

IOT Based Smart Lighting System for Hostels

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- 1 Introduction
 - Current State of the Art
- 2 Literature Survey
 - Existing recent solutions
- 3 Proposed Work
 - Proposed solution to the problem
- 4 Results
 - Simulations and Results
- 5 Cost of Production
- 6 Discussions and Future Work
 - Discussions on the results
 - Future Work

What is the problem that you are tackling

- There are many areas in offices and residential blocks where lights are kept ON absolutely during night time. During most of this time, light is being wasted as it is not being utilised by anyone and should only be kept ON when required.
- A good solution for such a problem is highly demanded as it would help save large units of electricity. This would further attract managers as it would lead to huge savings from electricity bills.
- We have focused our project on a smart lighting system for hostels.

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- Current state of the art in this field consist of many motion detector indoor lights such as Frostfire motion sensor light, RAB super stealth, Samsung Smart Things Motion Sensor etc.
- Major roadblock among them is that they detect motion and presence and so we have to continuously move for them to work. However our problem is to detect the presence of visitors in lobbies. So we have also made use of sound information from sound sensors.

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Existing recent solutions I

- A solution based on IOT system for city-wide level has been proposed in [1]. A smart lighting system has been introduced with brief overview of communication protocols used. Their analysis revealed that using IOT solutions can reduce power consumption by over 30
- In [2], [3] IOT solutions to build smart lighting solutions in buildings are discussed. Sensors have been used to make decisions for lighting and air-conditioning. These solutions have been shown to be more effective in power management.
- Most intuitive solution to save electricity is to turn OFF lights when no person is near them and then turn them ON when reaches a specified area.
- Use PIR sensors to decide if someone is inside a room and then switch light state is shown in [4]. An algorithm for counting number of people has been implemented.

Existing recent solutions II

- Human tracking and activity recognition to change light state including illumination is performed in [5]. For this task, thermal and depth cameras have been used.
- A microwave sensor has been used in [6].
- NFC tags have been used in [7], which work on weak radio signal for communication. Unique user tags have been used containing user information and lights illumination are changed based on preference of users.
- In [8], data from sensors collected include relative position of viewers relative to an exhibit. Different lights near the exhibit are then modified to provide best viewing experience to users. Evolutionary algorithms have been used to give the best outcome. Not only does this give an enhanced user experience but also significant savings have been predicted by use of such a system.

Existing recent solutions III

- Fruitful conclusions can be derived from analysis of data from sensors. [11] shows data analysis from smart lighting system in hostels and based on consumed voltage they were able to predict that maximum power consumption is from electrical cooking appliances.
- It is important for these smart solutions to be cost effective along with being primarily energy efficient. Savings from saved energy should cover up cost of installation of these systems.
- Cost for a system of smart lighting solution at a smart city level has been discussed in [9]. They have simulated deployment of their proposed solution and have successfully shown cost effectiveness of such solutions.

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Proposed Work I

- 1 We have made an IOT device which will detect the presence of the visitors using sensor nodes by sensing their motion and audio output which will in turn switch on the lights and switch off them when detecting no presence.
- 2 We are also checking whether daylight is optimum for switching the lights on or not.

Proposed Work II

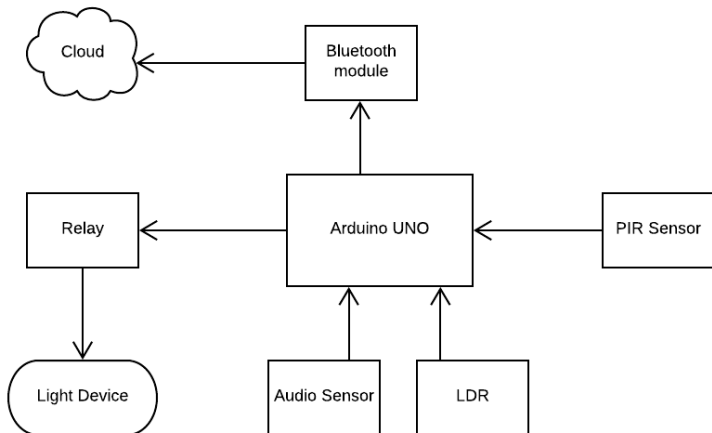


Figure: Hardware components diagram

Proposed Work III

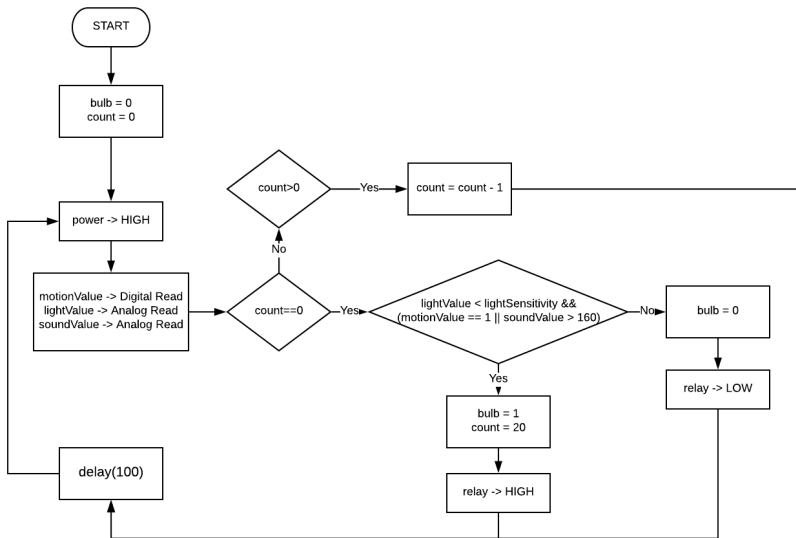


Figure: Algorithm Flowchart

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Simulations and Results I

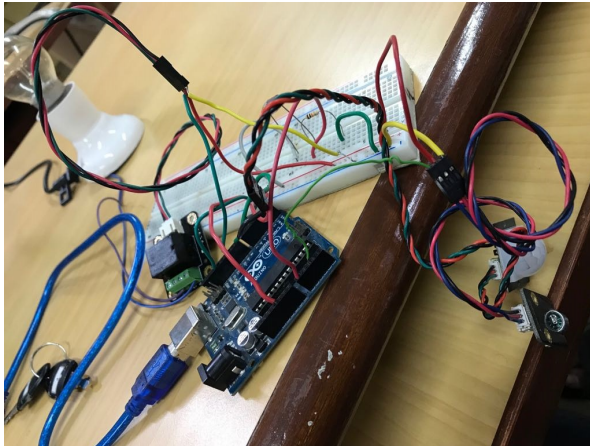


Figure: Our project

Simulations and Results II

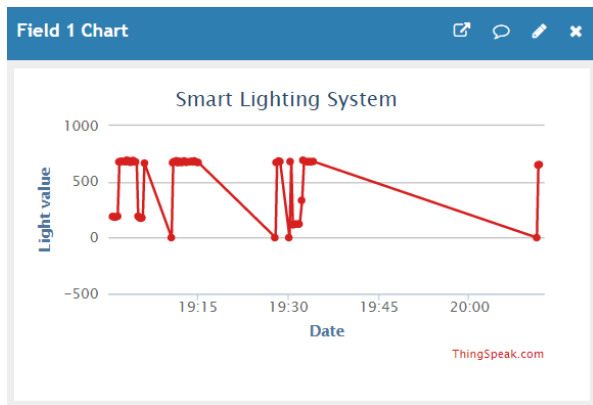


Figure: Data from Light Sensor

Simulations and Results III

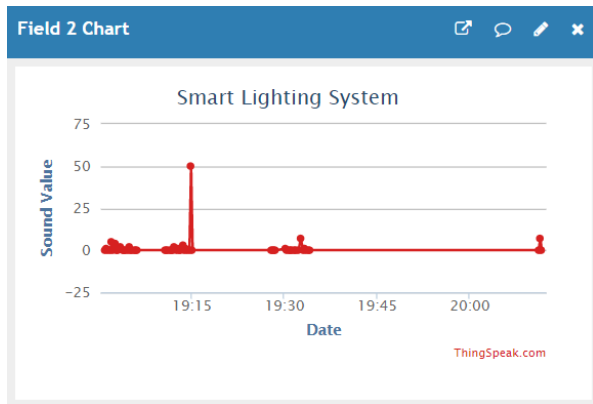


Figure: Data from Sound Sensor

Simulations and Results IV

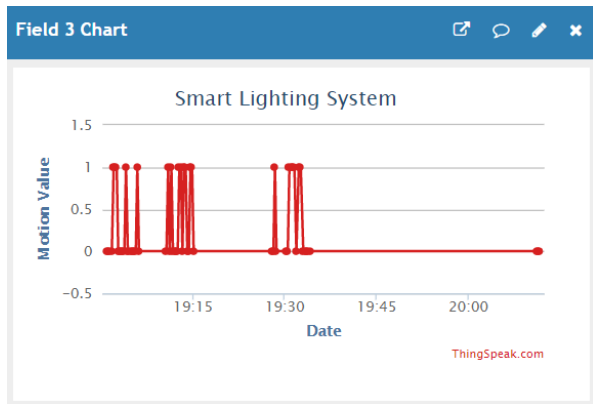


Figure: Data from PIR Sensor

Simulations and Results V

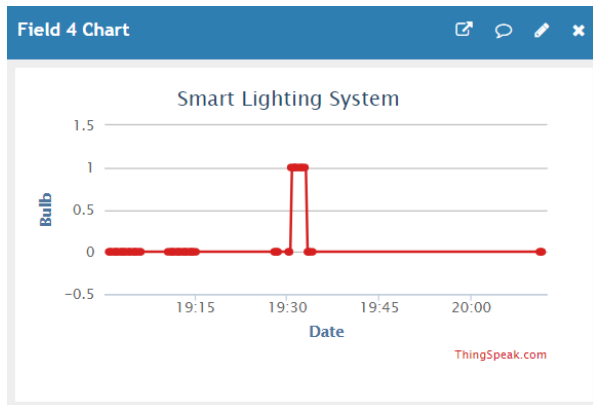


Figure: Data when Bulb was switched on

Cost of Production

①	Arduino	INR 340
②	PIR	INR 60
③	Bluetooth Transceiver	INR 280
④	Relay Module	INR 140
⑤	LDR	INR 8
⑥	Sound Sensor	INR 60
⑦	Total Estimated Production Cost	INR 900

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Discussions on the results

- ① IOT Based Smart Lighting System for Hostels is an automation system and it is a recompense over the present fair price shops.
- ② To increase accuracy, we have added sound sensor so that if in case of no motion we can still keep the lights on.
- ③ Using the IR, sound and illumination we tried to minimise the consumption where the illumination is below a certain level and no visitors are there in that lobby.

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- 1 Project can further be extended by making it more intelligent as to adapt to any environment and setting the light as well as audio threshold for different place by itself. Thus, it will make system more automatic.
- 2 We can try to increase its accuracy by adding more sensors.

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