Application Title: Connected Multi-User Virtual Reality (CMVR) Platform for Interactive Education and Collective Decision Making

Lead contact for RDF Application: **Julian Kang**, Department of Construction Science
juliankang@tamu.edu, 979-845-7055

Key Participating Units: College of Engineering: Aerospace, Biomedical, Computer Science, Civil, Electrical, Engineering Technology & Industrial Distribution, Industrial & Systems Engineering, Ocean, Mechanical, Nuclear
College of Architecture: Architecture, Landscape Architecture and Urban Planning, Construction Science, Visualization
College of Agriculture & Life Sciences: Biological & Agricultural
College of Education & Human Development: Health & Kinesiology
College of Geosciences: Oceanography, Atmospheric Sciences
College of Liberal Arts: Psychology
Centers: TTI, Internet2 Technology Evaluation Center

Anticipated Request Amount ($): $170,000

Executive summary of this application to utilize Research Development Funds:

The goal is to create a Connected Multi-User Virtual Reality (CMVR) platform that can be used by multiple users simultaneously, and present it to faculty member in the TAMU system and industry partners.

The proposed CMVR platform consists of several individual Virtual Reality (VR) platforms that are connected to each other over the network. Individual VR platforms are equipped with Head Mounted Display, Omni-Directional Treadmill, Force Feedback Gloves, and Haptic Vest that allow us to walk, see, touch, and feel in a virtual reality space. The CMVR platform allows multiple users to meet each other in a virtual reality space to observe objects of interest and make collective decisions.

The advanced virtual reality platform enables us to experience various physical phenomena in agriculture, engineering, medical and social sciences that we cannot see in real life. In addition to this, time can be controlled in virtual reality, so we can observe how the physical phenomena changes as time goes by at a desired speed. It helps us to figure out the entire picture of the physical phenomenon.

The CMVR platform provides the opportunity for researchers at the TAMU system and industry experts in the Brazos County to observe and analyze unusual physical phenomena, which would allow them to carry out new research that they have not tried in the past. For example, they can create a Virtual Disaster City where a particular disaster starts and evolves over time, which would enable them to perform a completely new research task that was not possible before. The CMVR platform also enables us to create a future city where everyone uses a self-driving vehicle to test the concept of Transportation-as-a-Service (TAAS). Experts in urban planning, transportation, and social science can experience this future city together to support their interdisciplinary research.

Advanced Virtual Reality and Simulation (VR) technology allows us to better understand complex physical phenomena, and expand our knowledge in engineering, architecture, agriculture, education, medical and social sciences. However, CMVR technology evolves almost daily and requires constant upgrades. It is more reasonable to create a centralized CVMR facility and share resources with the TAMU community and industry partners.