Makerspace Galileo
Headcounter Documentation

OVERVIEW.

The D.H. Hill Makerspace Galileo Headcounter is designed to track the number of people that physically enter the Makerspace, regardless of whether they are an authenticated user or an interested library patron. It estimates the number of people in the Makerspace and sends that data every hour on the hour to an online database.

COMPONENTS.

Electronic.

Intel Galileo
Model: Generation 2.
Product Page:
http://www.intel.com/content/www/us/en/embedded/products/galileo/galileo-overview.html
Modifications:

- Programmed with the Arduino IDE.
- Added datalogger.py in /home/root/

PIR Motion Sensor
Product Page: https://www.sparkfun.com/products/13285
Modifications: Removed JST. Exposed individual wires.

Otherwise.

Breadboard
Alligator Clips (3)
Jumper Wires (9)
Green LED
Yellow LED
Red LED
10K Resistor
330 Resistor (3)
12V Power Supply
Ethernet Cable
Legos

OPERATION.

On a surface level, the Headcounter keeps track of the number of people who visited the Makerspace in the following way:

1. When the motion sensor is activated and the Makerspace is open, that person's presence is added to a total tally inside of the Galileo.
2. The tally is sent to an online database: http://data.sparkfun.com/ncsuhillmakerspace. This is done every hour on the hour. Since Sparkfun automatically assumes we're operating in Greenwich Mean Time, the "Hour" field denotes what hour the data was sent and the "Visitors" field denotes a rough estimate of how many people entered *and* exited the Makerspace.
3. The tally is also appended to a spreadsheet on Google Drive
   Note: if resetting the worksheet or adding a new one for the program to write to, be sure to delete all but row 1. This way, new rows of data are appended correctly.
4. The internal tally is reset to zero after sending the data.

Several physical precautions and warning signs have been implemented in order to ensure the best functionality from the Headcounter. These include:

1. Sheltering the motion sensor from peripheral stimuli. This allows it to only count movement that is directly in front of it.
2. Two LEDs to determine the state of the ethernet connection. If the green LED is on, the data has been posted to the database without a problem. If the red LED is on, the connection has failed. In this event, unplug and replug the Headcounter in.
3. A third LED to determine if the Headcounter is functioning properly while plugged in (running the code, counting people, everything not ethernet-based). This LED blinks on and off, at a rate of on for about ten seconds and off for about three.
4. The opening and closing staff should press the button labeled "Reset" on the Galileo board. If the Galileo runs for a long time, propagation delays between it and the ethernet switch don't synchronize and the ethernet connection fails (I think).

PROGRAMMING.

The Makerspace Galileo Headcounter can be programmed through the Arduino IDE, adapted for the Intel Galileo and is programmed exclusively in C.

Libraries used include ethernet.h and ethernetudp.h, used for establishing an ethernet connection and checking the time, respectively.

Before uploading to the Galileo, I recommend uploading the basic Blink function to force the ethernet to stop communicating.

LINUX INTERACTION.

Important information:

- Serial port uses 115200 baud (GNU Screen or PuTTY + 6-pin USB to serial cable).

POSSIBLE FUTURE IMPROVEMENTS.

Though the Headcounter functions as it is supposed to, there are a few improvements that would better collect data and preserve the project, combating issues such as:

1. If someone stands in front of the motion sensor (at the door of the Makerspace), the counter function will believe that the person is multiple people. This might just be as simple as asking people not to talk/stop at the door.
2. The Headcounter is not very pleasing to look at, with wires exposed and sprawling everywhere. However, it would still need access to the ethernet switch and power.