CV: Amelie Bonde

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(A) Professional Preparation

Carnegie Mellon University, B.S. in Computer Science with Minor in Professional Writing, 2014

- Pittsburgh, PA

Carnegie Mellon University, Electrical Computer Engineering, Ph.D. Candidate, expected graduation 2021.

- Moffett Field, CA

(B) Select Publications

Amelie Bonde, Hae Young Noh, Shijia Pan, and Pei Zhang. "Demo Abstract: Deskbuddy: an Office Activity Detection System." In *2019 18th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)*, pp. 352-353. IEEE, 2019.

Amelie Bonde, Shijia Pan, Orathai Sangpetch, Akkarit Sangpetch, Woranun Woramontri, and Pei Zhang, "Structural vibration sensing to evaluate animal activity on a pig farm." In Proceedings of the First Workshop on Data Acquisition To Analysis, pp. 25-26. ACM, 2018.

Amelie Bonde, Mostafa Mirshekari, Jonathon Fagert, Shijia Pan, Hae Young Noh, and Pei Zhang, “Seat vibration for heart monitoring in a moving automobile.” Proceedings of the First Workshop on Data Acquisition To Analysis. ACM, 2018.

Mostafa Mirshekari, Jonathon Fagert, Amelie Bonde, Pei Zhang, and Hae Young Noh, “Human Induced Gait Monitoring Using Footstep-Induced Floor Vibrations Across Different Structures.” Ubicomp Workshop CPD, 2018

Amelie Bonde, Shijia Pan, Zhenhua Jia, Yanyong Zhang, Hae Young Noh, and Pei Zhang, “VVRRM: Vehicular Vibration-based Heart RR-Interval Monitoring System”, Proceedings of the 19th ACM International Workshop on Mobile Computing Systems and Applications, 2017

Zhenhua Jia, Amelie Bonde, Sugang Li, Chenren Xu, Jingxian Wang, Yanyong Zhang, Richard E. Howard, and Pei Zhang, “Monitoring a Person’s Heart Rate and Respiratory Rate on a Shared Bed Using Geophones”, Proceedings of the 15th ACM International Conference on Embedded Networked Sensor Systems, 2017

Amelie Bonde, Shijia Pan, Hae Young Noh, and Pei Zhang, “Demo Abstract: Heart and Sole: Shoe-based heart monitoring.” Proceedings the 16th ACM/IEEE International Conference on Information Processing in Sensor Networks, 2017

Shijia Pan, Tong Yu, Mostafa Mirshekari, Jonathon Fagert, Amelie Bonde, Ole J. Mengshoel, Hae Young Noh, and Pei Zhang, “FootprintID: Indoor Pedestrian Identification through Ambient Structural Vibration Sensing”, Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies, 2017

Shijia Pan, Amelie Bonde, Jie Jing, Lin Zhang, Pei Zhang, and Hae Young Noh, “BOES: Building Occupancy Estimation System Using Sparse Ambient Vibration Monitoring”, SPIE: Smart Structures/NDE conference, 2014

C) SYNERGISTIC ACTIVITIES

i) *Select Honors and Awards*:

- University Transportation Center Student of the Year 2019
- HotMobile Student Travel Grant Feb 2018
- National Science Foundation Graduate Research Fellowship April 2017
- SenSys Student Travel Grant Nov 2016
- Alex Waibel Presidential Fellowship at Carnegie Mellon University July 2016
- Build18 Sponsor's Choice Award from Harris Corporation Jan 2016
- Dr. Tech. Marcus Wallenberg Foundation for Education Scholarship in International Industrial Entrepreneurship May 2015

ii) *Community Service*:

- Student Volunteer: SenSys 2016, SenSys 2018
- Phone-line crisis counseling and support for the elderly and disabled: Friendship Line, Institute on Aging, San Francisco CA. Sep 2016-Sep 2017
- Event Organizer: Carnegie Mellon Electrical Computer Engineering Graduate Organization. August 2016-May 2017

D) RESEARCH MOTIVATION

Smart Home Environment that helps care for the sick and elderly: My research focuses on ways to monitor people in order to better support those who have difficulty living alone, such as the elderly.

D) SELECTED RESEARCH DESCRIPTIONS

i) *Homecare Room-based Activity Monitoring System*

- Use vibration sensors to track the activity of people in a home
- Use machine learning and signal processing techniques to detect trends and anomalies in activity and behaviors over time

ii) *PIGS: Pervasive Intelligent Ground monitoring System*

- Use vibration sensors on the floor to monitor the movement of pigs and piglets in a pig pen, detecting changes in activity level over time.
- Detection of important pig events, such as crushed piglet and feeding events

iii) *Monitoring Heart Rate and Respiratory Rate in a Shared Bed using Geophones*

- A non-invasive heart-rate and respiratory-rate monitoring system which simultaneously tracks multiple people's heartbeats and respiration using two analog geophones mounted on a single bed.
- Separates vibration signals from different sources, then segregates heartbeat and respiration signals using an amplitude demodulation algorithm, due to our observation that these signals are naturally modulated in the human body

iv) *VRRM: Vibration-based RR-interval (heartbeat) Monitoring in Car Seat*

- Using accelerometers embedded in the back rest of a car seat to determine the heart rate of a person in a moving car

v) *Indoor Pedestrian Monitoring through Structural Vibration Sensing*

- Designed and tested a building occupancy estimation system using sparsely distributed low-resolution vibration sensors, including signal feature extraction and pattern recognition.
- Achieved 99.5% accuracy for event detection, less than three feet average error for localization, and 85% accuracy in room level occupancy counting.

vi) *Build18 2016: Smart Pill Bottle*

- Designed and built a smart pill bottle that used inertial sensors to automatically send an update to a mobile app when the bottle was opened or closed.
- Won the Sponsor's Choice Award from Harris Corporation