Rahul Rajan

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Education

Carnegie Mellon University 2010–08/2016 (expected)
Ph.D. Electrical & Computer Engineering
Context-Aware Computing, Machine Learning, HCI

Georgia Institute of Technology 2003–2007
BS/MS Electrical & Computer Engineering, *Highest Honors*

Experience

Carnegie Mellon University (CMU), PhD Candidate 2010-2016

- Research on modeling human behavior with machine learning & signal processing, and building **AI systems** that augment human performance
- Practical experience with processing **time-series data** including physiological signals, audio and accelerometer data
- Designed multiple **user studies** for hypothesis testing & data analysis
- Project lead on the following research projects:
  - **Distracted Driving**
    - Built realtime mediation system to reduce driver distraction using a **classification model** built on pupil dilation measures
    - Investigated **feature extraction** from various physiological signals to estimate cognitive load
  - **Conference Call Mediator**
    - Built conference call system for realtime **conversation analysis**, capable of providing autonomous feedback to individual or group
    - Adapted feedback to different types of users using **reinforcement learning**
  - **Considerate TV**
    - Prototyped a video player that responds to ambient **sound recognition**
    - Trained GMM models on MFCC features extracted from audio data

Microsoft Research (MSR), Research Intern May–Aug, 2013

- Prototyped novel user interface using speech, gaze (Tobii) and pointing (Kinect)
- Designed and led data collection effort to investigate browsing using this interface

CMU-Qatar, Research Intern May–Jul, 2009

- Computer Vision: Worked on prototyping a person detection system
- Implemented histogram of gradient feature extractor in Matlab

RF Micro Devices, IC Design Engineer 2008–2009

- Designed integrated power amplifier modules for Nokia handsets

Motorola, RF Product Intern May–Aug, 2006

- Automated the calibration of an anechoic chamber using LabVIEW

Research Publications

- **Rahul Rajan**, Ted Selker, Ian Lane, *"Task Load Estimation and Mediation Using Psychophysiological Measures,"* in IUI 2016
- **Rahul Rajan**, Ted Selker, Ian Lane, *"Effects of Mediating Notifications based on Task Load,"* in submission
- **Rahul Rajan**, Ted Selker, *"An Adaptive Mediating Agent for Teleconferences,"* in AAAI 2016 Spring Symposium
- Malcolm Slaney, **Rahul Rajan**, Andreas Stolcke, Partha Parthasarathy, *"Gaze-enhanced Speech Recognition,"* in ICASSP 2014
- **Rahul Rajan**, Joey Hsiao, Deven Lahoti, and Ted Selker, *"Roger that! — The Value of Adding Social Feedback in Audio-mediated Communications,"* in INTERACT 2013
- **Rahul Rajan**, Cliff Chen, Ted Selker, *"Considerate Audio MEdiating Oracle (CAMEO): Improving Human-to-human Communications in Conference Calls,"* in DIS 2012
- **Rahul Rajan**, Cliff Chen, Ted Selker, *"Considerate Supervisor: An Audio-only Facilitator for Multiparty Conference Calls,"* in CHI EA 2012
- Manohar Ganesan, Neil Russell, **Rahul Rajan**, Nathan Welch, Tracy Westeyn, Gregory Abowd, *"Grip Sensing in Smart Toys: A Method for User Categorization,"* in CHI EA 2010

Selected Projects

Psychosocial Assessment for Elderly, Dept. of Health and Human Services

- Hand Tremor Monitor: Android app to motivate steady hold to collect accelerometer data
- Pain Journal: Visually record and playback pain location and intensity

Audio Voting Interface, U.S. Election Assistance Commission

- Built a browser-based voting interface for the visually impaired
- Explored methods for list-browsing and write-in techniques

iLearn: The App that Learns

- Built an Android app that learns to recognize user activity through demonstration
- Extract features from accelerometer and microphone to learn HMM models

Grip Sensing in Smart Toys

- Prototyped a toy to help with differentiating between adults and children
- Based on grip sensing using arduino and force sensitive resistors

Skills

Development: Python, Java, C/C++, Matlab

Toolkits: scikit-learn, pandas, numpy, scipy, theano

Environments: Android/Glass, Linux, ROS, Arduino

Service, Awards, Misc.

- TA for Machine Learning 10-601, Circuits ECE 3041/42, RF Measurement ECE 4360
- Reviewer for Special Issue on Peripheral Interaction in the Interaction Design and Architecture(s) journal (IxD&A)
- AAAI/NSF Travel Grant
- CMU ECE Ph.D Prospectus: "Considerate Systems". Thesis Committee: Ian Lane, Ted Sekler, Anind Dey, Malcolm Slaney