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Cerebro Real-time Security

Built on a Distributed Cloud Architecture, Powered by Computer Vision Machine Learning Algorithms

Motivation

Campus crime is on the rise

The consensus amongst students is that our campus is not being adequately secured from criminals (who come from surrounding areas) that target students.

We believe campus police should have the most current and sophisticated technology, seeing as the best and brightest are RIGHT HERE, in the STEM departments of these universities.

Actual CSU Email

The following is a message from Cleveland State University on Feb 24th

"A robbery was reported today to the Cleveland Police Department at approximately 7:20 pm on East 24th Street between Euclid and Prospect Avenue. "

"A female CSU student had her cell phone taken from her while she was talking on it."

"She was pushed to the ground while the suspects attempted to unsuccessfully take her purse. "

"One suspect was wearing an orange hoodie. The second suspect was wearing a white or gray hoodie or jacket. "

"Both suspects ran east on Euclid Avenue. **No further information is available at this time.**"

Suspect apprehension rate is low, we'll fix that

Cerebro uses a innovative human-detection and memorization algorithm, based on a Computer Vision Machine Learning algorithm (modified neural network) to detect humans in the video streams of the hundreds of cameras on campus. Using this algorithm, crimes can be detected in real time. As a crime is committed, the suspect is tagged in the system, and they are then tracked from camera to camera as they attempt to flee. Their location is reported to police in real-time, and is displayed on tablets in police cruisers as both video and as a dot on a map.

Using this, police can track the suspect, update information about the chase, and bring the chase to a conclusion both quicker and more efficiently than ever.

Solutions

Cerebro Solutions

Hardware | Software & Data

HelpKey | CV Algorithm | Applications

Software

Client Application | Server Application | Media Streaming Pipeline | HelpKey Web API | Computer Vision Application

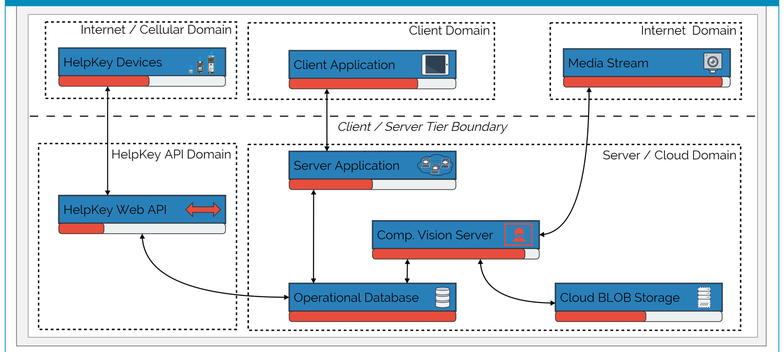
Operational Database | Cloud BLOB Storage Mechanism

Hardware

University Issued Cerebro HelpKey

1. User Holds Button
2. API Request Made
3. Cerebro Initiates GPS

System Architecture



Cloud-based Architecture

Cerebro's application suite is built on Microsoft Azure's cloud infrastructure. This ensures maximum up-time, minimal cost, and infinite scalability. This allows for easy expansion from campus security to city security and beyond.

Technology and Innovation

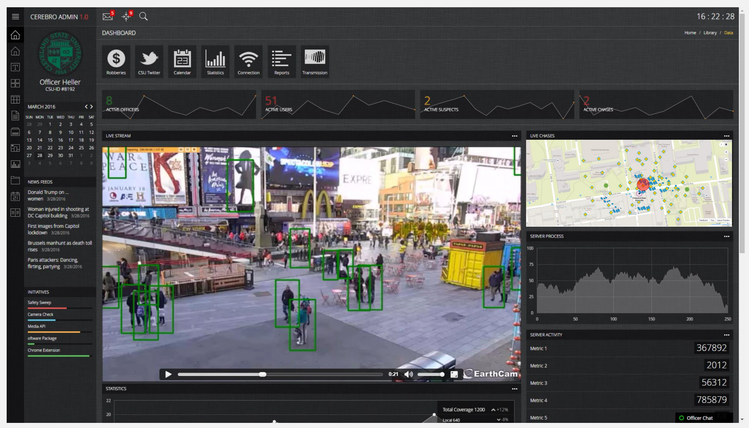
Computer Vision Algorithm

Our proprietary neural network algorithm makes detecting and tracking unique humans both fast, efficient, and accurate. Using this data, individuals cannot escape from local police, as they are tracked from camera to camera – having their location reported in real-time.

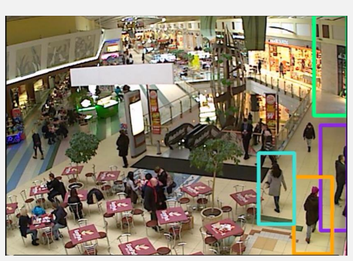
Real-time Feedback

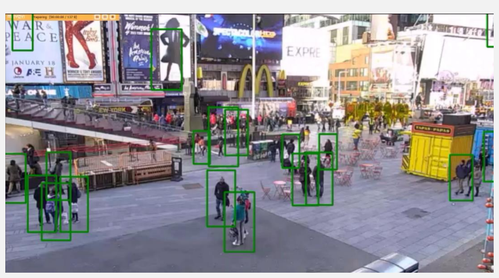
Using the mobile application on police tablets (developed by our team), police can add suspects to a chase, initiate a chase, view camera feeds, and perform many other tasks which give them eyes in nearly every corner of the city.

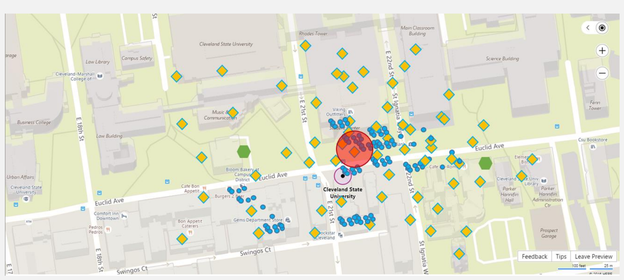
Revolutionary Police User Interface



Application Screenshots







Conclusion & Future Work

Patent and Intellectual Property

Currently, a patent for Cerebro's computer vision algorithm is being drafted and reviewed by CSU professors. This patent will give the students exclusive ownership over the software.

Distribution to Ohio Universities

The next step in Cerebro's life-cycle is to distribute the solution to campuses state-wide. This pilot will provide valuable feedback on the solution, as well as help combat the growing crime in many Ohio schools.

Incorporation

The mission of Cerebro is to end violent crime on campuses. This is a goal that is very near and dear to our hearts. It's something that we simply must do. With this in mind, our final goal is to form a startup that focuses itself on facilitating this goal.

Acknowledgements

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	Dr. Pong P. Chu (CSU EECS Department)

The goal of Cerebro is to utilize what we have learned as STEM students to create a scalable web based security system that will first and foremost secure campuses, cities , and eventually the world.