Carnegie Mellon University

95-733 Internet of Things
Smart Cities

Smart Cities

- Smart cities is about more than technology.
- Must often include partnering with (perhaps several) government agencies.
- In general, the goal of smart cities is to improve the quality of life of its citizens.
- In many cities, populations are increasing, weather events are more severe, and infrastructure is aging.

Smart City applications: transportation

- Goal: Reduce traffic congestion and improve air quality
- Consider EZPass adopted by several states
- Sensors may be placed in roads
- Cameras installed in traffic lights may be used as sensors
- Dashboard cameras mounted in garbage trucks monitor road conditions (initiating early repair)
- Monitor the traffic with intelligent traffic lights (counting cars passing and regulate light signaling)
- May involve lights working independently or in collaboration with each other
- Metro 21 at CMU reduced congestion by 26% and improved air quality by %34.

Smart City applications: transportation

- Interesting example from December 2022
- The world's first fully automated parking system has been approved for public use in Germany.
- The driverless parking system allows users to drop their Mercedes S-Class or EQS electric car at a drop off point after notifying an app. The system then checks that the route to a specific parking spot is clear and drives the vehicle autonomously to the correct location, wherever that might be in the parking garage.
- Later, the vehicle returns to the pick-up point in exactly the same way. This relies on the interaction of the intelligent infrastructure supplied by Bosch and installed in the parking garage and Mercedes-Benz technology in the car…
- https://www.eenewseurope.com/en/worlds-first-driverless-public-parking-system-rolls-out/

Smart City applications: transportation

- The Bay Area Rapid Transit System (BART) provides a REST API.
- Think of BART as a very large WoT device.

- Quiz: How could we leverage this information on a microcontroller?

Smart City applications: transportation

- See the BART API: https://api.bart.gov/docs/etd/etd.aspx
- See the bottom of the page for XML and JSON examples
- Use this API Key: MW9S-E7SL-26DU-VV8V

Smart city applications: human services

- Calls for help (disabled people, people who are sick)
- The data for each call is logged in a database
- Decision support systems may utilize these data for improved decision making
- For example, based on the call, prescription information might be made available to first responders

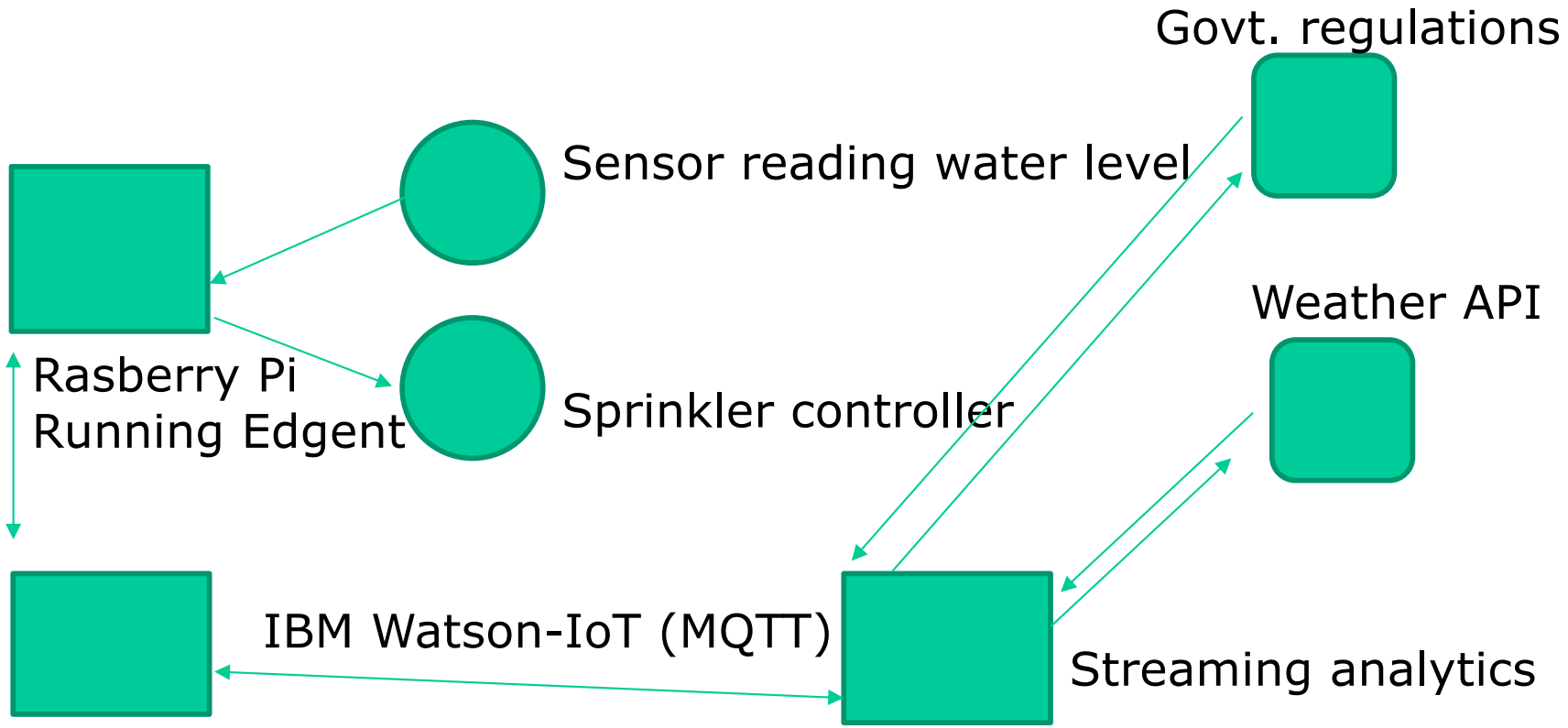
Smart city applications: safety

- Data from shot sensing technology such as ShotSpotter
- Controversy: Some say ShotSpotter is inaccurate, with one study finding that 70% of alerts don't have evidence of gunfire. Others say the system is highly accurate, with a 97% aggregate accuracy rate.
- Data from 9-11 calls can be placed into databases
  - Positive use cases
  - Negative use cases
- Police forces can deploy in areas thought to be temporary hotspots
- Locations can be targeted rather than individuals

Smart city applications: conservation

- An example from IBM
- A city wide application
- Water conservation needs the smart sprinkler to be connected as well as smart.

Smart city applications: water conservation



https://www.youtube.com/watch?v=Rvc1CqNJkOA&feature=youtu.be&list=PLhZR82i0P9NqrksME13f2t8tDMIhxUtCH