

Embedded System Design(EC342)

Project Evaluation - 1

Project Title : Light Saver

Team Members :

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Project introduction & motivation :

In order to comply with the ongoing need to use resources efficiently & sustainably, we aim to build a street light system based on solar energy which tracks the position of the Sun during daytime & provides lighting only as & when required.

During day time, the system must be able to track the location of the sun to maximize the solar energy intake. When the natural light diminishes and dips below a certain threshold, the light should turn on. Keeping the light on at full intensity when no one is around leads to energy wastage, hence we aim to make the system run at full intensity only when natural lighting is not enough and there are people around. We aim to build a prototype containing 2 LEDs initially.

Current State of the Art :

Smart Lighting Systems are not an untouched area of projects. Many prototypes of smart lighting systems are available. For example,

https://www.researchgate.net/publication/262352965_Smart_street_light_system_with_energy_saving_function_based_on_the_sensor_network describes a project which minimizes the use of energy by a network of sensors. In most projects implemented today, the communication is present only between the controller and the sensor network & there is no real-time surveillance of data. Given the upcoming smart cities with public wifi network, we aim to make the system connected to the internet which may make problem debugging easier & less time consuming.

Features :

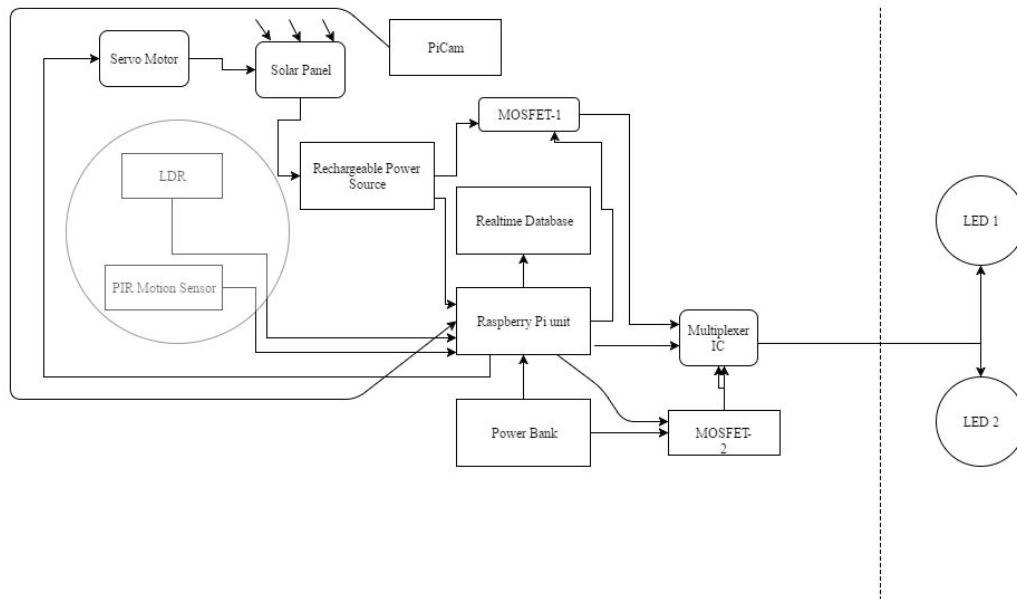
- Uses renewable Solar Energy.
- Optimizes energy usage by deciding whether or not artificial lighting is required based on the present natural lighting & human presence.
- In case of a shortage of ample solar energy, The system will be able to connect to a conventional energy source to provide lighting.
- System will be connected to the internet and data such as available solar energy, human presence, etc will be uploaded onto a real time database for surveillance.

Details of implementation :

Components to be used :

- Microcontroller : Raspberry Pi
~Used to implement image processing algorithm to track the Sun.
- Solar Panel (12v, 1.5W)
~Used to channelize solar energy to the power source of the lights.
- Rechargeable Batteries
~Rechargeable power source for the lights.
- Power Bank
~Used as power source for the system (microcontroller, sensors)
- Servo Motor
~Used to make the solar panel face towards the sun.
- Light Dependant Resistors
~Used to check presence of natural lighting. No feedback should be present from the LED.
- MOSFET IC
~To vary lighting based on conditions. Used as Voltage controlled Voltage source.
- LED Lamp
- Pi camera
~Used with Raspberry Pi to track the Sun.
- PIR motion sensor
~Used to detect presence of motion (travelling car, walking person)
- Multiplexer IC to select between Solar/Conventional energy.

Proposed Block Diagram :



Timeline :

