I. Project Description

The overall objective of this project is to implement an automatic solar powered LED security system designed to collect enough solar energy during the daylight to power a series of LEDs during the night. The solar collectors will gather a sufficient amount of power to make the LEDs shine at a minimum brightness. Motion sensors will also be implemented into the system to detect movement and brighten the LEDs also sending a message notifying a security director of some sort. The solar panels will use power to charge a battery or series of batteries during the day and the LEDs will draw power from that source at night. If an LED goes out or does not have enough energy to illuminate, the system will be designed to gather energy from one of the other sources. Also, if there is any type of power failure, a message will be sent again to an outside source for help. Applications for a project like this are mainly large scale. We would see systems like this outside of buildings, spotlights that tell when there is movement in an area, whether it be an intruder or not. Clients would expect a product like this possibly as a model before the design of a building by using a small scale rendition to show what the large scale will be able to accomplish.

II. Deliverables

1. Solar collection linked with ultra-bright LEDs
2. Able to collect enough energy to power a battery to turn on a series of LEDs
3. Incorporate motion sensors to turn on LEDs at a low luminance when motion is detected
4. Apply energy scale, battery collects enough power for the longest time possible
5. Send message when motion is detected

6. Send message if problem is recorded

III. Milestones

1. Solar collection linked with ultra-bright LEDs
    i. Research photovoltaic cells and how they work in order to charge a battery
    ii. Turn LEDs on with an already charged battery
    iii. Test solar collectors for energy collection
2. Able to collect enough energy to power a battery to turn on a series of LEDs
    i. Build collector circuit
    ii. Collect solar energy and test circuit
    iii. Link microcontroller to battery charger and LED driver circuit
3. Incorporate motion sensors to turn on LEDs at a low luminance when motion is detected
    i. Attach motion sensors to LED driver circuit
    ii. Link microcontroller to motion sensors
4. Apply energy scale, battery collects enough power for the longest time possible
    i. Connect energy storage system to battery charger and link to LED driver circuit
5. Send message when motion is detected
    i. Python programming
6. Send message if problem is recorded
    i. Python programming

IV. Work Breakdown Structure

1. Solar collection linked with ultra-bright LEDs

1.1. Research photovoltaic cells and how they work in order to charge a battery

(GREEN)

1.2. Turn LEDs on with an already charged battery

(GREEN)

1.3. Test solar collectors for energy collection

(RED)

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2. Able to collect enough energy to power a battery to turn on a series of LEDs

   2.1. Build collector circuit

   (GREEN)

   2.2. Collect solar energy and test circuit

   (YELLOW)

   2.3. Link microcontroller to battery charger and LED driver circuit

   (RED)

3. Incorporate motion sensors to turn on LEDs at a low luminance when motion is detected

   3.1. Attach motion sensors to LED driver circuit

   (YELLOW)

   3.2. Link microcontroller to motion sensors

   (RED)

4. Apply energy scale, battery collects enough power for the longest time possible

4.1.Connect energy storage system to battery charger and link to LED driver circuit

(RED)

5. Send message when motion is detected
6. Send message if problem is recorded

5-6.1. Python Programming ***(RED)***