Name(s)	Project Number
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Project Title

AquaGuard: Smart Water Sensor and Electronic Alert System (Internet of Things Device)

Abstract

Objectives/Goals

The goal of this project is to design and build a prototype of a smart water sensor that will send an electronic message alert when a water leak is detected, creating a next generation Internet of Things device. Because water sensors on the market today provide passive (ie. visual or audible) alerts, they are limited in their usefulness. If a person is not home to notice the alert, he/she will not know that the water sensor has detected a leak. By the time they come home, the damage will be done. AquaGuard is an active water sensor that sends out an email immediately upon detecting a water leak allowing the home owner to proactively address the problem and reduce the resulting water damage.

Methods/Materials

A smart water sensor prototype was designed by connecting a fluoropolymer (water sensing) wire to an Arduino microcontroller in a way that once water hits the water sensing wire, it acts as a conductor and closes the circuit. Once the circuit is closed, an electric current signals the Arduino software which then triggers Python#s email-sending software and an electronic alert is sent. A branded case was designed and 3D printed to protect the hardware. Additional experiments were performed to compare the water sensitivity of the fluoropolymer wire to other, household materials.

Results

The design and construction was successful, and the goal was met with AquaGuard detecting water leaks and sending an electronic message. Due to its sensitivity, conductivity and design, the fluoropolymer wire was determined to be the better material to use for the AquaGuard prototype.

Conclusions/Discussion

The engineering goal was met. AquaGuard sends an electronic alert once water is detected. Adding a fluoropolymer water sensing wire combined with the email alert feature enables home owners to act quicker and mitigate the water damage, making it a more effective solution. Next steps would be to remotely trigger a solenoid valve to automatically shut off water flow as soon as a water leak is detected and then send an electronic message confirming the action taken. While water is the focus of this project, the possibilities for an active sensor with an electronic message alert system are endless, and could be applied to heat sensors, smoke sensors, air and light sensors.

Summary Statement

To design and build a prototype of a smart water sensor that will send an electronic alert when a water leak is detected.

Help Received

To build the prototype I used Arduino tutorials and designed the software with the help of internet research. Ian Moore from the Carlsbad Library helped me with the TinkerCAD and 3D Printing. My parents provided general advice and guidance, and purchased my materials.