

# SYED SHABIH HASAN

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- INTERESTS** Human Computer Interaction, Machine Learning, Data Science, IoT Based Healthcare, Signal Processing, Affective Computing, Ubiquitous Health Application Development, Mobile Applications for Healthcare
- TECHNICAL SKILLS** **Programming:** Python, Java, MATLAB, C.  
**Techniques:** Supervised learning, Unsupervised learning, Mobile Ecological Momentary Assessment (mEMA), Mobile Sensor Data, Parametric testing, Non-parametric testing, Physiological Data, Digital Signal Processing, Sentiment Analysis, Social-Network Analysis.  
**Operating Systems:** Mac OSX, Linux(Ubuntu, Fedora, Raspbian), Android, Windows.  
**Tools:** Eclipse, Android Studio, PyCharm, Vi, Weka, OpenSmile, VoiceBox, Git, SVN.  
**IoT:** Parallela Boards, Empatica E4 Bands, InterSense Motion Sensor, Shimmer3.
- EDUCATION** **University of Iowa**, Iowa City, IA  
*PhD*, Computer Science, Expected: May 2017 GPA: 4.0  
*Advisor:* Dr. Octav Chipara  
*Topic:* Mobile Ecological Momentary Assessment for Hearing Aid Evaluation  
**Aligarh Muslim University**, India  
*B.Tech.(w/Honors)*, Computer Engineering GPA: 3.7
- EXPERIENCE** **Research Intern** Starkey Hearing Research Center  
May 2015 - August 2015 Berkeley, CA  
*Primary Project:* Explored, proved, and modeled the existence of identifiable gestures that represent human intent for advanced hearing aid control.
  - Proved the existence of head movement based gestures that constitute intent in accelerometer data using non-parametric statistical methods.
  - Built optimized tree based ensembles for recognizing gestures in real-time for individuals with mean accuracy of  $\approx 90\%$  against a mean baseline accuracy of 60%.
  - Designed, implemented, and analyzed the experiments from the beginning to the end.
  - Implemented the complete data collection and analysis code pipeline (C, MATLAB).*Secondary Project:* Global noise meter using Twitter
  - Created the first global noise map through hashtag and geotag based data collection from Twitter using Python for identifying locations with high noise exposure.
- RESEARCH PROJECTS** **AudioSense: Mobile Ecological Momentary Assessment (mEMA) for evaluating hearing aids, predicting user success, and objective data**
  - Designed and implemented the most comprehensive android application for mEMA for jointly characterizing hearing aid performance and auditory contexts.
  - Developed machine learning models for determining the success of a hearing-aid prescription based on user perception of device performance with accuracies over 90% against baseline accuracy of 50%.
  - Characterized lifestyle patterns of hearing aid users for the first time from in-situ data.
  - Successfully deployed in the field for 55 study participants making the study the largest of its kind.
  - Created a complete pipeline to analyze acoustic exposure variation across users using GPS data.
  - Currently working on (i) novel methods for reduction in assessment burden through modeling auditory context constituents like acoustic activity and noise level using features extracted from in-situ audio, (ii) GPS based assessment delivery methodology.

### **Using Mobile Ecological Momentary Assessment(mEMA) to identify differences in hearing aid performances**

- Worked with a global leader in electronics manufacturing to evaluate the performance of their prototype hearing aids.
- Proved existence of statistical differences between the prototype and an off-the-shelf hearing aid using approximately 4000 real-world data samples via mEMA.
- Validated the drawbacks associated with traditional evaluation methodologies by statistically proving that differences between the hearings aids were not captured by them.

### **Real-time mobile phone based hearing aid configuration tuning:**

- Working with one of the largest hearing aid manufacturers in the world.
- Designed and implemented a state-of-the-art android application for collecting contextual information and hearing aid's internal parameters in real-time.
- Will build optimal hearing aid configuration identification models based on joint distribution of auditory context, user-perception of hearing aid performance, and hearing aid's internal parameters.
- Pilot data collection will commence in April 2017.

### **Social Network Communication Analysis of Middle School Students:**

- Built an end-to-end pipeline for analyzing text, twitter, and facebook messages between middle school students from a graph theoretic perspective in Python for a team consisting of researchers from Public Health, Informatics, Social Sciences, and Communication Sciences.
- Compared the performance of several off-the-shelf sentiment analyzers for overlaying polarity on the communication network.
- Proved that the social network conformed to weak structural balance theory.
- Currently in the process of knowledge transfer to another graduate student.

### **Identifying Transcription Factors in Amino Acids:**

- Built models to predict whether a given protein was a transcription factor with the accuracy of 88% (baseline accuracy 56%) using a multi-layered neural network.
- Compared the performance of various machine learning algorithms like classification trees, random forests, logistic regression, support vector machines, and ensembling techniques like boosting and bagging.
- Found that natural groupings of essential and non-essential amino acid probabilities in the dataset.

### **Low Cost Distributed Data Analysis Using Parallela Boards:**

- Explored the feasibility of using Parallela, a linux based \$120 credit card sized computer, for distributed data analysis.
- Achieved a 3x computational speedup relative to a standard high performance node with a 18x less energy consumption.
- Implemented a GPU based k-nearest neighbor search.
- Used the Million Song Dataset as our underlying Big Data source for processing.

## **PAPERS**

- **Syed Shabih Hasan**, Octav Chipara, Ryan Brummet, Yu-Hsiang Wu, Assessing the Performance of Hearing Aids Using Survey and Audio Data Collected In-Situ [In Preparation]
- **Syed Shabih Hasan**, Ryan Brummet, Octav Chipara, Yu-Hsiang Wu, Tianbao Yang, In-situ Measurement and Prediction of Hearing Aid Outcomes Using Mobile Phones, 2<sup>nd</sup> IEEE International Conference on Healthcare Informatics (ICHI 2015).
- **Syed Shabih Hasan**, Octav Chipara, Yu-Hsiang Wu, Nazan Aksan, Evaluating Auditory Contexts and Their Impacts on Hearing Aid Outcomes with Mobile Phones , 8<sup>th</sup> International Conference on Pervasive Technologies for Healthcare (Pervasive Health 2014).
- **Syed Shabih Hasan**, Farley Lai, Octav Chipara and Yu-Hsiang Wu, AudioSense: Enabling Real-time Evaluation of Hearing Aid Technology In-Situ, 26<sup>th</sup> IEEE International Symposium on Computer-Based Medical Systems(CBMS 2013). [**Best Student Paper**]

- Farley Lai, **Syed Shabih Hasan**, Austin Laugesen, Octav Chipara, CSense: A Stream-Processing Toolkit for Robust and High-rate Mobile Health Systems, 13<sup>th</sup> ACM/IEEE The International Conference on Information Processing in Sensor Networks (IPSN 2014).
- Yu-Hsiang Wu, Elizabeth Stangl, Octav Chipara, **Syed Shabih Hasan**, Jacob Oleson, Modeling Real-World Speech Listening Situations for Adults with Mild-to-Moderate Hearing Loss, submitted to Ear & Hearing.

## MEDIA COVERAGE

- **CBS News** Hearing Aids Get a Boost from Smartphone App, appeared 04/04/2014
- **Press-Citizen:** Smartphones give Iowa researchers hope for hearing loss, appeared 04/04/2014

## AWARDS

- NSF Travel Award: Awarded \$500 for attending ICHI 2015
- Strategic Initiative Fund Award: (Spring 2015) Awarded for exceptional performance as a PhD student by CS Department at U.Iowa. Full tuition, benefits, and a stipend for 1 semester.
- Strategic Initiative Fund Award: (Summer 2013) Awarded for the best performance among all PhD students in the qualifying exam by CS Department at U.Iowa. Full tuition, benefits, and stipend awarded for 1 semester.
- Nurul Hasan Merit Scholarship: (2008-2011) Awarded for academic performance in undergraduate Computer Engineering coursework by the A.M. University (India).

## PROFESSIONAL SERVICE

- Reviewer
  - Elsevier Journal Future Generation Computer Systems (FGCS)
  - 14<sup>th</sup> Intl. Conf. on Wireless and Optical Comm. Networks (WOCN 2017)
  - Intl. Conf. on Multimedia, Signal Processing and Comm. Technologies (IMPACT 2013)
- Volunteering
  - Student volunteer at ICHI 2015.

## REFERENCES

- **Dr. Octav Chipara**  
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- **Dr. Yu-Hsiang Wu**  
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