Software Engineering of Internet of Things
Handin 3: Design for Theoretical Case

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Task

Summary: Perform a high-level design of an IoT system that solves a problem from a case.

Details:

1. Pick one of the 5 cases in this document. All cases require:

   - You will need to design a system around the chosen case.
   - You will likely need to obtain some domain knowledge in order to understand the requirements and what a solution will look like.
   - You will have to consider which other features fit into the chosen case and argue how your design supports them.
   - You will need to have code running in the cloud and on the edge.
   - You may have code running in the fog.
   - You need to send something from the edge to the cloud.
   - You need to send something from the cloud to the edge.

2. Analyse the problem.

3. Design a solution, including:

   - Network topology.
   - Radio technology.
   - Sensor and actuator choices.
   - Data processing regime.

4. Describe the resulting design and argue for the choices made. Remember to include:

   - A block diagram of the different components.

- References to the different network tiers (cloud, fog, edge) and their tradeoffs.
- Discussion about how the requirements can be met.
- Discussion of privacy considerations.

5. **Note:** No code needs to be produced. This is a purely theoretical exercise.

Case 1: Lighthearted Lighting

Purpose: Make a "bulb" with adjustable light setpoint(s).

Requirements:

- Implements daylight harvesting using a setpoint.
- Ability to control intensity.
- Ability to monitor the light level.

Case 2: Perceptive Parcel

Purpose: Construct a parcel tracker which will track travel conditions.

Requirements:

- Ability to locate a parcel on a map.
- Ability to locate a parcel in the physical world (e.g., light up an LED).
- Detect extreme conditions (e.g., temperature and vibration) and generate alarms based on this.

Case 3: Clever Cup

Purpose: Monitor consumption of beverages.

Requirements:

- Allow user to locate cup (e.g., by placing a pin on a map and lighting up an LED).
- Allow user to define a range of comfort temperature and alarm the user when this range is violated.

Case 4: Cunning Climate

Purpose: Construct a networked climate system.

Requirements:

- Allow for temperature/humidity/light curves to be defined.

- Attempt to affect the environment to reach these setpoint curves.

- Notify user if measured conditions deviate from setpoints.

Case 5: Sneaky Sneaks

Purpose: Construct an instrumented shoe.

Requirements:

- Log route walked in the cloud.

- Log environmental factors (e.g., temperature, humidity and traction).

- Maintain a set of personal bests and alert the user when they have been improved.

- Tie shoes.

Deadline

May 28th, 2021.