Senior Design Project: WaterMainia

April 20th, 2017
WaterMainia

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What is the Problem?

Water Conservation

Water Pipe Damage
Our Solution - WaterMainia

Sense

Detect

Alert
System Specifications and Deliverables

1. Implemented using 3/4” pipe
2. Water flow data is metered and recorded
3. Store data for previous two years
4. Display water consumption data in tables, line charts and scatter plots
5. Close water main & notify owner within one minute from pipe burst
6. Alerts owner of leaks and provides options
7. Power < 50W
8. Cost <$500 budget
System Structure - Block Diagram

Water Source

Flow Sensor

Sensor Pulses

Power System

ADC

Rasp Pi 3 Model B

3.3V

Solid State Relay

Emergency Shutoff Valve

Manual Override

WiFi Chip

SMS Alert Message

Cloud Server

Data Transfer

Android App

Data Transfer

120V AC Wall Outlet

Wall Outlet

Sensor Pulses

3.3V

Data Transfer

Power System

Water Source
Water Flow Detection

- Water Source
- Flow Sensor
- Flow Algorithm
- Solenoid Valve
- Solenoid Closes
  - Flood Detected
- Water Distributed Through Home

Flow Voltage
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Hall Effect Sensor

- Mechanical Flow Meter with a magnet attached to one fin of a turbine. On every revolution a square pulse is generated when the magnet passes the semiconductor mounted to the pipe.
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Vacation Mode
At Home Mode
Data Transfer

- Change WaterMania Settings
- Upload Water Flow Data
- Download Water Flow Data
- Change WaterMania Settings
- Android App
- WiFi Chip
- SMS Message
Android App

WaterMania

View Water Consumption

Respond to Alert

System Settings

We detected an abnormally large volume of water flowing on 2017-04-14 at 15:49:40

CHANGE DATA DISPLAY
Budget

- Solid State Relay - $11.28
- MCP3008 ADC - $19.86
- Raspberry Pi 3 SBC - $41.99
- GPIO Expansion board - $9.90
- 110V AC Solenoid Valve - $26.99
- Hall effect sensor - $10.00
- Power Cord - $15.64
- Bridge Rectifier - $6.75
- 5V Voltage regulators - $6.45
- PEX pipe fittings - $28.00
- Transformer - $16.56
- Micro USB Charging Cable - $7.15
- Micro SD card - $20.99
- Server - $25.00
- Raspberry Pi 3 case - $7.75

Total: $243.00

Demo Costs: $180
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Thank you!
Any Questions?