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Project 7 Design Document

1. System Design.

The high-level design of this project was to utilize a microcontroller that had a thermometer and photocell connected to take in readings of the current environment. There were some difficulties setting up the ports for the ADC but other than that it ran quite smooth. The initial sampling frequency was just with a for loop running for 100000 times.

1. Experiment.

I conducted the experiments in room playing with different lights. Then I used my phone light to increase the light exposure, like someone is using their phone or tv. It was challenging to get a range of different lights in just my room. I was conducting experiments at night, so it felt useless to go outside.

1. Results.

|  |  |  |
| --- | --- | --- |
| Temp | Photo | Light |
| 25 | 67 | Off |
| 20 | 68 | Off |
| 21 | 70 | Off |
| 21 | 72 | Off |
| 21 | 72 | Off |
| 21 | 70 | Off |
| 20 | 68 | Off |
| 20 | 66 | Off |
| 21 | 67 | Off |
| 21 | 69 | Off |
| 21 | 72 | Off |

The precision and accuracy were pretty good while conducting the experiment. In my final model I decided to use just the photocell. One method to minimize the number of sampling frequency would be to just have environments set up very well. The temperature sensor was just about useless, so I decided to not even use it in Weka, the photocell on the other hand was great at telling when a phone screen was on. It is quite accurate in my room. There is just the photocell with Boolean logic. I validated the machine learning algorithm by just observing what it did and if it aligned with what I thought it would do some sort of cross validation.

1. Discussions.

In the process I used Weka and just processed all the data and specifically used the photocell. I used photocell as the primary classifier. My real time approach work in classifying the events seemed to be quite accurate. I used 6 different environments to test out the system. I used a dark room, a dark room with a phone light, a regularly room, a regular room with a phone light, a dimly lit room, and a dimly lit room with a phone light. The system worked accurately to identify when a phone light was being used in just about every environment. The best environment was when the room was in the dark room.

The design was somewhat successful. I believe that the wide range of environments helped increase the accuracy of the identification of when a phone light was being used. I think for this experiment to completely increase accuracy there needs to be a lot of sensors placed all around the room and more controlled lighting. Also, a better way to trigger when a phone light is being used. I used a button as a trigger to tell the system when a phone is being used and there is a slight delay between it being pressed and the phone light turning on. Overall, this was a successful experiment that created a program that could identify when in the correct setting if a phone light is being used.

Diagram:

