Antony Albert Raj Irudayaraj

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Education

PhD, Computer Science (Human Computer Interaction) - 3.93/4 *Sep 2018 – Present*
University of Waterloo Ontario, Canada
Advisors: Daniel Vogel and Omid Abari

Master of Engineering (Computer Engineering) - 3.92/4 *Sep 2015 – Sep 2016*
University of Toronto Ontario, Canada
Project Supervisor: Steve Mann

Bachelor of Technology (Electrical and Electronics Engineering) - 8.99/10 *Aug 2011 – May 2015*
Vellore Institute of Technology, Chennai Tamil Nadu, India
Project Supervisor: Febin Daya

Work Experience

Graduate Research Assistant *Sept 2018 – Present*
University of Waterloo, HCI Lab

- Research on investigation mobile phone interactions through the fabric
- Building ad-hoc reconfigurable displays
- Hardware design for touch sensing on the edge of a mobile phone

Project Associate *Jan 2018 – Mar 2018*
Indian Institute of Technology, CREATE Lab

- Software development for IGest, a wearable gestural interaction devices for people with cerebral palsy.

Research Assistant *Jan 2016 – Sept 2018*
University of Toronto, DGP Lab

- Investigation on novel haptic actuation devices
- Initial Exploration to design fabric displays
- Haptic Learning of free hand semaphoric gestures

Research Assistant *Jan 2016 – Sept 2018*
University of Toronto, Intelligent Sensory Microsystems Lab

- Design of inductive power flow for wireless transfer of power from a transmit wireless coil to a receiving coil to be placed on rodent head for in lab testing.

Electronics Build Engineer *Oct 2015 – Feb 2016*
University of Toronto , Chemistry IT Department

- Troubleshooting of Electrical instruments,Circuit Debugging, Circuit Designing and Soldering

Project Profile

Ebike with a smart Helmet *Jan 2015 – May 2015*
A normal bicycle was converted into a smart electric bike by integrating a wide range of sensors and actuators to perform intelligent tasks.The cycle included sensors to monitor speed, circuitry to drive and control an electric motor, theft monitoring system using GSM and GPS, and password-based entry for authenticating the driver.A smart helmet synced with the bike enables wider interactions. The helmet can control the indicator lights by tilting the head and speech input can be used to control the bikes' acceleration.

Augmented Reality Vibro-Acoustic Helmet for the visually impaired *Oct 2015 – Aug 2016*
A helmet was designed to help visually impaired users to navigate through obstacles in indoor and outdoor scenarios. A depth-sensing camera interfaced with a Raspberry pi maps the location of the obstacle to appropriate vibroacoustic feedback, that can be interpreted by the user. Also, a Haar-Cascade classifier was trained to help the users locate trivial objects like water bottles and currency notes. Project Supervisor: Steve Mann

Haptic Clench: Novel haptic actuation device *Sept 2016 – April 2016*

HapticClench is a feedback system that can generate squeeze sensations on the user's wrist and finger using Flexinol wires. These wires can be electrically controlled to generate squeeze sensations ranging from weak to strong. Squeeze sensation can be more intimate and natural than vibratory feedback (UIST 2017)

Implementation of High Dynamic Range (HDR) Imaging on a GPU *Feb 2016 – Apr 2016*

Implemented a High Dynamic Range(HDR) Composition on a GPU GTX980 by combining 10 differently exposed images to capture the dynamic range of the scene. The GPU implementation of the HDR achieved a speedup of 7708x compared to a CPU implementation of it.

Haptic Learning of Freehand Semaphoric Gesture Shortcuts *Jan 2016 – Apr 2016*

A study performed on 30 users evaluated the performance of haptic learning for teaching semaphoric freehand finger gesture shortcuts.Haptic rings fitted with vibration motors attached to the finger generate vibration patterns associated with a gesture. The results of the study showed that the efficiency of haptic learning was on par with wholly visual learning techniques. (UIST 2016).

Cuttistant *June 2015 – Sept 2015*

Cuttistant is a smart cutting board, derived from Cutting and Assistant. It has various features which solves problems that people face while preparing their dishes. It has a weighing machine, timer , instruction for making dishes, container to collect the waste and control the music on your phone from the cutting board.

Smart Jacket *June 2015 – Sept 2015*

This project was built from inspirations from the Sixth sense by MIT media labs.The system has a projector, camera ,gesture sensor and touch sensor. The touch sensor is used to navigate between various option in the system. This system will allows to take pictures by a simple gesture , then view pictures using a projector projected onto the wall, get weather updates and play music.

Publications

- Yen-Ting Yeh, Quentin Roy, Antony Albert Raj Irudayaraj, Daniel Vogel **Expanding Side Touch Input on Mobile Phones: Finger Reachability and Two-Dimensional Taps and Flicks using the Index and Thumb** Proceedings of the ACM on Human-Computer Interaction 4 (ISS), 1-20 DOI: https://doi.org/10.1145/3427334
- Aakar Gupta, Antony Irudayaraj, Ravin Balakrishnan. **HapticClench: Investigating Squeeze Sensations using Memory Alloys** In Proceedings of the 29th Annual Symposium on User Interface Software and Technology (UIST '16). ACM, New York, NY, USA, 219-226. DOI: https://doi.org/10.1145/2984511.2984558
- Aakar Gupta, Antony Irudayaraj, Vimal Chandran, Goutham Palaniappan, Khai Truong, and Ravin Balakrishnan, **Haptic learning of Freehand Semaphoric Gesture Shortcuts** In Proceedings of the 30th Annual ACM Symposium on User Interface Software and Technology (UIST '17). ACM, New York, NY, USA, 109-117. DOI: https://doi.org/10.1145/3126594.3126598

Teaching

- Teaching Assistant for CS 349 - User Interface Design *Sept 2018 – Dec 2018*
- Teaching Assistant for CS 105 - Introduction to Programming *Sept 2019 – Dec 2019*

Awards and Achievements

- David.R.Cheriton Graduate Scholarship($ 20,000) *Sept 2018–Sept 2020*
- Achiever of the University,VIT University *Sept 2014–Sept 2015*
- International Doctoral Student Award

Talks

- **'Introduction to Electronics Devices and Advancement in Electronic projects'** in Laqshya Institute of Technology and Sciences, Khammam.
- **'Basics of Analog and Digital Circuits'** as part of my Electronics hobby club activities.

Technical Skills

Programming Languages: C, Python , CUDA , C sharp

Software Packages: Multisim, MATLAB, Proteus , LabView , Pspice , Tanner EDA , Quartus , OpenCV libraries, AutoDesk Fusion 360, Kicad, Altium

Computing Platforms: Arduino, Raspberry Pi, NVIDIA GTX980