

PATHS-UP

Precise Advanced Technologies and Health Systems for Underserved Populations

A National Science Foundation Engineering Research Center since 2017



Lead Institution



TEXAS A&M UNIVERSITY

Partner Institutions



Evaluation Partner Institution:



Center for Culturally Responsive Evaluation and Assessment
University of Illinois at Urbana-Champaign (UIUC)

Engineering transformative, affordable, point-of-care health technologies to impact the well-being of urban and rural underserved populations

Every 30 seconds, an American will be diagnosed with diabetes and another will suffer a coronary event.

These two chronic diseases represent a disproportionately larger burden in underserved communities across the US and the world due to higher prevalence and reduced access to care. We believe an inclusive approach based on stakeholder input is required to conduct application-inspired research and development of transformational and affordable technologies to meet the demand for better and cost-effective health for underserved populations.

OUR MISSION

To change the paradigm for the health of underserved populations by developing revolutionary and cost-effective technologies and systems at the point-of-care (POC). Specifically, we aim to:

- engineer transformative, robust, and affordable, technologies and systems to improve healthcare access, enhance the quality of service and life, and reduce the cost of healthcare in underserved populations; and
- recruit and educate a diverse group of scientists and engineers who are ready to lead the future in developing enabling technologies to improve health in underserved communities.

Research

The PATHS-UP ERC will develop transformative, affordable, point-of-care technologies and systems for underserved populations, with an initial focus on diabetes and cardiovascular disease (CVD), chronic diseases that are particularly devastating in underserved communities in the US.

The goals for the PATHS-UP ERC are to develop the fundamental knowledge, enabling technology and engineered systems needed to overcome current technology gaps and address the current barriers. We will aim to understand other constraints we may not yet know of — particularly in our chosen underserved communities. Further, we will build a transdisciplinary engineering inclusive culture among the current faculty, staff, and students. Understanding the barriers and constraints in each of our underserved communities will require an integrative and interactive process among all partner institutions that includes interaction with all four pillars (research, workforce development, innovation ecosystem, and culture of inclusion) of the ERC and multiple stakeholders: patients, health care providers, caregivers, community health advocates, industry, insurance providers, and government agencies. Thus, the unifying theme across all four of the Center's research thrust areas (see Figure 1) is to use participatory design and stakeholder input to develop two transformative engineered systems: a **Lab-in-your-Palm** (LiyP) and a **Lab-on-a-Wrist** (LoaW), to monitor key biomarkers.

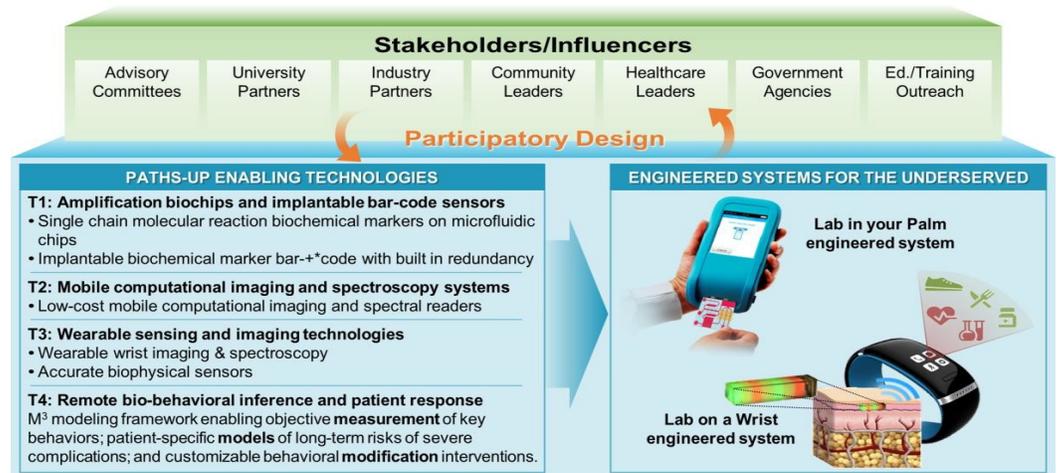


Figure 1: PATHS-UP modular, high performance, enabling technologies and modeling framework will lead to transformational engineered systems for health monitoring, particularly for underserved populations.

Each research thrust and project will also have a broader impacts component in which the students and/or faculty will work with our workforce development/K-12 and innovation ecosystem teams on developing modules, integrating the material into the classroom, and working with the undergraduate Research Experiences for Undergraduates (REU) students and K-12 students and teachers. Each project team will also receive feedback for the enabling technology designs from our engagement team as they obtain stakeholder input from our under-served communities.

Education

The overarching goals of the PATHS-UP workforce development plan are to increase STEM engagement by P-20 students and pre-college educators from diverse backgrounds. Students and teachers will be recruited, educated and trained in unique programs that focus on research innovation and enhancing health in underserved communities where the team's presence already exist. For undergraduate college students, PATHS-UP research will be incorporated into learning modules and vertically integrated research experiences. Such activities are also intended to increase the retention of diverse students in STEM majors and interest in advanced STEM degrees. Moreover, a five year integrated BS Engineering and Masters in Public Health degree will be developed for students. For the pre-college program, we will develop research experiences for K-12 teachers and young scholars program for K-12 students as part of a summer institute that will include diverse participants from our under-served communities.

Innovation Ecosystem

The innovation ecosystem strategic plan is driven by five overarching goals:

- Collect and refine industry stakeholder inputs over the 10-year period
- Enable screening of new discoveries and technologies in alignment with stakeholder requirements
- Enable identification of incremental and disruptive innovations
- Orchestrate seed and pilot funding mechanisms to initiate stakeholder-driven research projects at each phase of technology development
- Implement a process for IP management, training, filing, conversion, and licensing for members.

The innovation and entrepreneurship model involves interaction among three entities: (1) the re-search team (PIs and students at the center institutions), (2) industry stakeholders (IPAB) and affiliates, and (3) the Innovation Ecosystem Implementation Team, (members from the technology transfer and commercialization offices of each institution, including dedicated entrepreneurs-in-residence / training that are embedded in each Center partner institution).



A trainee from a PATHS-UP lab showing an early pre-prototype of a hand-held point-of-care technology

Facilities

The PATHS-UP Center main offices and research headquarters at Texas A&M University (TAMU) will be located in the University Research Park. Texas A&M has pledged to renovate a new building to provide laboratory and office space in to house the Center. The new space will incorporate an FDA QSR compliant quality system to perform medical device development, pilot manufacturing, and testing capabilities. Controlled storage and inventory, as well an inspection area, will also be added. Staffing will include a Quality Engineer to manage the Quality System and maintain ISO13485 registration. The partner institutions also have a good blend of diverse faculty, administration, staff, and students across multiple disciplines that each have their own research laboratories and offices commensurate with Tier 1 universities.

Center Configuration, Leadership, Team Structure

To reach the goals of PATHS-UP, Texas A&M University, the lead institution, will collaborate with partner institutions, Florida International University (FIU), Rice University and University of California at Los Angeles (UCLA). The team also includes culturally responsive evaluation and assessment experts from the Center for Culturally

Responsive Evaluation and Assessment (CREA) at the University of Illinois at Urbana-Champaign (UIUC). The PATHS-UP team brings the necessary expertise to carry out the vision and mission of the ERC for all pillars of research, innovation ecosystem, workforce development and culture of inclusion.

Center Headquarters

PATHS-UP ERC

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