

Application Title: Design Research for Health (*DrHealth*): Transdisciplinary Living Labs for the Built, Natural and Virtual Environment

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Key Participating Units:

- College of Architecture, School of Public Health, College of Engineering, College of Education & Human Development, College of Agriculture & Life Sciences, College of Liberal Arts
- CHSD, CPHA, Center for Remote Health Technologies & Systems (CRHTS), Clinical Science and Translational Research Institute, Human Clinical Research Facility (HCRF), Ergonomics Center, Texas Virtual Data Library, High Performance Research Computing Center, Human Behavior Lab (HBL), Energy Systems Laboratory, Adaptive Robotics & Technology (ART) Lab, Design Research for Active Living (DrAL), Hazard Reduction & Recovery Center, Center for Housing & Urban Development
- The Texas A&M University System (TAMUS) RELLIS Campus, Texas A&M Transportation Institute, Texas Target Communities, Center for Health & Nature

Anticipated Request Amount (\$): \$1,459,370

Matching Fund (\$): \$857,000+

Executive summary: With RDF support, our transdisciplinary team will establish “*DrHealth: Transdisciplinary Living Labs for the Built, Natural and Virtual Environment*” — the first-of-its-kind research infrastructure to help tackle many long-standing challenges in assessing causal impacts of our everyday environment on human health. Establishing true causality (e.g. through randomized control trials) has been nearly impossible in public health studies involving physical environmental interventions due to controllability and feasibility problems. Our project addresses this critical gap by establishing a transformative living lab cluster, consisting of a **Biometeorological Chamber** in a fixed location and **deployable labs**.

Despite significant and increasing interests in living labs that involve various forms of chambers and outdoor laboratories, ours is the first one that combines the capabilities of (a) simulating both indoor and outdoor environmental conditions, (b) testing solar radiation and terrestrial radiation, (c) incorporating virtual reality and haptic technology, and (d) assessing direct public health impacts of various environmental exposures and interventions. This Chamber allows for programming specific and modifiable aspects of everyday environments to foster controlled and virtual reality experiments, while the deployable labs support a wide range of natural and mixed reality experiments in indoor and outdoor locations. These labs will facilitate a broad range of transdisciplinary research targeting everyday environments (e.g. homes, schools, workplaces, neighborhoods) and their health impacts related to (a) protecting health (e.g. reducing exposure to heat, hazards, crime/crash risks), (b) promoting health (e.g. encouraging walking/physical activity, healthy aging, mental health), and (c) restoring health (e.g. increasing access to nature, therapeutic landscape, and healing healthcare environment). *DrHealth*'s innovation comes from the capacity to (a) make the environment programmable to meet the needs of controllability, scalability, and adaptability; (b) support the full range of environmental experiments including the real, virtual, and mixed-reality settings; (c) conduct and process location-specific and real-time measures of both the environment and the corresponding human exposure and response; and (d) serve as a training lab for both faculty, staff, and students. These labs allow TAMUS investigators to utilize and integrate the latest technologies and tools to empower their research related to assessing the environmental impacts on human health outcomes and beyond. They will further stimulate creative and innovative research and transdisciplinary collaboration leading to a large number of grants, publications and patents.