

Playground Sensors

Backgrounds

Playgrounds are expensive installations. Some facilities with less use has the same replacing frequency as those with more use, which is a huge waste of expense. Therefore, knowing how frequently an equipment has been used is significant and necessary.

The objective of this project is recording the use frequency of a playground within a certain time by counting the number of children passing through the slide.



Long Lake Park

Details of Meets

- Track the times of playground being used within a certain time.
- Achieve 85% accuracy
- Cannot involve users' privacy issues
- Product safety standard
- Achieve one month service life

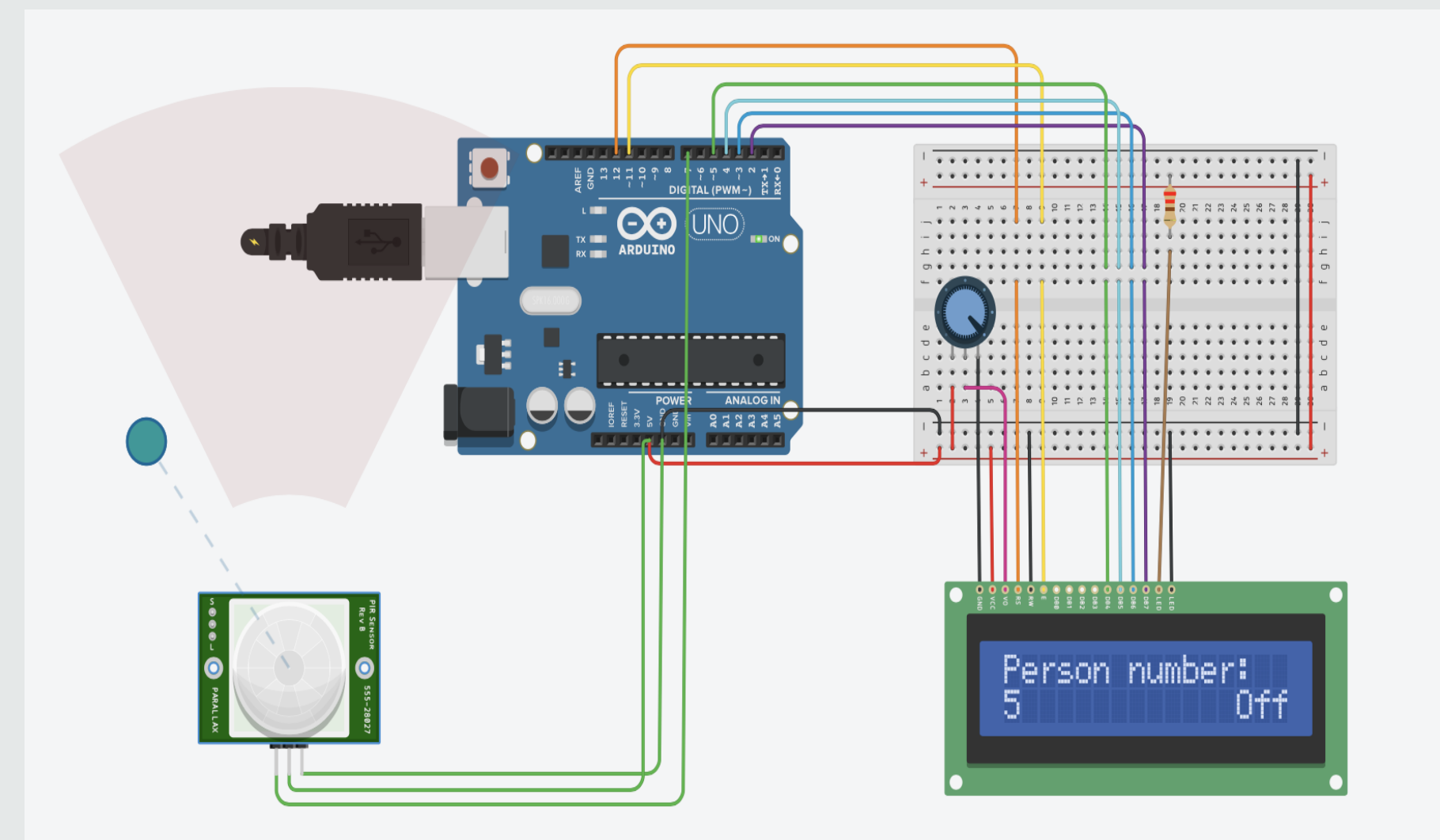
Test Result

- Basically achieve 85% accuracy in high average
- Error occurs when temperature is high
- The battery can support the device working all night, with solar panel it can work all day long.

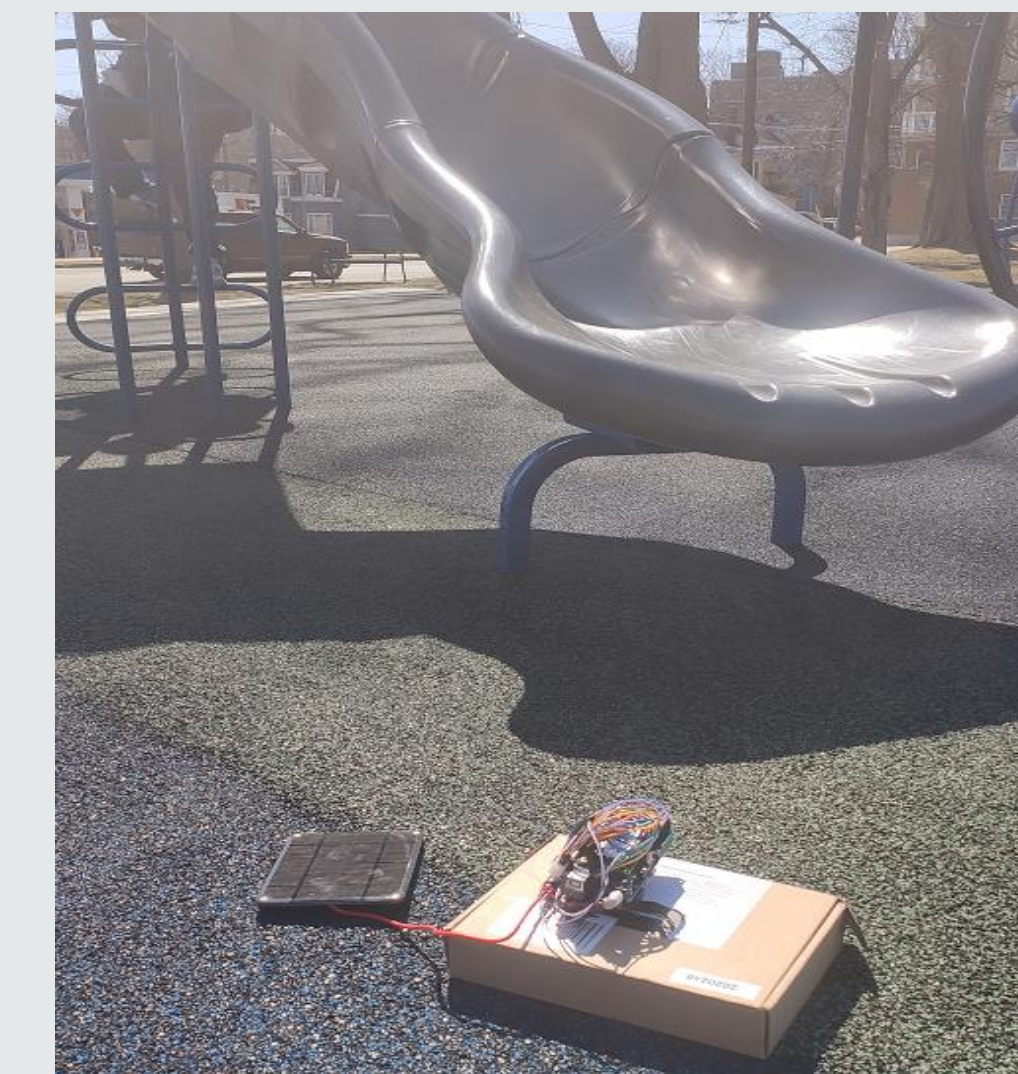
Details of Design

Component Breakdown

- LCD Display Module:** Displaying information as we want. Adjustable brightness.
- PIR Sensor Module:** Detecting people in a sector.
- Solar Rechargeable Battery:** Producing stable voltage no matter how the weather is.



Module Overview



Prototype

Why choose PIR sensor? - Cost efficiency; High accuracy; Wide applicable environment

PIR sensor is a sort of temperature sensitive sensor which can detect infrared rays emitted by human or certain animals and convert them into electrical signals for output. PIR sensor relies on radiation for detection, which solves the problem of identifying moving objects.

Why choose LCD? -Low power consumption; More information showing

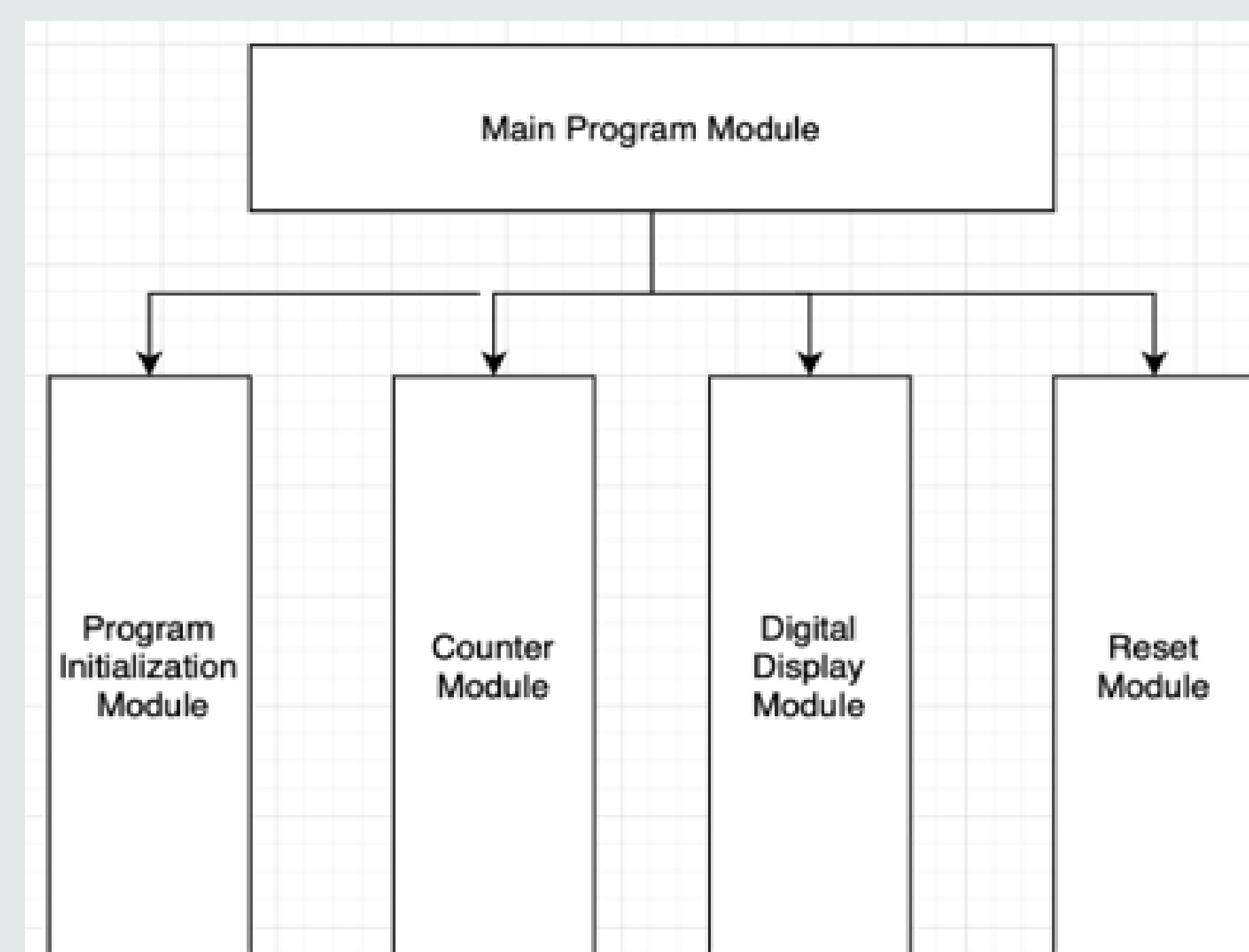
LCD display can display more contents compared with LED display. Also, the display brightness is able to be adjusted to save power.

Why choose Solar Charger? -Continuity; Conveniency

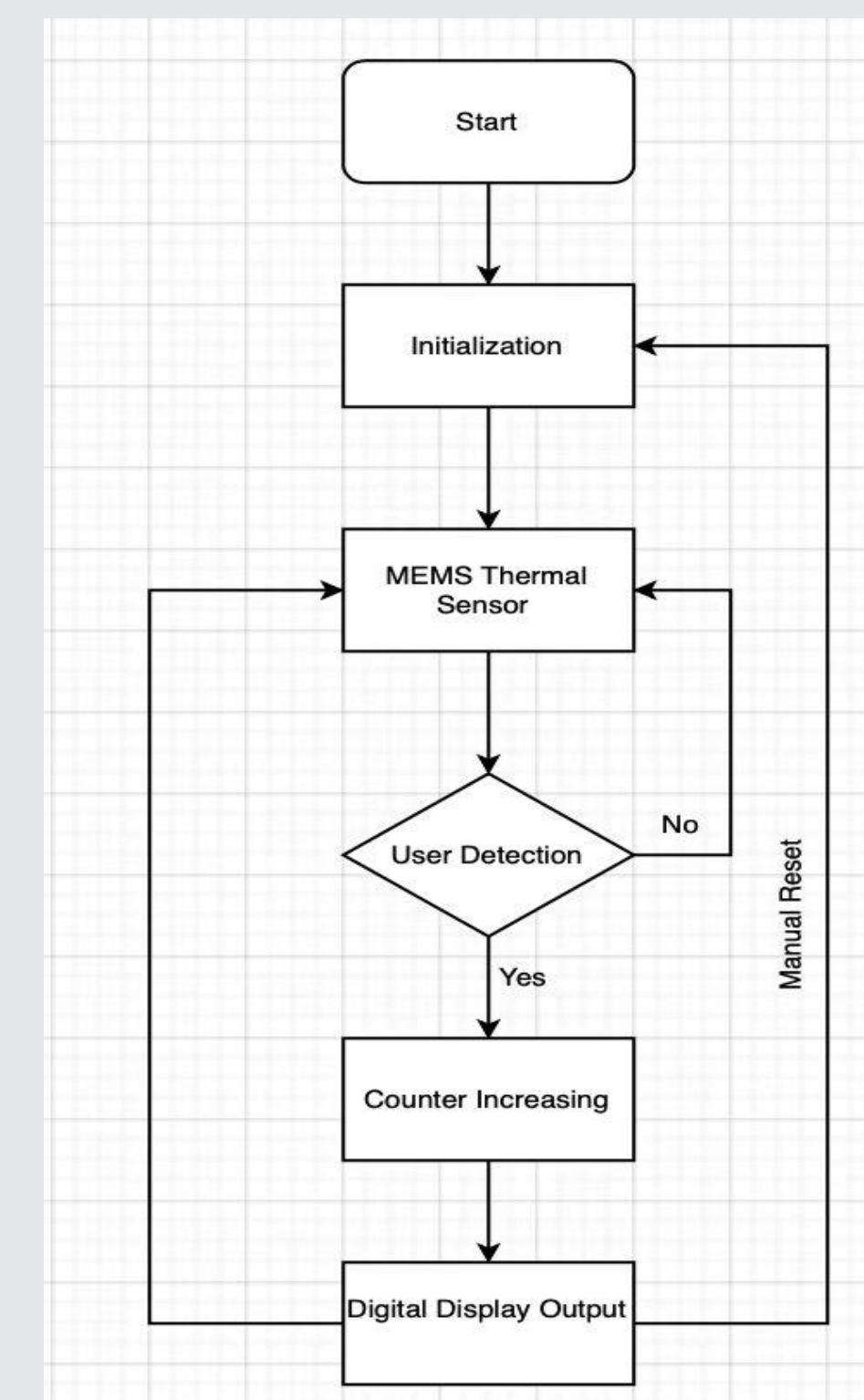
Solar rechargeable battery can power the whole system continuously and it won't need to be replaced.

About software structure

- Program Initialization Module:** this module is to initialize the digital display and timer.
- Counter Module:** this module is based on the high-level pulses detected by the thermal sensor and input to the microcontroller interface, the microcontroller starts counting when triggered by the high-level voltage.
- Digital Display Module:** this module counts according to the connection of the microcontroller and performs corresponding digital display.
- Reset Module:** reset and clear all data.



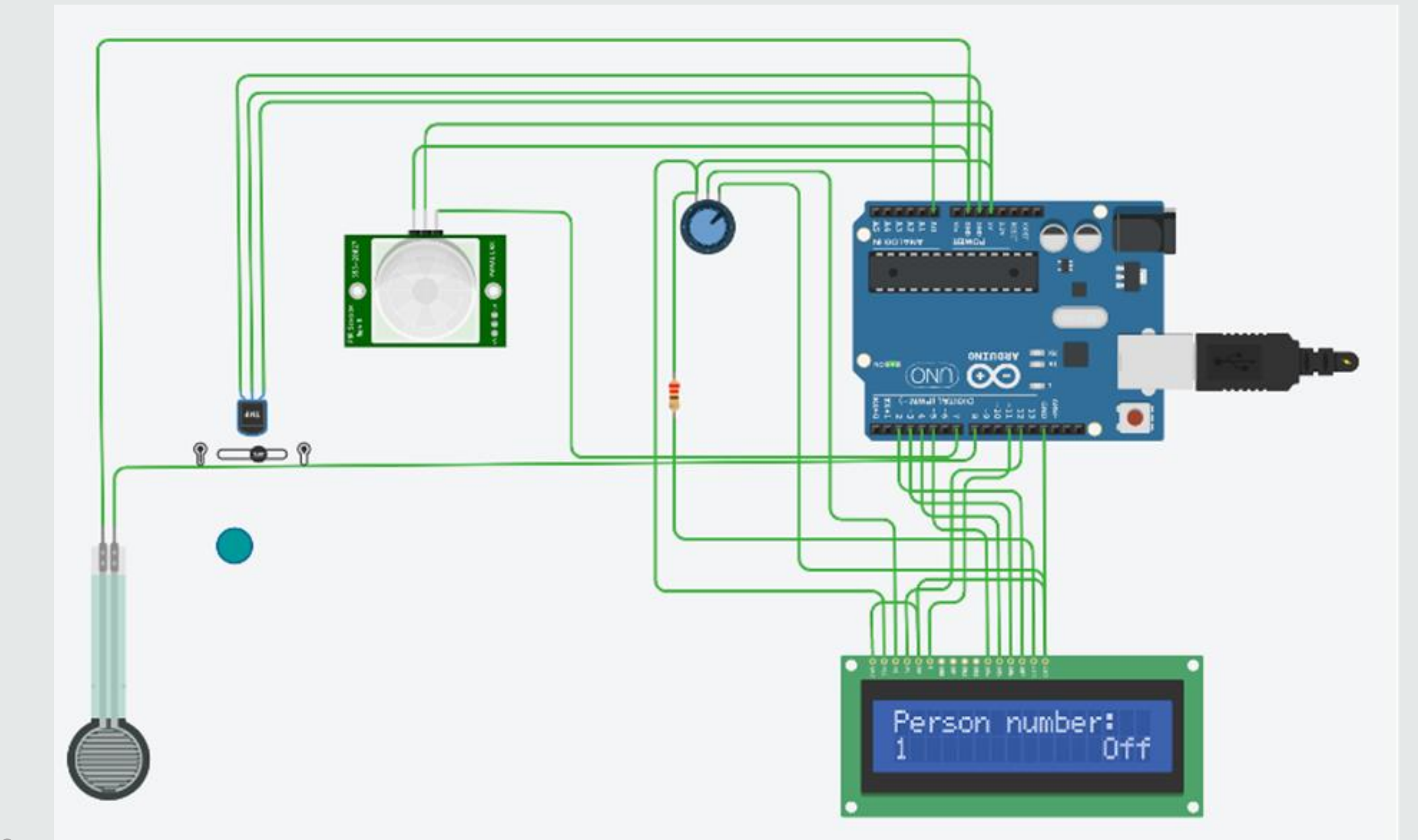
Software System Block Diagram



Software Flowchart

Conclusion and Recommendations

- Now, our product have basic function to detect numbers of children using a playground in a certain time.
- The design team are working on adding new temperature & pressure sensor to make the product works better in summer. Pressure sensor works instead of PIR sensor under high temperature.



Modified Circuit Diagram

References

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