Smart Porch Controller

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Inspiration

- Consulted with brother
- Explained inputs and outputs on Photon 2
- Told him I was thinking of environmental inputs determining outputs
- He mentioned cars whose windshield wipers turn on (output) when detecting rain drops (input)
- I decided to make a controller in the shape of a car to do just that - take environmental inputs to control lights, outlets, and more!

Variables and Components

Variables:

- Temperature
- Ambient Light
- Precipitation
- Motion

Components:

- BME280 (temperature)
- Photodiode (light)
- Rain Sensor (precipitation)
- Motion Sensor
- 2 Servo Motors (windshield wipers)
- 2 Buttons (cycle modes)
- OLED Display
- 2 Neopixels (headlights)
- Hue Lights
- Wemo Outlets
- Particle Photon 2 (controller)

Design and Fabrication

Design Tools:

- Solidworks 3D design
  - Car Body
  - Windshield
  - Wheels/Axles
  - Tray to mount servos/pass wires through
- Adobe Illustrator
  - Template for laser cut/engrave
- Bambu Carbon 3D printer
  - Printed all solidworks parts
- Epilog Laser Cutter/Engraver
  - Cut acrylic windshield
  - Engraved “Deep Dive” into windshield

Demonstration 1 - Lights

The Photodiode allows more current to flow through it when it is exposed to more light. This means it can be used to determine what ambient light levels are - and what to do about it!

The Smart Porch Controller uses this information to control two outputs - the headlights on the controller and the Hue lights in the room (or on the porch!).

At low light levels:

- The NeoPixels will be brighter
- The Hue lights will turn on

At high light levels:

- The Neopixels will dim (and eventually turn off
- The Hue lights will turn off

Demonstration 2 - Temperature

The BME280 monitors the current temperature, pressure, and humidity in the area. This data is displayed live on the OLED screen.

This data can be used to determine if a fan or heater needs to be turned on, and the Smart Porch Controller can do just that by communicating with the Wemo Smart Outlets.

When the temperature is above 80F:

- A Wemo outlet with a fan plugged in will turn on
- The OLED will display a bitmap reflecting warm weather

When the temperature is below 70F:

- A Wemo outlet with a heater plugged in will turn on
- The OLED will display a bitmap reflecting cold weather

Demonstration 3 - Precipitation

The Rain Sensor is a simple device that, when exposed to moisture, will send a signal to the Photon 2. The water completes a circuit on the component and it sends a high signal.

The Smart Porch Controller uses this data on a more local scale - it has automatic windshield wipers!

When rain is detected:

- The windshield wipers on the controller will turn on for ten seconds
- The bitmap image on the OLED will change to reflect wet weather (as well as warm or cold)
- There are four bitmap images:
  - Sun (dry, warm)
  - Winter Coat (dry, cold)
  - Storm Cloud (wet, warm)
  - Snowflake (wet, cold)

Demonstration 4 - Modes

The Smart Porch Controller normally operates in Automatic mode, which has all been demonstrated to this point.

Clicking the black button will switch it to Manual mode.

While in Manual mode, clicking the green button will cycle through six different Manual mode settings.

- All off
- Dry/Warm Mode
  - Lights on
  - Fan on
- Dry/Cold Mode
  - Lights on
  - Heater on
- Wet/Warm Mode
  - Lights on
  - Fan on
  - Wipers on
- Wet/Cold Mode
  - Lights on
  - Heater on
  - Wipers on
- Away Mode
  - Motion triggers lights to turn on

Thank you!