Digital Twin City for Age-friendly Communities: Crowd-biosensing of Environmental Distress for Older Adults

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Population aging is a global concern, and it demands smarter and more connected cities for independent mobility and healthy aging of older adults. However, traditional urban planning and design practices that target the “average person” have failed to meet the special needs of older adults experiencing multiple physiological and psychological declines associated with various stages of aging. To address this grand challenge, this project aims to construct a digital twin city (DTC) model with biosignals (i.e., physiological sensing data from older adults’ wearable devices) and photos (i.e., visual sensing data of infrastructure defects and neighborhood disorder from smartphones); this model will serve as a digital replica of the city that shows older adults’ collective distress—detected from biosignals—and associated environmental conditions, thereby allowing us to continuously identify where, why, and to what extent older adults experience distress in their daily routine. The DTC model will be leveraged to design and simulate stress-aware interventions to promote older adults’ mobility and healthy behaviors (e.g., identify the least stressful first-and-last mile trip path to access transit).
Developing the Art-Technology Intergenerational Community (ATIC) Program for Older Adults’ Health and Social Connectedness

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As the older adult population increases research investigating how to support their health and well-being has become more urgent. Our NEA (National Endowment for the Arts) funded research focus on developing of the Art-Technology Intergenerational Community (ATIC) program for older adults in Bryan and College Station, Texas. The program’s purpose was to help improve older adult’s health, well-being and social connectedness. During the program, participants attended four sessions across four weeks creating interactive art projects such as Light-up Cards, Pop-up cards with Light, Interactive Light Painting, and Interactive Soft Circuit Ornaments. Preliminary studies allowed researchers to refine making materials by designing easy to follow fabricated circuit templates. Participants were able to create interactive art by using various materials such as LEDs, copper tape, coin-cell batteries, conductive thread and much more. We utilized mixed research methods. Our findings show that those who participated in the ATIC program had improved perceptions of their own health and intergenerational relationships. There were also significant differences between pre and post study conditions for positive and negative affect. Qualitative results showed the program participants were engaged in the art-making process, creations helped to support intergenerational relationships with their own family members and the student volunteers.