Team 6 Documentation
Walk-In Doormat Light

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Introduction

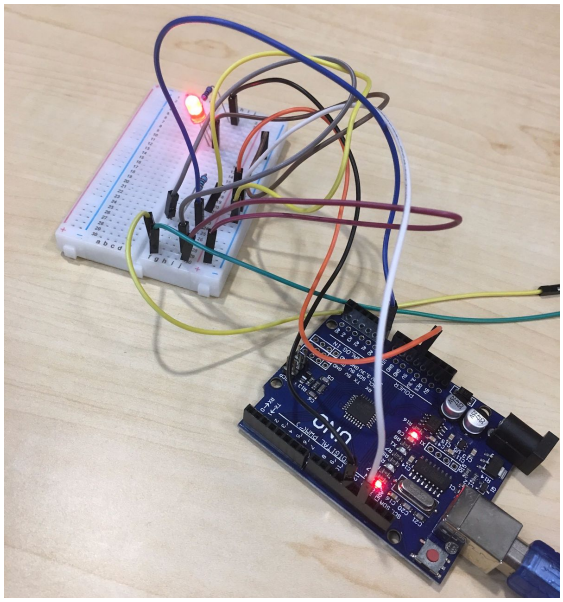
The idea behind this project is to increase the efficiency of turning lights on and off in order to reduce electricity use. The use of the doormat reduces the necessity of thought to remember to turn off the lights. As a result, this reduces wasted energy, which is costly not only in terms of resources but also in terms of money. How this project will go about this problem is by providing a more practical way to switch on and off the lights even if the person is not aware. Motion sensors do not work too well and cost more to install, so what we did instead for our project was use a doormat with a pressure sensor underneath. When someone is walking in or out of a room, they will step on the mat, and the force of their weight will turn on and off the lights.

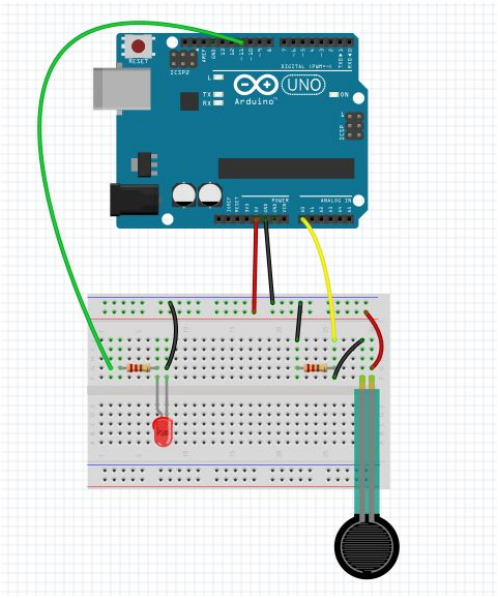
Materials

- Arduino
  - 1 resistor
  - 1 LED light
  - 12 male to male jumper wires
  - 2 female to male jumper wires
  - 1 breadboard (half-size)
- Pressure Sensor
- Soldering Kit
- Four plexiglass layers of different sizes
- Duct tape
- Soft doormat

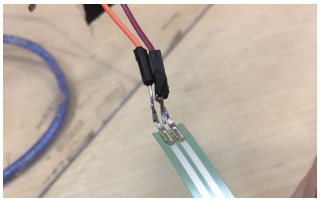
Instructions

1. Obtain materials

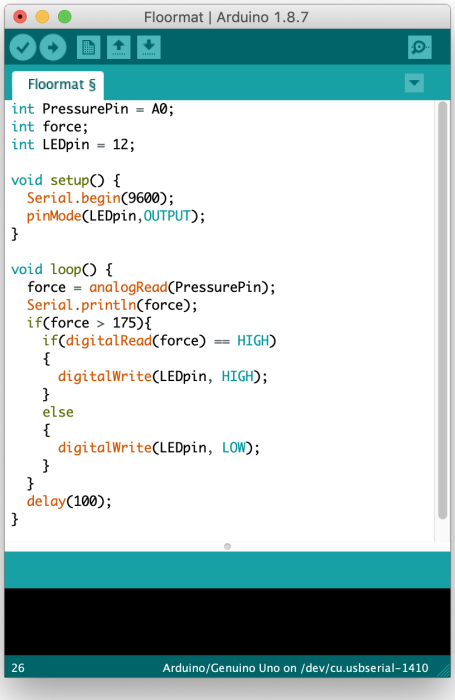




2. Set up Arduino components based on diagram



   a. Solder parts together, if necessary, using soldering kit



3. Code program within Arduino IDE using example code (shown above)
4. Assemble bowl shaped layout of pressure sensor
    a. Make square out of duct tape, approximately wrapping it around itself 5 times
    b. Score plexiglass into 3 different sizes, each larger than the last with the smallest one larger than the pressure sensor
    c. Attach all pieces to each other using duct tape, in this order:
        i. Duct tape square
        ii. Pressure sensor
        iii. Plexiglass (4 pieces, from smallest to largest)
        iv. Doormat
5. Test final product and make adjustments if necessary

Conclusion

If we had more time, we would have worked more on the code for the doormat; we would account for the different weights of whoever is stepping on the doormat; that way, the pressure sensor isn't the same sensitivity for every person. In terms of funding, we would have gotten a bigger pressure sensor that would cover much more area for the doormat, making it easier to not just design but also code for.

Our greatest obstacle was maximizing the pressure sensor's range of input; the pressure sensor we bought was not large enough to cover the entire doormat, so we created a bowl-like shape using plexiglass and duct-tape that allowed the sides of the doormat to be responsive as well. We spent many hours applying trial-and-error to find the most successful setup for our sensor. Another obstacle we

faced was discovering the right force threshold for our code so that the sensor was not too responsive/unresponsive–the number seemed to vary based on the surface the doormat was on, so we consumed much time simply testing different numbers and utilizing the print function in the Arduino IDE to see the exact force inputs over time.

Our proudest moment was completing the project. Since none of us has prior experience with hardware, it was amazing to see our hard work come to fruition through a tangible object that fulfilled our goals. Our experiences with this project may lead us into pursuing similar topics in the future.

References

Our idea was guided by:
http://samsneatprojectblogcode.blogspot.com/2016/06/force-sensor-code-and-wiring.html

IEEE QP coordinators and helpers:
Dillon
Michael
Hugo
Bassel