experience and opportunity to network.

I had a great experience working at Carnegie Mellon in the DREU. This internship has taught me many skills for many career options. It is something I thoroughly enjoyed and would recommend for anyone interested in higher education or just trying to find out what is best for them.

### **About AccessComputing**

Led by the Department of Computer Science & Engineering, the information school, and DO-IT (Disabilities, Opportunities, Internetworking, and Technology) at UW, *AccessComputing* is supported by the NSF (Grant #CNS-0540615, CNS-0837508, CNS-1042260, CNS-1539179). Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the NSF. For further information, to be placed on the mailing list, request materials in an alternate format, or to make suggestions for project publications or web pages, contact us:

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