# Anh Nguyen

Postdoctoral Researcher
Internet Systems Lab (ISL)
Department of Computer Science
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*Google Scholar*: https://tinyurl.com/2d4w2ny8

## Summary

My research interest is in building wearable and mobile systems to capture various physiological signals for understanding human body's health, improving current health care practice, and enhancing smart building efficiency. Our contributions are published in selective venues including ACM MobiCom, ACM SenSys, ACM MobiSys with **two (02) Best Paper awards from ACM SenSys 2016 and ACM MobiCom 2019, two (02) Best Paper Runner Up awards from ACM MobiCom 2017 and ACM SenSys 2018, four (04) Research Highlights from CACM 2021 and 2018 and SIGMOBILE 2017 and 2016, and four (04) patents**.

I have been leading multiple pivotal projects in which we design and implement novel, practical, and industrial-level hardware and software to realize closed-loop personalized health care through high-fidelity brain tracking and just-in-time brain stimulation wearables. We have been collaborating with Children's Hospital Colorado and Anschutz Medical Campus to prove the medical significance and technical advances of our novel systems.

## Education

**Ph.D. in Computer Science** at University of Colorado Boulder                    *August 2014 – August 2022*
Advisor: Dr. Tam Vu
Thesis: *Enabling Closed-loop Personalized Sleep Care Through High-fidelity Brain Tracking And Just-in-time Brain Stimulation Wearables*

**M.S. in Software Engineering** at Chonnam National University, Korea                    *August 2010 – June 2012*
Advisor: Dr. Guee-Sang Lee
Thesis: *Location based Active Contour Model for Object Segmentation from Natural Color Images*

**B.S. in Mathematics and Computer Science** at University of Science - HCMC, Vietnam                    *August 2005 – June 2009*
Advisor: Dr. Bao Pham
Thesis: *Fingerprint Identification System in Banking Transactions*

## Research Experience

**Attention Detection, Classification, and Boosting for Education Improvement**                    ISL, CU Boulder, USA
- o Develop a scientific mechanism to help users measure their level of attention over a long period of time in the presence of various distractors
- o Develop a scientific mechanism to help them flexibly control their attention ability
- o Design and implement hardware prototype of a brain sensing and entraining model for attention

**A Closed-loop Just-in-time Brain Stimulation System for Sleep Care**                    MNS Lab, CU Boulder, USA
- o Develop a smart mechanism to help users fall asleep quickly and relaxed, stay asleep tightly, and wake up refreshed
- o Design and implement hardware prototype of a brain stimulation model for sleep quality improvement

**High-fidelity In-ear Brain Tracking System**                    MNS Lab, CU Boulder, USA
- o Develop an in-ear biosensor to capture the physiological signals representing human brain, eyes, and muscles activities
- o Design and implement hardware prototype of an in-ear biosensing model for sleep quality monitoring

**Understanding of Bedroom Environment**                      MNS Lab, CU Boulder, USA
  o Develop a smart system working on sensors built in wearable and mobile devices for automatically revealing both common and uncommon interconnections between the bedroom environment and human sleep quality
  o Design and implement a mobile application to assist users for adjusting their bedroom environment for a better sleep

**Object Segmentation from Natural Color Images**                Multimedia And Communication Lab,
                                                                                                    CNU, Korea
  o Develop an algorithm to automatically localize and segment objects with any shapes in natural color images in real time

## WORK EXPERIENCE

**Department of Computer Science, University of Colorado Boulder**              June 2022 – present
**Internet Systems Lab (ISL)**                                                                      with Sangtae Ha
Postdoctoral Associate

**Department of Computer Science, University of Colorado Boulder**              August 2017 – May 2022
**Mobile and Networked Systems (MNS) Lab**                                                  with Tam Vu
Graduate Research Assistant – Teaching Assistant

**Department of Computer Science & Engineering, University of Colorado Denver**   August 2014 – June 2017
**Mobile and Networked Systems (MNS) Lab**                                                  with Tam Vu
Graduate Research Assistant – Teaching Assistant – Instructor

**Department of Computer Science, University of Science, Vietnam**              August 2012 – June 2014
Instructor

**Department of Software Engineering, Chonnam National University, Korea**      August 2010 – June 2012
**Multimedia And Communication Lab**                                                       with Guee-Sang Lee
Graduate Research Assistant

## AWARDS & HONORS

- Dissertation Open Access Fellowship                                                                  2022
- Computer Science Departmental Summer Research Fellowship                                 2020
- **Best Paper Award, ACM MobiCom**                                                                  2019
- **Honorable Mention Grad Talk,** ACM-W RMCWiC                                                2018
- Best Paper Runner-Up Award, ACM SenSys                                                         2018
- **CACM Research Highlights**                                                                            2017
- N2Women Young Researcher Fellowship                                                             2017
- Best Paper Runner-Up Award, ACM SenSys                                                         2017
- **SIGMOBILE Research Highlights**                                                                 2016 & 2017
- **Best Paper Award, ACM SenSys**                                                                      2016
- Brain Korea 21 (BK21) Research Fund Sponsorship (Korea)                                  2010 – 2012
- ITRC (Mobile Device Interface Research Center) Research Fund Sponsorship (Korea)   2010 – 2012
- Chonnam National University Global Graduate Scholarship (Korea)                         2010 – 2012
- Chonnam National University Academic Achievement Award (Korea)                          2012

## PUBLICATIONS

### Refereed Conferences
[C.1]   **eBP: An Ear-Worn Device for Frequent and Comfortable Blood Pressure Monitoring**
        *Nam Bui, Nhat Pham, Jessica Jacqueline Barnitz, Zhanan Zou, Phuc Nguyen, Hoang Truong, Taeho Kim, Nicholas Farrow,* **Anh Nguyen***, Jianliang Xiao, Robin Deterding, Thang Dinh, Tam Vu*
        Communications of the ACM, 2021

**[C.2]** **Painometry: Wearable and Objective Quantification System for Acute Postoperative Pain**
*Hoang Truong, Nam Bui, Zohreh Raghebi, Marta Ceko, Nhat Pham, Phuc Nguyen, **Anh Nguyen**, Taeho Kim, Katrina Siegfried, Evan Stene, Taylor Tvrdy, Logan Weinman, Thomas Payne, Devin Burke, Thang Dinh, Sidney D'Mello, Farnoush Banaei-Kashani, Tor Wager, Pavel Goldstein, and Tam Vu*
The ACM International Conference on Mobile Systems, Applications, and Services (ACM MobiSys), 2020
(34 out of 175 submissions, acceptance ratio: 19.4%)

**[C.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*
The ACM International Conference on Mobile Computing and Networking (ACM MobiCom), 2019
(55 out of 290 submissions, acceptance ratio: 18.9%)
*Best Paper Award, SIGMOBILE Research Highlight,* and *CACM Research Highlight*

**[C.4]** **LIBS: A Bioelectrical Sensing System from Human Ears for Staging Whole-Night Sleep Study**
***Anh Nguyen**, Raghda Alqurashi, Zohreh Raghebi, Farnoush Banaei-kashani, Ann C. Halbower, and Tam Vu*
Communications of the ACM, 2018

**[C.5]** **CapBand: Battery-free Successive Capacitance Sensing Wristband for Hand Gesture Recognition**
*Hoang Truong, Shuo Zhang, Ufuk Muncuk, Phuc Nguyen, Nam Bui, **Anh Nguyen**, Qin Lv, Kaushik Chowdhury, Thang Dinh, and Tam Vu*
The ACM Conference on Embedded Networked Sensor Systems (ACM SenSys), 2018
(23 out of 147 submissions, acceptance ratio: 15.6%)
*Best Paper Runner-Up Award*

**[C.6]** **Cost-Effective and Passive RF-Based Drone Presence Detection and Characterization**
*Phuc Nguyen, Hoang Truong, Mahesh Ravindranathan, **Anh Nguyen**, Richard Han, and Tam Vu*
ACM GetMobile Highlights, 2018

**[C.7]** **TYTH-Typing On Your Teeth: Tongue-Teeth Localization for Human-Computer Interface**
*Phuc Nguyen, Nam Bui, **Anh Nguyen**, Hoang Truong, Abhijit Suresh, Matthew Whitlock, Duy Pham, Thang Dinh, and Tam Vu*
The ACM International Conference on Mobile Systems, Applications, and Services (ACM MobiSys), 2018
(37 out of 138 submissions, acceptance ratio: 26.8%)

**[C.8]** **Cost-Effective and Passive RF-Based Drone Presence Detection and Characterization**
Phuc Nguyen, Hoang Truong, Mahesh Ravindranathan, *Anh Nguyen*, Richard Han, Tam Vu
ACM GetMobile Highlights, 2017

**[C.9]** **LIBS: A Lightweight and Inexpensive In-Ear Sensing System for Automatic Whole-Night Sleep Stage Monitoring**
***Anh Nguyen**, Raghda Alqurashi, Zohreh Raghebi, Farnoush Banaei-kashani, Ann C. Halbower, and Tam Vu*
ACM GetMobile Highlights, 2017

**[C.10]** **PhO2: Optical 3D printed elements and NIR/R light extraction techniques for phone-base blood oxygen level measurement**
*Nam Bui, **Anh Nguyen**, Phuc Nguyen, Hoang Truong, Ashwin Ashok, Thang Dinh, Robin Deterding, and Tam Vu*
The ACM Conference on Embedded Networked Sensor Systems (ACM SenSys), 2017
(26 out of 151 submissions, acceptance ratio: 17.2%)
*Best Paper Runner-Up Award* and *2nd Prize ACM MobiCom App Contest 2017*

**[C.11]** **Matthan: Drone Presence Detection by Identifying Physical Signatures in the Drone's RF Communication**
*Phuc Nguyen, Hoang Truong, Mahesh Ravindranathan, **Anh Nguyen**, Richard Han, and Tam Vu*
The ACM International Conference on Mobile Systems, Applications and Services (ACM MobiSys), 2017
(34 out of 188 submissions, *acceptance ratio: 18%*)
*SIGMOBILE Research Highlight*

**[C.12]** **Whole Night Sleep Monitoring with a Low-cost In-ear Wearable Device**
***Anh Nguyen**, Zohreh Raghebi, Farnoush Banaei-kashani, Thang Dinh, Ann C. Halbower, and Tam Vu*
The American Thoracic Society International Conference (ATS International Conference), 2017.

**[C.13]** **A Lightweight and Inexpensive In-ear Sensing System for Automatic Whole-night Sleep Stage Monitoring**
***Anh Nguyen**, Raghda Alqurashi, Zohreh Raghebi, Farnoush Banaei-kashani, Ann C. Halbower, and Tam Vu*
The ACM Conference on Embedded Networked Sensor Systems (ACM SenSys), 2016
(21 out of 119 submissions, *acceptance ratio: 17.6%*)
*Best Paper Award, SIGMOBILE Research Highlight,* and *CACM Research Highlight*

[C.14] **Android Permission Recommendation using Transitive Bayesian Inference Model**
*Bahman Rashidi, Carol Fung, **Anh Nguyen**, and Tam Vu*
The European Symposium on Research in Computer Security (ESORICS), 2016

[C.15] **Sensing Occupant Comfort using Wearable Technologies: A Pilot Study**
*Moatassem Abdallah, Caroline Clevenger, Tam Vu, and **Anh Nguyen***
Construction Research Congress - American Society of Civil Engineers (ASCE CRC), 2015

[C.16] **mSleepWatcher: Why didn't I sleep well?**
***Anh Nguyen**, Raghda Alqurashi, Ann C. Halbower, and Tam Vu*
ISSAT International Conference on Modeling of Complex Systems and Environments (MCSE), 2015

[C.17] **3D Human Face Recognition Using Sift Descriptors of Face's Feature Regions**
*Nguyen Hong Quy, Nguyen Hoang Quoc, **Nguyen Tran Lan Anh**, Hyung-Jeong Yang, and Pham The Bao*
New Trends in Computational Collective Intelligence, 2015

[C.18] **Object Segmentation based on Location Information for Level Set Method**
***Nguyen Tran Lan Anh**, Vo Quang Nhat, and Guee-Sang Lee*
Proceedings of the 7th ICUIMC, 2013

[C.19] **Fast Automatic Saliency Map driven Geometric Active Contour Model for Color Object Segmentation**
***Nguyen Tran Lan Anh**, Vo Quang Nhat, Elyor Kodirov, Soo-Hyung Kim, and Guee-Sang Lee*
Proceedings of the 21st International Conference on Pattern Recognition (ICPR), 2012

[C.20] **Morphological Gradient Applied to New Active Contour Model for Color Image Segmentation**
***Nguyen Tran Lan Anh**, Young-Chul Kim, and Guee-Sang Lee*
Proceedings of the 6th International Conference on Ubiquitous Information Management and Communication (ICUIMC), 2012

[C.21] **Object Segmentation in Color Images using Distance Regularized Level Set**
***Nguyen Tran Lan Anh**, Nguyen Huy Hoang, Le Thi Khue Van, and Guee-Sang Lee*
Proceedings of the 3rd International Conference on Internet (ICONI), 2011

[C.22] **Camera Based Motion Tracking by Camera Images**
***Nguyen Tran Lan Anh**, Jeong-Hwan Kim, and Guee-Sang Lee*
The Conference on Human-Computer Interaction (HCI), 2011

## Journal Articles

[J.1] **A Large-Scale Study of a Sleep Tracking and Improving Device with Closed-loop and Personalized Real-time Acoustic Stimulation**
***Anh Nguyen**, Galen Pogoncheff, Ban Xuan Dong, Nam Bui, Hoang Truong, Nhat Pham, Linh Nguyen, Sangtae Ha, and Tam Vu*
Science Translational Medicine, 2022 – **Under submission**
Impact factor: 17.99.

[J.2] **Smartphone-Based SpO2 Measurement by Exploiting Wavelengths Separation And Chromophore Compensation**
*Nam Bui, **Anh Nguyen**, Phuc Nguyen, Hoang Truong, Ashwin Ashok, Thang Dinh, Robin Deterding, and Tam Vu*
The ACM Transactions on Sensor Networks (ACM TOSN), 2019
Impact factor: 2.313.

[J.3] **Android User Privacy Preserving through Crowdsourcing**
*Bahman Rashidi, Carol Fung, **Anh Nguyen**, Tam Vu, and Elisa Bertino*
IEEE Transactions on Information Forensics and Security (IEEE TIFS), 2017
Impact factor: 6.211.

[J.4] **Color Image Segmentation using a Morphological Gradient-based Active Contour Model**
***Nguyen Tran Lan Anh**, Soo-Hyung Kim, Hyung-Jeong Yang, and Guee-Sang Lee*
International Journal of Innovative Computing Information and Control (IJICIC), 2013
Impact factor: 1.055.

[J.5] **Proximity based Object Segmentation in Natural Color Images Using Level Set Method**
***Nguyen Tran Lan Anh** and Guee-Sang Lee*
Transactions on Fundamentals of Electronics, Communications, and Computer Sciences (IEICE), 2013
Impact factor: 0.530.

[J.6] **Color Image Segmentation using Distance Regularized Level Set**
*Nguyen Tran Lan Anh and Guee-Sang Lee*
Journal of Korea Society for Internet Information (KSII), 2012
Impact factor: 0.883.

[J.7] **Fingerprint Authentification System in Banking Transaction**
*Nguyen Tran Lan Anh, Phan Thi My Dung, and Pham The Bao*
GESTS International Transactions on Computer Science and Engineering, 2011

## Refereed Workshops

[W.1] **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*
International Conference on Mobile Computing and Networking - The Eighth Wireless of the Students, by the Students, and for the Students Workshop (ACM MobiCom-S[3]), 2017
*Best Presentation Award.*

[W.2] **Capacitive sensing 3D-printed Wristband for Enriched Hand Gesture Recognition**
*Hoang Truong, Phuc Nguyen, **Anh Nguyen**, Nam Bui, and Tam Vu*
The ACM International Conference on Mobile Systems, Applications and Services - Workshop on Wearable Systems (ACM MobiSys-WearSys), 2017

[W.3] **LIBS: A Low-cost In-Ear Bioelectrical Sensing Solution for Healthcare Applications**,
***Anh Nguyen**, Zohreh Raghebi, Farnoush Banaei-kashani, Ann C. Halbower, and Tam Vu*
The 22nd Annual International Conference on Mobile Computing and Networking – Workshop on Wireless of the Students, by the Students, for the Students (ACM MobiCom-S[3]), 2016

[W.4] **In-ear Biosignal Recording System: A Wearable For Automatic Whole-night Sleep Staging**
***Anh Nguyen**, Raghda Alqurashi, Zohreh Raghebi, Farnoush Banaei-kashani, Ann C. Halbower, Thang Dinh, and Tam Vu*
The ACM International Conference on Mobile Systems, Applications and Services - Workshop on Wearable Systems and Applications (ACM MobiSys-WearSys), 2016

[W.5] **Investigating Cost-effective RF-based Detection of Drones**
*Phuc Nguyen, Mahesh Ravindranathan, **Anh Nguyen**, Richard Han, and Tam Vu*
The ACM International Conference on Mobile Systems, Applications and Services - Workshop on Micro Aerial Vehicle Networks, Systems, and Applications for Civilian Use (ACM MobiSys-DroNet), 2016.

## Posters and Demos

[D.1] **Demo: Earable - An Ear-Worn Biosignal Sensing Platform for Cognitive State Monitoring and Human-Computer Interaction**
*Nhat Pham, Taeho Kim, Frederick M Thayer, **Anh Nguyen**, and Tam Vu*
The ACM International Conference on Mobile Systems, Applications, and Services (ACM MobiSys), 2019

[D.2] **Demo: Fusing Mobile Sensors for Paper Keyboard On-the-Go**
***Anh Nguyen**, Duy Nguyen, Nhan Nguyen, Ashwin Ashok, Binh Nguyen, Bao Pham, and Tam Vu*
The ACM International Conference on Mobile Systems, Applications and Services (ACM MobiSys), 2017

[D.3] **Demo: Low-power Capacitive Sensing Wristband for Hand Gesture Recognition**
*Hoang Truong, Phuc Nguyen, **Anh Nguyen**, Nam Bui and Tam Vu*
The Eighth Wireless of the Students, by the Students, and for the Students Workshop (ACM MobiCom-S[3]), 2017

## PATENTS

[P.1] Tam Vu, Ann Halbower, Anh Nguyen, "***In-Ear Sensing Systems and Methods for Biological Signal Monitoring***," U.S. Patent No. 11,382,561, 07/2022.

[P.2] Tam Vu, Robin Deterding, Anh Nguyen, and Phuc Nguyen, "***Systems And Methods For Determining Physiological Information With A Computing Device***," U.S. Patent Application, No. 16/342,944, 09/2019.

[P.3] Caroline Clevenger, Moatassem Abdullah, Tam Vu, Anh Nguyen, "***Thermal comfort building monitoring with wearables: method, apparatus, and system***," U.S. Provisional Patent Application, No. 62/288,924, 03/2016.

[P.4]    Carol Fung, Bahman Rashidi, Tam Vu, Anh Nguyen, "*Resource Access Permission Recommendation Method for Mobile Applications*," U.S. Patent pending, 10/2016.

# Professional Services and Activities

- *Reviewer Activities:*
  - Conference reviewer:
    - ACM MobiCom, ACM SenSys, ACM MobiSys, ACM UbiComp
    - IEEE/ACM CHASE, IEEE VNC, IEEE PerCom, IEEE/ACM IPSN
  - Journal reviewer:
    - IEEE Journal of Biomedical and Health Informatics (JBHI)
    - PLOS Digital Health
    - Transactions on Mobile Computing (TMC)
    - IEEE Transactions on Instrumentation and Measurement (TIM)

- *Technical Program Committee:*
  - ACM SenSys Shadow Program 2022
  - ACM MobiCom - S$^3$ Workshop 2017
  - Grace Hopper Celebration 2019

- *Event Organizer:*
  - N$^2$Women Meeting at MobiCom 2017

- *Professional Services:*
  - Social media Co-Chair in N2 Women Board 2018 – 2019

- *Undergraduate Student Mentoring:*
  - YOU'RE@CU program Spring 2020

# Courses Taught

**CSCI 3753: Design and Analysis of Operating Systems**                                        Fall 2018 - Fall 2021
Teaching Assistant
Department of Computer Science, University of Colorado Boulder

**CSCI 1410: Fundamentals of Computing**                                        Spring 2015 - Spring 2017
Instructor & Teaching Assistant
Department of Computer Science and Engineering, University of Colorado Denver

**CSCI 4034: Theoretical Foundations of Computer Science**                                        Fall 2016
Teaching Assistant
Department of Computer Science and Engineering, University of Colorado Denver

**CSCI 5446: Theory of Automata**                                        Spring 2016
Teaching Assistant
Department of Computer Science and Engineering, University of Colorado Denver

**CSCI 5173/7173: Computational Complexity and Algorithms**                                        Spring 2016
Teaching Assistant
Department of Computer Science and Engineering, University of Colorado Denver

**CSCI 1411: Fundamentals of Computing Lab**                                        Fall 2014 - Fall 2015
Instructor
Department of Computer Science and Engineering, University of Colorado Denver

**CSCI 4800/5800: Mobile Computing & Programming**                                        Fall 2014
Teaching Assistant
Department of Computer Science and Engineering, University of Colorado Denver

**Course: Advanced Machine Learning**                                    Spring 2014
Teaching Assistant
Department of Computer Science, University of Science, VNU-HCMC, Vietnam

**Course: Discrete Mathematics**                                         Spring 2014
Instructor                                                               Fall 2013
Department of Computer Science, University of Science, VNU-HCMC, Vietnam  Fall 2012

**Course: Object Oriented Programming**                                  Spring 2014
Instructor                                                               Spring 2013
Department of Computer Science, University of Science, VNU-HCMC, Vietnam

**Course: Pattern Recognition**                                          Fall 2013
Instructor
Department of Computer Science, University of Science, VNU-HCMC, Vietnam

**Course: Introduction of Machine Learning**                             Fall 2013
Teaching Assistant
Department of Computer Science, University of Science, VNU-HCMC, Vietnam

**Course: Data Structure and Algorithms**                                Fall 2013
Lab Instructor
Department of Computer Science, University of Science, VNU-HCMC, Vietnam

**Course: Algorithm Analysis**                                           Spring 2013
Lab Instructor
Department of Computer Science, University of Science, VNU-HCMC, Vietnam