Columbus Consolidated Government

Smart River Safety Digital Twin

Host Community Project Lead(s):

Dr. James Forrest Toelle, Director of Information Technology, Columbus Consolidated Government

Dr. John E. Taylor, Associate Director for Graduate Programs and Research Innovation, School of Civil and Environmental Engineering, Georgia Tech

Dr. Neda Mohammadi, Senior Research Engineer, School of Civil and Environmental Engineering, Georgia Tech

Physical Project Work Location:

Columbus Consolidated Government
100 10th Street
Columbus, GA 31901

Project Description:

Building on the successes of the Smart Uptown Columbus project funded by the Smart Communities Challenge, this project extends the deployment of Internet of Things (IoT) sensors and application of machine learning algorithms to enhance river safety in the adjacent Chattahoochee River. Columbus's proximity to the Chattahoochee provides residents and tourists with an abundance of outdoor river activities such as whitewater rafting, fishing, and kayaking. The section of the Chattahoochee River that runs through Columbus is the longest manmade Urban Whitewater course in the United States. Frequent flooding, however, poses a threat to pedestrians who may find themselves stranded in the river following the release of water from upstream dams. From 2017-2019, 11 people drowned in the Columbus-Phenix City area of the Chattahoochee River and Columbus Fire and EMS reported 54 rescue calls over the last three years. This project develops a method of human detection using high-resolution cameras paired with state-of-the-art object detection methods to monitor sections of the Chattahoochee River that require frequent search and rescue efforts due to flooding. The project will explore future improvements to the city's existing alert methods in the event of a flood when upstream dam water releases and may strand pedestrians.

Project Learning Goals:

Two project interns will work with the Project Leads to deploy cameras along the Chattahoochee River, develop, refine, and apply algorithms for human detection from the video feeds, and investigate new methods of alerting pedestrians of river flooding and Columbus Fire and EMS of pedestrians in the river when flooding occurs.

Top Desired Intern Skills:

Intern 1: Background knowledge in machine learning, visual sensing, data visualization and analysis, and simulation. Experience with at least two of the following: object detection, anomaly detection, agent-based modeling.

Intern 2: Background knowledge in public health and safety, and information systems. Specific knowledge on river safety and smart solutions to address public health and safety not necessary but helpful. Prior experience with sensor data collection/processing is a plus.

Intern Deliverables:

This summer we will be beta testing a variety of approaches to alerting pedestrians in the river of flooding, and Columbus Fire and EMS of pedestrians in the river when flooding occurs. Deliverables and a project timeline will be established in the first week of the internship. A final report of findings and conclusions with a presentation to Project Leads and Columbus Consolidated Government staff/officials is expected.