SEAS Computing Facility
Raspberry Pi Workshop 3:
Internet of Things with Cayenne

October 28, 2017
Overview

● Introduction to Cayenne
● Controlling triggers, outputs and actions without programming
  ○ Program a push-button ON/OFF input system for LED
  ○ Connect and program motion sensor with LED
What is Cayenne?

- Cayenne is an app for smartphones and computers that allows you to control the Raspberry Pi through a graphical user interface.
  - Add and remotely control sensors, motors, actuators, GPIO boards, and more
  - Customizable dashboards with drag-and-drop widgets for connection devices
  - Create triggers and threshold alerts for devices, events, and actions
  - Schedule one-time or multi-device events for easy automation
  - Allows remote desktop
Getting Started

● Create an account at https://cayenne.mydevices.com
● Follow the instructions to connect the Raspberry Pi
● After the Raspberry Pi restarts, go to cayenne.mydevices.com
● When you are done, the Dashboard should appear

Terminal commands:
○ wget https://cayenne.mydevices.com/dl/rpi_3a6ljvjpbtb.sh
○ sudo bash rpi_3a6ljvjpbtb.sh -v
Cayenne Dashboard

- Memory: RAM 379.7 MB / 862.1 MB, 44.0%
- Processor: CPU, Sony UK (Pi 3 Model B), 2%
- Storage: Disk 4.1 GB / 29.1 GB, 14.0%

Network Speed: 0.26 Mbit/sec
CPU Temperature: 58.00 °C
Processes: 122

Digital Motion Sensor

- Live: 1.0
- 0.5

Digital Output
Circuit Basics

- Ohm’s Law: \( V = IR \)
  - \( V \): Voltage (volts)
  - \( I \): Current (amperes)
  - \( R \): Resistance (ohms)
- LEDs have a maximum current
- Ohm’s Law (rewritten): \( I = \frac{V}{R} \)
  - To keep current \( (I) \) low, resistance \( (R) \) must be high enough
Breadboard

Diagram from Tweaking4All
Connecting an LED to Cayenne

- Connect the positive (long) side to pin 23
- Connect a resistor between the negative (short) side and ground
Connecting an LED to Cayenne
Adding an LED to Cayenne Dashboard
Dragging Devices to the Dashboard
PIR Motion Sensor Detector Module

- **Time Delay Adjust**
  - Clockwise increases delay

- **Sensitivity Adjust**
  - Clockwise decreases range

- **Pins**
  - **Power**: Should be between 5 and 20 V input
  - **Ground**: Should be connected to ground
  - **Output**: Will be 3.3 V if activated, 0 if not

Diagram from Henry’s Bench
Creating Triggers with Motion Sensor
Creating Triggers with Motion Sensor & LED
Creating Triggers with Motion Sensor & LED

Triggers

My Triggers

Sensor (light off)

if Raspberry Pi

Digital Motion Sensor (MotionSensor, Channel 24)

- On (1)
- Off (0)

then Raspberry Pi

Red LED (LightSwitch, Channel 23)

- On
- Off

Cancel Delete Save
Adding Notifications

- **If**: Raspberry Pi
  - Digital Motion Sensor (MotionSensor, Channel 24)
  - On (1)
  - Off (0)

- **Then**: Raspberry Pi
  - Send a notification
  - Add custom recipient
  - Add more recipients?
    - Select All
    - Send Text Message
      - Requires mobile phone number
    - Send Email
Extension Ideas from Last Week

Easy:
● Take video for 10 seconds after motion detected
● Time-lapse photography

Medium:
● Use button to activate or deactivate security system
● Have multiple LEDs represent how long since motion was detected
● Use secret code in terminal to deactivate security system
● Define your own functions in your code

Hard:
● Send email with photo of intruder (consider smtplib)
● Take photo upon receiving specific email