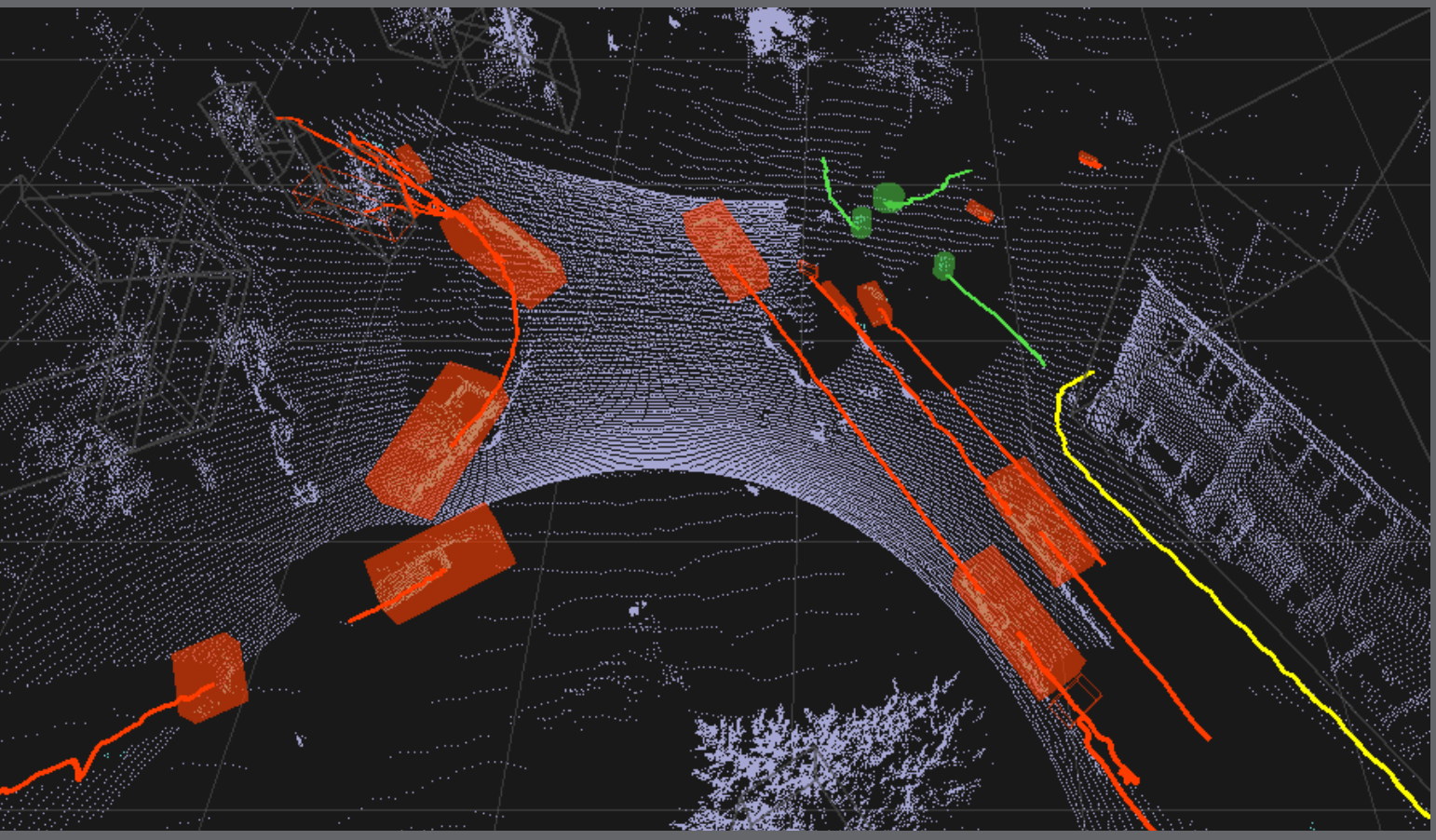
CASE STUDY

SEOUL ROBOTICS.

Smart Corridor: Chattanooga Smart City Division and the University of Tennessee at Chattanooga Create the City's First Smart Intersection Equipped with Pedestrian Analysis



Seoul Robotics provides 3D insights for the Chattanooga Smart City Division and the University of Tennessee at Chattanooga Center of Urban Informatics and Progress (CUIP) to ensure the safety of their citizens and improve efficiencies.

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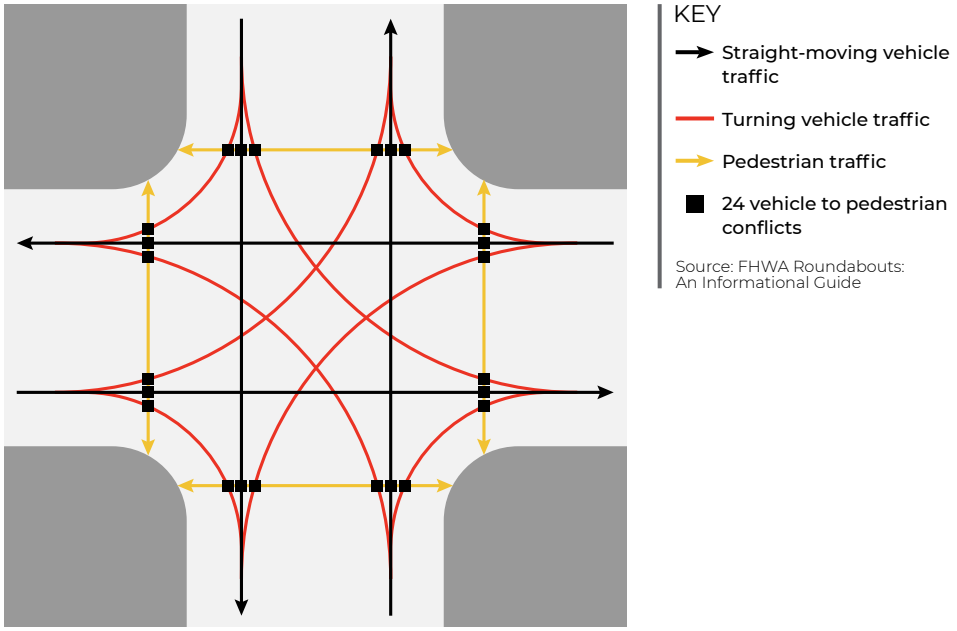
MISSION

The MLK Smart Corridor is a first-of-its-kind testbed for the Chattanooga Smart Community Collaborative (CSCC), which utilizes 3D technology to understand pedestrian safety. Pedestrian safety is a massive priority for the Chattanooga Smart City Division; proprietary data collected by the Chattanooga Smart City Division shows that pedestrians are 23x more likely to be fatally injured and 6x more likely to suffer injuries resulting from a crash than a motorist. With these statistics in mind, the city of Chattanooga sprung into action to significantly improve pedestrian safety in their city.

At a standard two-lane road intersection there are 24 potential spots for pedestrian to vehicle conflicts.



SOLUTION

In an effort to track and improve pedestrian safety along the city's bustling MLK Smart Corridor, the city of Chattanooga tapped Seoul Robotics to install their 3D perception software, SENSR™, and 3D LiDAR sensors to create a more robust picture of how pedestrians and vehicles interact through the classification and identification of objects.

RESULT

Today, this system can anonymously detect, track and predict the movement of pedestrians and vehicles, identifying potential incidents such as accidents and wrong-way driving, as well as better understanding traffic flow and suggesting reroutes. Furthermore, the system augments existing camera infrastructure to enhance the accuracy and detail of safety data while preserving the privacy of pedestrians. The project is already gaining valuable insights, and the city and university anticipate that, within a few months, this system will gather a large enough dataset to inform city planning decisions.

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WE ARE SMARTER TOGETHER

The project began when the Chattanooga Smart City Division recognized a need to improve pedestrian safety in the city's urban centers. They turned to the University of Tennessee at Chattanooga (UTC) and the Center for Urban Informatics and Progress (CUIP) to find a solution that would enable them to capture the necessary data to make informed decisions about how to improve pedestrian safety.

Recognizing the potential for 3D sensors to capture this data, UTC and the CUIP turned to Seoul Robotics to create a LiDAR solution powered by SENSR™, Seoul Robotics 3D perception software, that would create extremely accurate, 3D representations of the physical environment. The ultimate goal was to create a system that would provide researchers the necessary insights to understand traffic and pedestrian patterns, and create a safe environment for both drivers and pedestrians.

WHY SEOUL ROBOTICS?

For previous projects within smart cities, CUIP was using an in-house computer vision algorithm to classify vehicles and pedestrians, and to collect data on "near miss" collisions. However, it was difficult to get the 3D component out of the computer vision alone, and it was hard to calculate how close these "near misses" actually were. They recognized there was an opportunity to introduce a 3D vision solution, which would enhance the current capabilities by introducing:

- Data with a 360-degree field of view
- Object location in full 3D
- 24/7 all-weather and all-visibility performance
- High-resolution and accurate detection
- Anonymous object tracking
- No biometric data

So CUIP approached Seoul Robotics to learn more about a solution that would provide high resolution data and real-time actionable insights.

HOW DOES THIS 3D VISION SOLUTION AND LIDAR SENSORS CREATE A SMART CITY?

The city of Chattanooga installed LiDAR sensors, as eyes in the sky, in high-traffic intersections downtown, spaces that are close to city parks and event spaces and tend to have a high traffic volume. The core function of the technology—mapping, tracking, and identification—is utilized in combination with Seoul Robotics proprietary software SENSR™, which essentially acts as the brain processing data coming in from the LiDAR sensors. Seoul Robotics software deploys deep learning with patented 3D computer vision, which allows for greater detection and classification capabilities, creating a more intelligent, mobile and safe city.

Now, thanks to this new system (eyes + brain), the city can understand metrics like how long pedestrians are waiting on a sidewalk to cross, how traffic efficiencies are impacted by pedestrians crossing, and how individuals and cars interact with things like public transportation and bicycles. These unprecedented insights influence critical decisions that will impact pedestrian safety, prevent collisions, and aid city planning efforts.

"Installing the LiDAR system on our heavily trafficked MLK Smart Corridor has significantly enhanced the quality of insights we are able to receive. We no longer have to operate with blindspots in our data and can make decisions with the most accurate information available." said Austin Harris, CUIP Testbed Manager.

> "Our experience with Seoul Robotics has been nothing short of fantastic. They have worked very closely with our team throughout the deployment. Their technologies have allowed us to generate real-time data that create a safer and smarter city of Chattanooga. Their team is helpful, bright, and insightful. They are a crucial part of the work we do, and we're honored to have them as a partner"
>
> —Kevin Comstock, Smart Cities Director, City of Chattanooga

WHAT HAS THIS SYSTEM ENABLED?

Through a better understanding of how systems operate, the Chattanooga Smart City Division can improve infrastructure to make cities more efficient, reduce emissions, and improve air quality. The project also gives students access to highly granular insights into how the world and cities are working together, training students on the very technologies that will become even more prevalent for cities in the next few years, shepherding in this new wave of innovation.

The project has the potential to create a safer city not just in Chattanooga but also in other places that want to replicate the project, thanks to the development of a blueprint that will explain how other cities can implement and benefit from these systems. Municipalities don't have massive budgets to spend building out large-scale projects with the latest emerging technology. Instead, the city of Chattanooga is demonstrating that even by installing emerging technology in a select number of intersections, the data provided can be valuable and enable the city to make strategic decisions that improve safety.

> The ultimate vision for this project is to create a blueprint for other cities to accurately and cost-effectively implement this system, ensuring more municipalities can build a smarter city, improve pedestrian safety and create a better quality of life.

FUTURE APPLICATIONS

Long term, the Chattanooga Smart City Division, UTC, and CUIP will continue to build on this project, using the same LiDAR system already in place to continue innovation in smart cities. The next development will be the creation of a connected vehicle system, also known as autonomy through infrastructure—using the current 3D sensors on infrastructure to communicate via 4/5G with vehicles, to operate them autonomously. With this system in place, the city and university can pilot an autonomous vehicle that operates entirely via communications from LiDAR on infrastructure without requiring any sensors on the vehicle itself. The system is compatible with any vehicle embedded with 4/5G technology, including personal vehicles and public transportation.

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ABOUT SEOUL ROBOTICS

Seoul Robotics is a 3D computer vision company building a perception platform that uses AI and machine learning to power the future of mobility. Founded in 2017, Seoul Robotics has partnered with OEMs, system integrators and government agencies around the world to diversify the use of 3D data. The company's proprietary software is compatible with nearly all LiDAR and 3D data sensors and increases accuracy, efficiency and ensures safety across a range of industries and applications. Seoul Robotics has offices in Seoul, Silicon Valley, Munich and Detroit and is backed by leading global financial institutions.