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NEWSLETTER

PATHS-UP
1ST QUARTER, 2025

NEW START UP: CardiaTex Pioneering the Future of Cuffless Blood Pressure Monitoring

Born from groundbreaking PATHS-UP research at Texas A&M University, **CardiaTex, Inc.** is a cutting-edge startup founded by graduate student PATHS-UP Fellow **Justin McMurray** and PATHS-UP Director **Dr. Gerard Coté.** The company is at the forefront of wearable sensor technology, developing innovative solutions that provide real-time cardiovascular insights without the constraints of traditional blood pressure cuffs. By enabling continuous, noninvasive monitoring, CardiaTex, Inc. has the potential to revolutionize patient care—from high-acuity environments like ICUs to more passive, everyday health monitoring—ushering in a new era of seamless and efficient cardiovascular health management.

Accurate blood pressure monitoring is vital to cardiovascular health management, yet traditional methods can be restrictive and inconvenient. **CardiaTex, Inc.** has the potential to transform this process by offering continuous, noninvasive monitoring, which could enable earlier detection of fluctuations and more timely interventions. From high-acuity hospital settings to everyday wellness tracking, **CardiaTex's** innovative approach could empower both healthcare providers and individuals to better manage cardiovascular health.

Dr. Aydogan Ozcan elected to NAE

Congratulations to Dr. Aydogan Ozcan, PATHS-UP Co-PI, Research Thrust 2 Co-Lead, and Chancellor's Professor of Electrical & Computer Engineering and Associate Director of the California NanoSystem Institute (CNSI), UCLA Samueli School of Engineering, for being elected as a member of the **National Academy of Engineering** Class of 2025! Dr. Aydogan Ozcan is recognized for his contributions to mobile sensing and telepathology for medical diagnostics. Election to the NAE is one of the highest professional honors accorded an engineer, recognizing outstanding engineering contributions in business, education, research, government, and other organizations. Congratulations, Dr. Aydogan Ozcan! #NAE2025.

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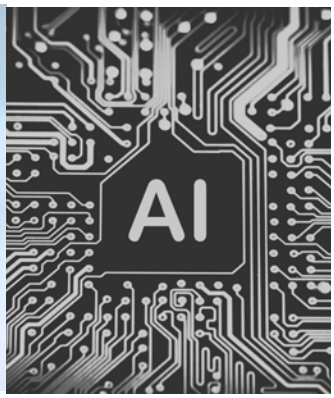
Quarterly Research Highlights

In Focus: A New Approach to Detecting Cardiac Troponin I (cTnI)



PATHS-UP researchers from UCLA have developed a deep learning-powered chemiluminescence vertical flow assay (CL-VFA) that enables clinical **laboratory-grade** cardiac troponin I (cTnI) testing on a **portable**, **cost-effective** point-of-care platform. Their study, recently published in Small, showcases how the integration of chemiluminescence-based biosensing, high-sensitivity imaging via a portable reader, and **AI-driven data** analysis allows for rapid and highly sensitive cTnI quantification. This advancement enhances myocardial infarction (MI) detection in diverse clinical settings, offering a promising solution for improving access to reliable cardiac diagnostics, particularly in resource-limited environments without advanced laboratory infrastructure.

The research was led by Dr. Aydogan Ozcan, PATHS-UP Co-PI, Research Thrust 2 Co-Lead, and Chancellor's Professor of Electrical & Computer Engineering and Associate Director of the California NanoSystems Institute (CNSI) at UCLA, in collaboration with Dr. Dino Di Carlo, PATHS-UP Co-PI, Research Thrust 1 Co-Lead, UCLA Bioengineering Department and Dr. Omai Garner, Director of the UCLA Clinical Microbiology Lab. The paper's first authors are Dr. Gyeo-Re Han, a PATHS-UP postdoctoral researcher, and Artem Goncharov, a PATHS-UP graduate fellow in UCLA's Electrical & Computer Engineering Department.

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3RD ANNUAL DIGITAL HEALTH WORKSHOP

- **WHEN:** SEPTEMBER 9TH & 10TH
- **WHERE:** BIOSCIENCE RESEARCH COLLABORATIVE, HOUSTON, TX | **SPONSORSHIPS ARE AVAILABLE**

For more information on event sponsorship, please contact Chris Finberg, chrisfinberg@tamu.edu, or Kerry Key, kerrykey@tamu.edu

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Quarterly Research Highlights

Advancing Digital Coaching for Hypertension and Diabetes

Dr. Farzan Sasangohar, PATHS-UP Thrust 4 Co-Lead, TAMU Industrial & Systems Engineering, led the development of the digital coaching program for high blood pressure, the **only long-term (90-day)** plan supported by the American Heart Association. Early results from our ongoing study show that it can greatly improve health. Our research also found that people who follow the program closely see much better results than those who don't. With funding from PATHS-UP, we created a similar program for diabetes, which is now being tested. Additionally, results from the Farming for Life study, led by Sansum Diabetes Research Institute, helped start a new project to test how fresh produce can improve diabetes management. Investigating the effect of an mHealth coaching intervention on health beliefs, adherence and blood pressure of patients with hypertension: A longitudinal single group pilot study.

Innovative methods to measure nutritional biomarkers

Dr. Mike McShane, PATHS-UP Thrust 1 Co-Lead and Professor at TAMU Biomedical Engineering, was awarded a new NIH-funded project aimed at advancing nutritional biomarkers to predict macronutrient intake. An **innovative combination** of insertable optical reporters combined with wearable readers and advanced computational methods is proposed to provide continuous/on-demand measurement of these metabolites in interstitial fluid (ISF) and to use them as "**nutritional biomarkers**" to predict macronutrient intake. This effort builds upon insights gained from the PATHS-UP ERC and an earlier NSF study that investigated fluctuations in individuals' blood sugar levels in response to dietary intake, furthering our understanding and application of personalized health monitoring technologies.

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PATHS-UP RECENT PUBLICATIONS

- Chip-Scale Aptamer Sandwich Assay Using Optical Waveguide-Assisted Surface-Enhanced Raman Spectroscopy, published in Nanomaterials
- Simplified single neuron model for robust local pulse wave velocity sensing using a tetherless bioimpedance device, published in Biosensors and Bioelectronics
- Deep Learning-Enhanced Paper-Based Vertical Flow Assay for High-Sensitivity Troponin Detection Using Nanoparticle Amplification
- Evaluating HbA1c-to-average glucose conversion with patient-specific kinetic models for diverse populations

For a list of all of PATHS-UP publications, please check out pathsup.org

BY THE NUMBERS

Yr. 7 Publications
- 47 Peer-Reviewed Technical Journals
- 22 Peer-Reviewed Conference Proceedings
- 67 total publications

5 Provisional Patent Applications Filed

Outreach: Considering all events, i.e., workshops, short courses, webinars, seminars, colloquia, invited talks, etc, PATHS-UP events reached roughly ~**3500 individuals** in year 7.

Yrs 1-7 Publications
- 297 Peer-Reviewed Technical Journals
- 220 Peer-Reviewed Conf. Proceedings
- 517 total publications

23 Provisional Patent Applications Filed
9 Full Patents

Outreach: ~**100,000 individuals** in total.

Texas A&M Engineering Experiment Station · FIU · RICE · UCLA · Arizona State University

PATHS-UP Upcoming Graduate

Artem received his Ph.D. in Electrical and Computer Engineering in March 2025 from the University of California at Los Angeles. Over the past five years, he has been working in Dr. Ozcan's Bio- and Nano-Photonics Laboratory. He has co-authored over 25 publications and has filed six patent applications. He was awarded the 2019 PATHS-UP student seed fund for his research on developing a computational sensor to quantify cardiac markers.

Artem's technical expertise includes proficiency in Python (NumPy, Keras, Tensorflow), MATLAB, Comsol Multiphysics, and Arduino/Raspberry Pi programming, alongside experimental skills in CAD design, microfluidics, paper fluidics, optical design, and spectroscopy.

Multilingual, he is fluent in English and Russian (native) and possesses intermediate proficiency in Spanish.

As he nears graduation, Artem actively seeks employment opportunities in both academia and industry, with a specific focus on point-of-care and wearable sensing.

Artem Goncharov

STUDENT SPOTLIGHT

Artem Goncharov, PATHS-UP Graduate Student Fellow
Scientific Advisor: Dr. Aydogan Ozcan
University of California at Los Angeles
Primary Research Interest:

- Point-of-Care Sensors for Diagnostics
  - Cardiovascular Disease
  - Lyme Disease
  - Diabetes

Student Success: PATHS-UP Graduate Student Fellow invited to attend Global Young Scientist Summit (GYSS)

Kimberly Branan, a distinguished PATHS-UP Fellow, earned a prestigious selection to attend the Global Young Scientist Summit (GYSS) in Singapore. The GYSS brought together young scientists and top minds from around the world to discuss how research and innovation can address major global challenges. It is a **multi-disciplinary summit** that covers topics including chemistry, physics, medicine, mathematics, computer science, and engineering. Speakers at the Summit include recipients of the Nobel Prize, Fields Medal, Millennium Technology Prize, and Turing Award. The theme for this summit was “Advancing Science, Creating Technologies for a Better World”. Kimberly was one of only eight students chosen to represent Texas A&M’s STEM community at this esteemed international gathering.