Sharif Mohammad Shahnewaz Ferdous

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Research Interest

My research in Human-Computer Interaction focuses on the design, implementation, and evaluation of accessible Virtual and Augmented reality systems. I am also interested in Game Development and Interactive Computer Graphics.

Education

Ph.D. in Computer Science *Aug. 2013 – Jun. 2018 (Anticipated)*
University of Texas at San Antonio (GPA: 4.00)

B.Sc. in Computer Science and Engineering *Jan. 2006 – Jan. 2011*
Bangladesh University of Engineering and Technology (GPA: 3.53)

Research Experiences

Research Assistant *Aug. 2014 – Present*
SAVE Lab, University of Texas at San Antonio

Investigate reason for postural instability in Virtual Reality

- Developed a virtual reality system where different visual component of virtual reality (e.g., resolution, field of view, frame-rate, and size of the virtual environment) can be controlled using *Unity 5*, *HTC Vive*, *Wii Balance Board*, and *BTS FREEEMG 300* muscle activity measurement system
- Conducted a study with healthy participants and participants with Multiple Sclerosis (MS) to investigate the effect of different visual components on postural stability

Improving postural stability of people with Multiple Sclerosis in Virtual and Augmented Reality

- Developed a game - "Dodge Ball"using *Unity 5*, *Kinect SDK*, and*Nintendo Wii Fit*
- Deployed the game in *Oculus* and conducted a virtual reality study with healthy participants and participants with MS and proposed a solution to improve postural stability that uses additional visual cues
- Deployed the game in *HoloLens* and conducted an augmented reality study with same participants with MS and successfully used same additional visual cues to improve postural stability in augmented reality

Understanding Cybersickness of people with Multiple Sclerosis

- Developed a virtual reality game "Driving Simulator"using *Unity 4* that run on *Oculus*
- Conducted a study with healthy participants and participants with MS where we used *electroencephalography (EEG)* to measure brain activity and discovered healthy participants perceive cybersickness differently than participants with MS

Use scaling to facilitate training for people with Parkinson's Disease

- Developed a virtual reality game "Water Balloon Smash"to investigate effect of scaling in virtual environment on people's reach and postural stability using *Unity 5*, *HTC Vive*, *Wii Balance Board*, and *BTS FREEEMG 300*

Teaching Experiences

Lead Instructor
Jun. 2016 – Jul. 2016

iD Tech Programming Academy

Courses: C++, Java, HTML5, Game development with Unity and C#

- Prepared lesson plan and taught students in a camp environment; planned and participated in indoor and outdoor activities for students
- Mentored the instructors and supervised all the classes to facilitate the needs of the instructors as well as the students
- Directed a camp during the absence of the director, communicated with parents about students' experiences and supervised safety of the students

Teaching Assistant
Aug. 2013 – January 2015

University of Texas at San Antonio

Computer Organization

- Prepared lesson plan, taught recitation classes, graded assignments and quizzes

Intro to Programming II

- Prepared lesson plan, taught recitation classes, graded assignments and quizzes

Computer Programming with Engineering Applications

- Co-instructed course assignments with professor, graded assignments and quizzes

Industry Experiences

Software Engineering Intern
May. 2017 – Aug. 2017

Google

WebRTC Team

- Implemented real-time video communication in virtual reality using *WebRTC, Unity, Vive SDK, C#, C++, and P/Invoke*
- Added video rendering functionality in *WebRTC* unity plug-in
- Designed and implemented prototype based on *AppRTC* that incorporates face detection and face-only video transmission functionality using *Google Mobile Vision API*, *Android* and *JNI*

Software Engineer
Jul. 2011 – Jul. 2013

Escenic

Widget Framework Team

- Designed and implemented major upgrade of *Widget Framework* from version 2 to 3 that included major architectural changes
- Migrated widget controllers in *Java* from *JSP* which improved loading time and reliability
- Developed responsive widgets using *Bootstrap*, *HTML5*, and *CSS3*
- Implemented *lazy loading* of contents and *adaptive image loading* in widgets

Software Engineer
Mar. 2011 – Jul. 2011

Samsung Bangladesh R&D Center

Mobile Development Group

- Customized MMP OS (include additional apps) for middle east market

Publications

Refereed Conference Papers

1. **Sharif Mohammad Shahnewaz Ferdous**, Imtiaz Muhammad Arafat, John Quarles."Visual Feedback to Improve the Accessibility of Head-Mounted Displays for Persons with Balance Impairments." *IEEE Symposium on 3D User Interfaces (3DUI). IEEE, 2016*
2. Tanvir Irfan Chowdhury, **Sharif Mohammad Shahnewaz Ferdous**, John Quarles."Information Recall in VR Disability Simulation." *ACM Symposium on Virtual Reality Software and Technology (VRST), 2017*
3. Imtiaz Muhammad Arafat, **Sharif Mohammad Shahnewaz Ferdous**, John Quarles. "The Effects of Cybersickness on Persons with Multiple Sclerosis." *Proceedings of the ACM Symposium on Virtual Reality Software and Technology (VRST). ACM, 2016*
4. Philippe Charbonneau, Mikael Dallaire-Cote, Sara Saint-Pierre Cote, David R. Labbe, Neila Mezghani, **Sharif Mohammad Shahnewaz Ferdous**, Imtiaz Arafat, Tanvir Irfan, Gayani Samaraweera, John Quarles."Gaitzilla: Exploring the Effect of Embodying a Giant Monster on Lower Limb Kinematics and Time Perception." *International Conference on Virtual Rehabilitation (ICVR), 2017*

Posters and Workshop Papers

1. **Sharif Mohammad Shahnewaz Ferdous**."Improve accessibility of virtual and augmented reality for people with balance impairments." *Virtual Reality (VR). IEEE, 2017*
2. **Sharif Mohammad Shahnewaz Ferdous**, Imtiaz Afarat, Tanvir Irfan Gayani, Samaraweera Mikael, David Labbe, John Quarles."Gaitzilla: A game to study the effects of virtual embodiment in gait rehabilitation." *IEEE Symposium on 3D User Interfaces (3DUI). IEEE, 2016*
3. **Sharif Mohammad Shahnewaz Ferdous**, Imtiaz Muhammad Arafat, John Quarles."Visual Feedback to Improve the Accessibility of Head-Mounted Displays for Persons with Balance Impairments." *Virtual Reality (VR). IEEE, 2016*
4. Al Amin Hossain, **Sharif Mohammad Shahnewaz Ferdous**, Samiul Islam, and Nicole Maalouf. "Rapid Cloud Data Processing with Healthcare Information Protection." *In Services (SERVICES), 2014 IEEE World Congress on, pp. 454-455. IEEE, 2014*

In Submission

1. **Sharif Mohammad Shahnewaz Ferdous**, Tanvir Irfan Chowdhury, Imtiaz Muhammad Arafat, John Quarles."Static Rest Frame to Improve Postural Stability of People with Balance Impairments in Virtual and Augmented Reality Systems." (Journal)
2. **Sharif Mohammad Shahnewaz Ferdous**, Tanvir Irfan Chowdhury, Imtiaz Muhammad Arafat, John Quarles."Investigating the Reason for Increased Postural Instability in Virtual Reality for Persons with Balance Impairments." (Conference)
3. Imtiaz Muhammad Arafat, **Sharif Mohammad Shahnewaz Ferdous**, John Quarles. "Cybersickness in Persons with Multiple Sclerosis - Heart Rate, Breathing Rate, and Galvanic Skin Response." (Journal)

Patents

Patent Pending

1. John Quarles, **Sharif Mohammad Shahnewaz Ferdous**, Kevin King, Mirza Sohail Baig, "Devices and Methods for Interactive Augmented Reality."
   Attorney Docket Number: HSCS.P0020US.P1

Services

- **Program committee member** of International Workshop on Mobile and Pervasive Internet of Things (PerIoT), [2018, 2017]
- **Journal reviewer** of Springer Virtual Reality [2017, 2016, 2015]
- **Conference reviewer** of IEEE Virtual Reality [2018]

Collaboration Experiences

- Collaborated with doctors from **University of Texas Health Science Center at San Antonio (UTHSCSA)** in a successful startup - **Medcognition**
- Collaborated with **Department of Kinesiology, Health, and Nutrition, UTSA** to use *Electromyography* in measuring persons' balance in two projects

Additional Experiences

- Attended **Austin regional National Science Foundation Innovation Corps (NSF I-Corps)** in Summer, 2016, which led to the successful start of Medcognition
- Attended **Grant Writing Workshop** at UTSA in Fall, 2016
- Helped my supervisor to write a grant for **NSF: IIS program** - *Enabling Accessibility of Virtual Reality for Persons with Balance Impairments*, which is based on my dissertation work

References

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