

Hoang Truong

Human-centered Sensing System & Mobile Healthcare

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EDUCATION

- **University of Colorado Boulder** USA
Ph.D. candidate, Computer Science, Advisor: Tam Vu Jan. 2017 – Present
- **Korea Advanced Institute of Science and Technology - KAIST** Republic of Korea
Cum Laude, Electrical & Electronic Engineering - M.S., Computer Science 2008 – 2014

HONORS AND AWARDS

- Ralph J. Slutz Student Excellence Award 2019.
- Best Paper Award, ACM MobiCom 2019.
- Best Paper Award Runner Up, ACM SenSys 2018.
- NSF Travel Grant Award, ACM SenSys 2018.
- ACM SIGMOBILE Research Highlights 2017.
- Best Paper Award Nominee, ACM SenSys 2017.
- Best Paper Award, ACM MobiCom-S3 2017.
- 2nd place, App Contest, ACM MobiCom 2017.
- NSF Travel Grant Award, ACM MobiCom 2017.

RESEARCH EXPERIENCE

- **Pain Quantification, Project Lead** **Published in ACM MobiSys'20**
 - Developed the Sweep Impedance Profiling (SIP) sensing method to capture activity of a selected muscle group accurately at high-spatial-resolution compared to conventional EMG.
 - Designed and implemented hardware prototype of the multimodal sensing headband (including EEG, GSR, PPG, and SIP) for objective and continuous quantification of pain (96.7% accuracy with 5 pain states on 15872 data points from 31 subjects).
- **Battery-free Gesture Recognition, Project Lead** **Published in ACM WearSys'17, ACM SenSys'18**
 - Developed an ultra-low-power capacitance-based sensing mechanism and custom capacitance sensor to capture the skin deformation due to hand gesture and muscle activities.
 - Designed and implemented hardware prototype of a capacitance sensing wristband for battery-free hand gesture recognition (95% accuracy with 15 gestures) using multiple energy harvesting modalities (solar cell and RF).
- **Respiration Rate and Pulmonary Function, Project Lead** **On-going**
 - Developed a sensor combination to capture all 3 breathing physical properties (acoustic, thermal and pressure) and derived an algorithm to accurately measure respiration rate using the fusion sensor measurement.
 - Developed an active airflow sensing technique to capture the whole range of patients' air blow in a spirometry test.
 - Designed hardware prototype that can plug-and-play with Android phones and test in Children's Hospital Colorado.
- **Drone Detection System, Project Co-Lead** **Published in ACM MobiSys'17, ACM GetMobile'18**
 - Developed a low-cost RF detection system that detects physical characteristics of the drone (i.e. body vibration and body shifting) from wireless communication signals between the drone and its controller.
 - Implemented this drone detection system that detects drone appearance at 600m and classifies 7 drone types.
- **Capacitive Touch Communication, Project Co-Lead** **Published in ACM S3'17, ACM MobiCom'18**
 - Developed a channel model for Body-guided Communications which enables the Through-body communication between wearable devices and touch-enabled devices.
 - Designed and implemented hardware prototypes of wearable rings and wristbands for securely authenticating and identifying users with commercial-off-the-shelf touch-enabled devices on every single touch.

INDUSTRY EXPERIENCE

- **HUMAX Co., Ltd, Korea, Software Engineer/Android Team Manager** **Jan. 2015 – Jan. 2017**
 - **Set-top Box Development:** Developed Android-based set-top box production (device drivers, Bluetooth stacks, hardware verification, and factory application). Managed factory mass production verification process. Designed and developed company own DVB engine for Android platform which was integrated into 2016 OTT set-top box productions.
 - **Android Team Manager:** Trained and mentored Android-platform junior team for R&D center.
- **KAIST Startup Program, Korea, Software Developer** **May. 2014 – Nov. 2014**
 - **Product Development:** Design and build an on-demand video platform for movie sharing.

PATENTS

- “Drone Presence Detection”, App. No. 62/516,875, CU4333D-PPA1, 2017.
Tam Vu, Richard Han, Phuc Nguyen, Hoang Truong, Mahesh Kumar Ravindranathan
- “Respiration Rate Measurement System”, App. No. 62/744,062, 2018.
Tam Vu, Robin Deterding, Hoang Truong, Nam Bui
- “Wearable System for Automated, Objective and Continuous Quantification of Pain”, App. No. 62/900,176, 2019.
Tam Vu, Robin Deterding, Hoang Truong

SELECTED PUBLICATIONS

1. “Painometry: Wearable and Objective Quantification System for Acute Postoperative Pain”
H. Truong, N. Bui, Z. Raghebi, M. Ceko, N. Pham, P. Nguyen, A. Nguyen, T. Kim, K. Siegfried, E. Stene, T. Tvrdy, L. Weinman, T. Payne, D. Burke, T. Dinh, S. D’Mello, F. Banaei-Kashani, T. Wager, P. Goldstein, and T. Vu
ACM MobiSys 2020 - ACM International Conference on Mobile Systems, Applications and Services 2020
(Acceptance rate: 19.4%)
2. “TYTH-Typing On Your Teeth: Tongue-Teeth Localization for Human-Computer Interface”
Nhat Pham, Tuan Dinh, Zohreh Raghebi, Taeho Kim, Nam Bui, Phuc Nguyen, Hoang Truong, Farnoush Banaei-Kashani, Ann Halbower, Thang Dinh, and Tam Vu
ACM MobiSys 2020 - ACM International Conference on Mobile Systems, Applications and Services 2020
(Acceptance rate: 19.4%)
3. “eBP: A Wearable System For Frequent and Comfortable Blood Pressure Monitoring From User’s Ear”
Nam Bui, Nhat Pham, Jessica Jacqueline Barnitz, Phuc Nguyen, Hoang Truong, Taeho Kim, Anh Nguyen, Zhanan Zou, Nicholas Farrow, Jianliang Xiao, Robin Deterding, Thang Dinh, and Tam Vu
ACM MobiCom 2019 - The ACM International Conference on Mobile Computing and Networking 2019
(Acceptance rate: 16.1%) - **BEST PAPER AWARD**
4. “CapBand: Battery-free Successive Capacitance Sensing Wristband for Hand Gesture Recognition”
H. Truong, J.S. Zhang, U. Muncuk, P. Nguyen, N. Bui, A. Nguyen, Q. Lv, K. Chowdhury, T. Dinh, and T. Vu
ACM SenSys 2018 - The ACM Conference on Embedded Networked Sensor Systems 2018
(Acceptance rate: 15.6%) - **BEST PAPER AWARD RUNNER-UP**
5. “Body-Guided Communications: A Low-Power, Highly-Confined Primitive to Track and Secure Every Touch”
Viet Nguyen, Mohamed Ibrahim, Hoang Truong, Phuc Nguyen, Richard Howard, Tam Vu, and Marco Gruteser
ACM MobiCom 2018 - The ACM International Conference on Mobile Computing and Networking 2018
(Acceptance rate: 22.5%)
6. “TYTH-Typing On Your Teeth: Tongue-Teeth Localization for Human-Computer Interface”
P. Nguyen, N. Bui, A. Nguyen, H. Truong, A. Suresh, M. Whitlock, D. Pham, T. Dinh, and T. Vu
ACM MobiSys 2018 - ACM International Conference on Mobile Systems, Applications and Services 2018
(Acceptance rate: 26.8%)
7. “PhO2: Smartphone based Blood Oxygen Level Measurement Systems using Near-IR and RED Wave-guided Light”
Nam Bui, Anh Nguyen, Phuc Nguyen, Hoang Truong, Ashwin Ashok, Thang Dinh, Robin Deterding, and Tam Vu
ACM SenSys 2017 - The ACM Conference on Embedded Networked Sensor Systems 2017
(Acceptance rate: 14.3%) - **BEST PAPER AWARD NOMINEE**
8. “Matthan: Drone Presence Detection Using Physical Signatures in the Drone’s RF Communication”
Phuc Nguyen, Hoang Truong, Mahesh Ravindranathan, Anh Nguyen, Richard Han, and Tam Vu
ACM MobiSys 2017 - ACM International Conference on Mobile Systems, Applications and Services 2017
(Acceptance rate: 18%) - **ACM SIGMOBILE Research Highlight 2017**
9. “Photometry based Blood Oxygen Estimation through Smartphone Cameras”
Nam Bui, Anh Nguyen, Phuc Nguyen, Hoang Truong, Ashwin Ashok, Thang Dinh, Robin Deterding, and Tam Vu
ACM S3 2017 - **BEST PAPER AWARD**

TEACHING & MENTORING

- **Department of Computer Science, CU Boulder, Teaching Assistant** **Spring 2018 – Fall 2019**
 - **Computer System (CSCI 2400)**: Teach, deliver hand-on workshops on Computer Architecture and Assembly Language.
 - **IoT and Wireless Systems (CSCI 7000)**: Design, teach, and deliver hand-on workshops on Embedded Programming.
- **Department of Computer Science, CU Boulder, Mentor** **Fall 2018 – Fall 2019**
 - **Thomas Payne**: Advised his Graduation Research and Capstone Project. (*now at Northrop Grumman*)
 - **Devin Burke**: Advised research in Respiration Rate and Pulmonary Function Project.