

# Adnan Al Armouti

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| Education           | <b>University of California, Los Angeles</b> , Los Angeles, CA, USA<br>Master of Science<br>Specialization: Electrical and Computer Engineering<br>GPA: overall 4.0/4.0   | September 2021-Present<br>Graduation: June 2023   |
|                     | <b>University of California, Los Angeles</b> , Los Angeles, CA, USA<br>Bachelor of Science<br>Specialization: Electrical Engineering, Economics (Double)  | September 2017-June 2021<br>Graduation: June 2021 |
| Publications        | Vilesov, A., Chari, P., <b>Armouti, A.</b> , Harish, A.B., Kulkarni, K., Deoghare, A., Jalilian, L. and Kadambi, A., 2022. Blending camera and 77 GHz radar sensing for equitable, robust plethysmography. <i>ACM Transactions on Graphics (TOG)</i> , 41(4), pp.1-14.  |   |
| Patents             | Kadambi, A., Jalilian, L., Chari, P., Talegaonkar, C., Karınca, D., Cannesson, M., Kabra, K., Salehi-Abari, O., Kita, A., <b>Armouti, A.</b> 2021. “Systems and Methods for Measuring Vital Signs Using Multimodal Health Sensing Platforms,” Int’l Application PCT/US19/22532, filed June 16, 2021.<br><br>Kadambi, A., Jalilian, L., Abari, O., Cannesson, M., Kita, A., Chari, P., <b>Armouti, A.</b> 2021. “MMHEALTH: Multimodal Health Sensing Platform,” US Provisional Application 63/177,229, filed April 20, 2021.   |   |
| Presentations       | <i>Blending Camera and 77 GHz Radar Sensing for Equitable, Robust Plethysmography</i> . [Co-presented]. ACM Special Interest Group on Graphics, Computational Photography Roundtable Session, 2022 (SIGGRAPH ’22).<br><br><i>Blending Camera and 77 GHz Radar Sensing for Equitable, Robust Plethysmography</i> . [Poster, Co-presented]. IEEE International Conference on Computational Photography, 2022 (ICCP ’22).  |   |
| Research Experience | <b>UCLA Visual Machines Group</b> with Prof. Achuta Kadambi<br>Worked on <i>equitable robust plethysmography</i> as co-first author. <ul style="list-style-type: none"><li>• Led a successful \$1M DARPA grant proposal to fund research projects in contactless equitable health sensing and mobile health (mHealth).</li><li>• Developed an open-sourced Python multimodal data processing library for our deep learning (DL) pipelines.</li><li>• Developed PyTorch DL models including CNNs and Vision Transformers to estimate the subject’s vital signs from their perceived physical state, including photoplethysmography (PPG), the skin color changes due to pulsatile blood flow; physiological respiration; blood oxygenation (SpO2) via ratio-of-ratios (ROR) method; and mechanical respiratory effort.</li><li>• Co-built adversarial fusion learning pipelines that attempt to disentangle skin tone features from the final fused PPG estimate.</li><li>• Implemented prior “baseline” methods from existing literature for comparison against ours.</li><li>• Co-wrote the IRB and safety compliance amendments, and led our data collection.</li><li>• Designed paper figures via Inkscape, Photoshop and Illustrator.</li></ul> | September 2020-Present                            |
|                     | <b>UCLA Health</b> with Dr. Ashley Kita<br>Working on <i>Contactless Sleep Apnea and Hypopnea Detection</i> as the lead researcher and first author. <ul style="list-style-type: none"><li>• Developing DL implicit neural representation model to estimate SpO2 remotely via PPG and ROR intermediate supervision, with application in contactless hypopnea event detection.</li><li>• Developing anomaly detection models that classify apnea and hypopnea events from vital sign time-series data; currently working with contact-based gold-standard signals to verify automation feasibility.</li><li>• Developing causal inference pipelines to predict event onset, with plans to extend this to sepsis, arrhythmia, atrial fibrillation, and other diseases.</li></ul>  | April 2021-Present                                |

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| Employment Experience | <b>UCLA Health</b><br>Summer Research Intern<br><ul style="list-style-type: none"> <li>Built data acquisition sensor stack using triple NIR based FLIR Grasshopper3 camera system, using active illumination at 940nm, 850nm and 766nm, with additional FLIR Boson 640 Radiometric camera and TI AWR1443BOOST RF sensor.</li> <li>Developed Vision Transformer models for contactless estimation of respiratory rate and effort via long-wave infra-red and mmWave sensors, with application in apnea event detection.</li> <li>Implemented custom serial code in C++ to trigger Arduino-based barker code signal to synchronize our PC's time stamps with the PC in the control room, used to collect the polysomnography (PSG) ground truth data.</li> <li>Designed custom PCB to protect our PC when barker code signal is transmitted.</li> <li>Designed software-triggered hardware system to reset RF device, removing limit on maximum allowable amount of data collected at the UCLA Health Sleep Disorders Clinic.</li> </ul> | June 2022-September 2022   |
|                       | <b>UCLA Visual Machines Group</b><br>Summer Research Intern<br><ul style="list-style-type: none"> <li>Designed, sourced, and built a multimodal sensing system that senses in the visible, near infra-red, long wave infra-red and millimeter-wave (mmWave) radio bands.</li> <li>Built GPIO hardware-triggered system, enabling microsecond-level synchronized exposure.</li> <li>Co-built an open-sourced C++ multithreaded data acquisition codebase for our sensor stack.</li> </ul>   | June 2021-September 2021   |
|                       | <b>California NanoSystems Institute</b><br>Summer Research Intern<br><ul style="list-style-type: none"> <li>Used open source DeepLebCut ResNet CNN to create real-time marker-less pose estimation system for mice subjected to neuro-stimuli by electrodes, for behaviorally-triggered "closed-loop" brain-machine interface</li> <li>1/10th the cost of an NDI Polaris Vega system, gold standard for Parkinson's Disease research.</li> </ul>   | June 2020-September 2020   |
| Other Experience      | UCLA ECE, <i>Teaching Assistant, Upcoming</i><br>UCLA CS, <i>Teaching Assistant, Upcoming</i>  | January 2023-March 2023<br>April 2023-June 2023  |
| Awards                | 2022 UCLA ECE VMG GSR Scholarship – \$1,000<br>2022 UCLA ECE SIGGRAPH 2022 Vancouver Travel Grant – \$1,500<br>2022 UCLA ECE CVPR 2022 New Orleans Travel Grant – \$1,500<br>2022 UCLA ECE ICCP 2022 Pasadena Travel Grant – \$500<br>2021 UCLA ECE Dean's Honors List<br>2021 NSF REU Fellowship – \$7,500<br>2020 Intel URP Fellowship – \$1,250<br>2020 SRC URP Fellowship – \$1,250<br>2020 UCLA ECE Dean's Honors List  |  |
| Community Involvement | UCLA ECE VMG Mentoring Program, <i>Mentor</i><br>UCLA ACM AI Undergraduate Research Program, <i>Research Mentor</i><br>IEEE, <i>Student Member</i><br>ACM, <i>Student Member</i>   | September 2022-Present<br>September 2022-Present<br>May 2022-Present<br>May 2022-Present |
| References            | <b>Prof. Achuta Kadambi</b><br>Assistant Professor of Electrical and Computer Engineering & Computer Science at UCLA, <b>Email:</b> achuta@ee.ucla.edu<br><br><b>Dr. Ashley Kita</b><br>Assistant Professor-in-Residence of Head & Neck Surgery at UCLA Health, <b>Email:</b> akita@mednet.ucla.edu<br><br><b>Dr. Laleh Jalilian</b><br>Clinical Assistant Professor of Anesthesiology & Perioperative Medicine at UCLA David Geffen School of Medicine, <b>Email:</b> ljalilian@mednet.ucla.edu   |  |