2019 Progress Report
Chattanooga Smart Community Collaborative
March 2020

The Chattanooga Smart Community Collaborative (CSCC) is a consortium of partners who have committed to collaborate to solve challenges facing the city and the region in areas like Mobility, Energy & Environment, and Health. The Enterprise Center, EPB, City of Chattanooga, Hamilton County, Co-Lab and UTC signed a Memorandum of Understanding (MOU) to that effect in October 2018.

The CSCC high-level objectives are to improve quality of life, attract R&D funding, contribute to economic development – to make the whole more than the sum of its parts. Representatives of the partner institutions meet once a month to exchange information and to keep the focus of CSCC activities on important priorities. In addition, a smaller group meets or has a teleconference every week to ensure that work underway is on track and opportunities for the Collaborative effort do not go unrealized.

In September 2019 CSCC leaders decided to capture collective activities under three broad objectives:

1. Support the effort by the University of Tennessee at Chattanooga to expand its R&D portfolio by collaborating across sectors with strategic partners.
2. Develop and facilitate plans for CSCC members to collaborate modernizing the full array of community public services.
3. Support efforts to integrate smart community priorities and strategies into advancement of the Innovation District and the Health and Wellness Corridor

We are reporting progress achieved since the signing of the MOU with several projects supporting these objectives.

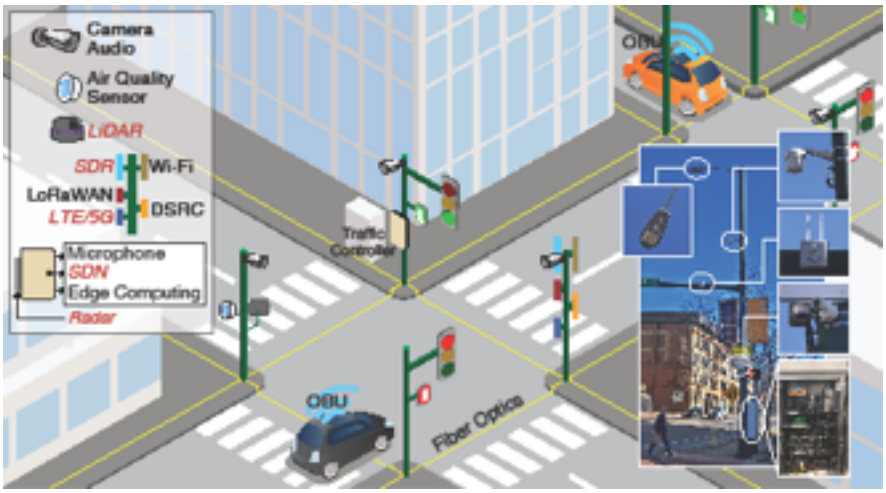
Collaboration

Paramount to the success of CSCC's goals is the effective collaboration of its members. To that end, CSCC member organizations are in constant communication.

- The city of Chattanooga and Hamilton County Emergency Services offers access to historical 911 emergency call data and the traffic network. In return, CUIP and Oak Ridge National Laboratory (ORNL) share traffic shortcuts and work methods with the city.
- The city of Chattanooga's Office of Performance Management and Open Data is working with CUIP to formalize Waze data that both groups can use.
- ORNL, the City, UTC, and CUIP collaborate frequently with other universities and government offices

- UTC participates in coordination meetings with TDOT and ORNL. UTC has partnered with UTK on a TDOT research project.
- CUIP, ORNL, and the City are in discussions regarding the bandwidth, telecommunications protocols and cyber-security of our collective systems.
- EPB provided the installation of the testbed and provides the foundation of the testbed: a community-wide fiber optic network.
- EPB sponsors STEM education programs.

Progress Highlights

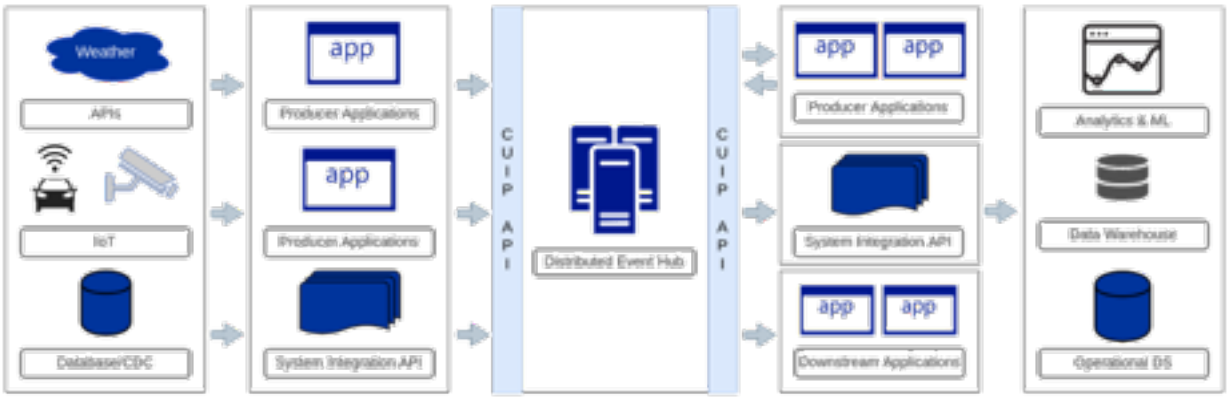


MLK Smart City Corridor: The first effort by the CSCC was establishing a testbed for research and technology development along MLK Jr Boulevard. This smart community corridor enables work on public safety, smart mobility, wellness, sensor development, AI, connected vehicles, and more. The corridor attracts collaborators from academia and the commercial sector. From the onset of the testbed, community involvement was at the core of its mission. The UTC sociology department, especially Dr. Chandra Ward, provided excellent leadership for this effort. Engagement and privacy are top priorities for the CSCC.

Testbed-as-a-service

The MLK Smart Corridor was built for collaboration. The goal is to make it easy for contributors to access parts of the data, deploy their sensors remotely, and receive real-time feedback via our integration platform. All communications, IoT and computer hardware deployed on the corridor are available to users. The design was intended to make integration of new users and projects as simple as possible in order to lower the barrier of entry into large scale projects at city scale.

A data integration platform was developed to provide users with an interoperable platform for data collection. An application programming interface (API) exposes the low-latency and high



throughput ingestion system. The API allows users to easily integrate their devices and collect data from distributed data sources along the corridor in real-time.

Use cases:

Public safety

Real-time analysis of video data identifies situations where moving vehicles (and pedestrians) come too close to each other – known as “near miss” incidents. Object tracking on the MLK Smart Corridor gives us the ability to measure distances between objects in the camera’s field of view to discover the conditions that create near miss incidents. Our hope is that by learning more of what creates these incidents, we can mitigate them.

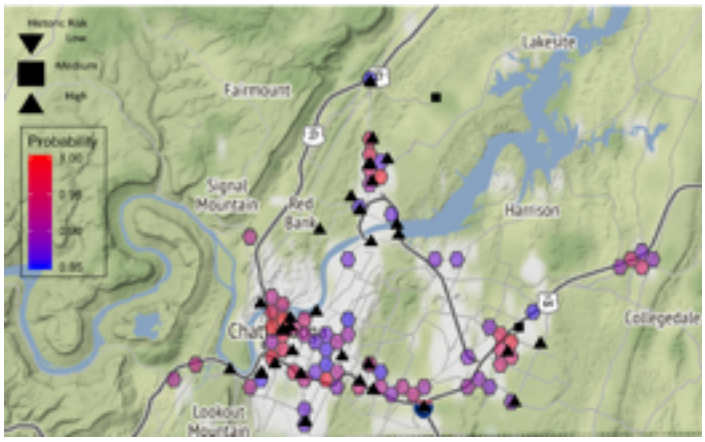
Digital Twin

Creating a digital twin allows researchers to study and experiment with a digitized copy of the physical world. Real-world sensors constantly update the digital twin so information within is up-to-date and reflective of its physical counterpart. Building a digital twin of Chattanooga allows researchers to gather insights that lead to real-world optimization without the consequences of experimenting in the real world. The video here is a short example of our digital twin in action.

SPaT data

Researchers at CUIP are studying implementations of real-time data from SPaT (signal phase and timing) and the benefits of that data being transmitted from signalized intersections to vehicles via DSRC (dedicated short-range communication). Large scale deployment of this technology would make for significantly safer streets through signal violation warnings, traffic signal adaptations, pedestrian and biker alerts at intersections, and incoming emergency vehicle alerts, among many others.

Accident Prediction



CUIP has combined historical 911 emergency call data, historical weather data, and roadway geometric data to create a computer model that estimates where and when accidents will occur. By accurately identifying when and where roadway accidents take place, the Chattanooga Police Department can allocate resources more efficiently to mitigate accidents. Be it officers patrolling in accident hotspots, reduced speed limits, speed deterrents, or other methods, CPD has the knowledge and data to reduce roadway accidents and ultimately, roadway fatalities.

Jeremiah Roland, Peter Way, Mina Sartipi, “Studying the Effects of Weather and Roadway Geometrics on Daily Accident Occurrence using a Multilayer Perceptron Model”, 14th International Science of Smart City Operations and Platforms Engineering (SCOPE’19), April 15, 2019, Montreal, QC, Canada

Co.Lab & Erlanger Health Tech Accelerator:

The mission of CO.LAB’s HealthTech Accelerator is to advance innovation in the healthcare industry by connecting promising startups with leading legacy healthcare organizations in the Chattanooga region.

As a collaboration with Erlanger (the nation’s 10th-largest public healthcare system) and Unum (a Fortune 500 insurance company), startups have the unique opportunity to work closely with industry leaders in healthcare and the insurance market. Through an intensive 10-week program,

companies will accelerate progress by building customer relationships, validating assumptions, pursuing strategic capital and expanding capacity.
https://colab.co/healthtech/

Awards

2019 Smart 50 "Horizon" Award

The Smart 50 Awards, created by US Ignite, Smart Cities Connect and Smart Cities Connect Foundation, listed the Chattanooga Smart Community Collaborative among the winners. The collaborative was a winner in the "Horizons" category, for projects that show "foundational and inspiring groundwork for future smart city projects."

2020 Smart 50 "Digital Transformation" Award

The Chattanooga Smart Community Collaborative was given the award for protecting citizens' privacy during data collection and analysis. The collaborative is a research partnership between the University of Tennessee at Chattanooga, the City of Chattanooga, Erlanger Health System, EPB, Hamilton County, Co.Lab, and The Enterprise Center.

2019 IDC Smart Cities North America Award – Education Category

The CSCC brings together City and County government, public hospital, University of Tennessee; and the municipal utility/fiber provider to coordinate initiatives that require a partnership ecosystem. The CSCC launched a Smart City Testbed initially to focus on data-driven approaches to pedestrian safety, test commercially available technologies, such as new traffic signal controllers, and research future innovations such as experimental vision processing algorithms that allow the detection of near miss events.

2020 IDC Smart Cities North America Award Winner – Police and Law Enforcement Category

The Chattanooga Smart Community Collaborative (CCSC), the University of Tennessee at Chattanooga's Center for Urban Informatics and Progress (CUIP) launched the "911 Project – Predicting Hotspots for Accidents" in early 2018. CUIP leveraged machine learning, specifically multilayer perceptron (MLP) neural network models, to analyze both historic and current 911 data to identify accident trends. This dataset is cross-referenced with DarkSky weather data, roadway geometric data through TDOT's ETRIMS database, and accident time, date, latitude and longitude. The dataset is then used to create a visualization of accident "hotspots" within a virtual grid of Chattanooga helping to determine mitigation strategies.

CSCC leadership

Becky Barnes, Administrator, Hamilton County Health Department
Lilian Bruce, Sr. Director Strategic Planning, EPB
Kevin Comstock, Smart City Director, City of Chattanooga
Matt Gibson, Erlanger Health System (EHS) - Siskin Hospital 1/1/2020
Ken Hays, The Enterprise Center, retired President & CEO
Rick Hitchcock, Chambliss Law
Jim Ingraham, VP Strategic Research, EPB
Tom Lyons, UTC, Clarence E. Harris Chair of Excellence in Entrepreneurship
Reinhold Mann, UTC, Deputy Vice Chancellor for Research
Giuseppe Pizzorno, Associate Dean for Research and CRO, UT College of Medicine & EHS
Philip Pugliese, CARTA (Chattanooga Area Regional Transportation Authority), System Planner
Mina Sartipi, UTC & Bredesen Center, Founding Director of CUIP
Marcus Shaw, CEO, Company Lab
Deb Socia, President & CEO, The Enterprise Center