Smart IoT Sprinkler System

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Abstract

The average family spends more than $1000 in water costs per year. One-way water is commonly wasted in many households is via inefficient sprinkler systems for lawns. Current technology has enabled the development of automatic sprinkler systems, which can be preconfigured to operate at desired times of day and intervals. Although these systems may reduce the amount of water utilized overall, they are not weather forecast aware. In situations when rainfall is upcomming the systems will still water the lawn. In this project, we plan to implement a smart sprinkler system that has full awareness of upcoming weather and take account of environmental conditions in the past and present. We will utilize the latest cloud computing technology and take account of environmental conditions to provide optimal watering solutions. Our system will maximize the cost effectiveness and efficiency regarding water utilization and flexibility.

What is IoT?

IoT, the Internet of Things, is an ecosystem composed of various layers. At the bottom layer, are the devices and sensors, whose main function is to perceive and identify objects, and collect information. Above this layer, is the gateway, which performs as a secure medium between the sensors and devices and the cloud. The analytics, monitoring, and overall management is conducted by the top layer.

IoT Ecosystem & Gateway Stack

IBM Watson™ IoT Platform

IBM Watson™ IoT Platform provides access to IoT devices and develop analytic applications. This platform enables the user to perform device management operations, storage and access of device data and secure communication over MQTT & TLS.

Architecture of the Watson IoT Platform

Mqtt : MQ Telemetry Transport

MQTT is a messaging protocol designed to minimize network bandwidth and resource requirements which ensuring reliability of data transfer. These characteristics are ideal for constrained devices with low-bandwidth and unreliable network. This form of data transportation is also ideal for the emerging world of IoT devices, where bandwidth and power are valuable. MQTT was invented by Dr. Andy Stanford-Clark of IBM and Arlen Nipper (of Eurotech) in 1999.

Wiring Diagram

Currently, this setup takes in localized data temperature and soil humidity to determine whether or not to activate the solenoid to allow water to pass through the sprinkler. The goal is to transfer the localized data to the cloud using IBM Watson™ IoT Platform. Then, we will acquire weather data in regards to the forecasted precipitation from the OpenWeatherMap API.

Program Flow Chart

Components

- Particle Photon
- Text LCD 16x2
- Text IC LCD Backpask
- DF Robot Gravity: Analog LM35 Temperature Sensor v 2

References

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