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Energetic Energy Conservation using Bluetooth Communications

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ABSTRACT

Wireless sensing element primarily based on management has drawn attention in many industries attributable to the reduced value, straightforward quality, maintenance, power management etc. Wireless sensing element based systems are deployed in industries, army and in family applications for varied applications like observation, maintenance, security etc. during this system, the utilization of wireless sensing element technology (Bluetooth) for energy conservation is projected, during which the sensing element area unit deployed to sense. And to watch the environmental conditions and take selections supported the inputs from the varied sensors. In addition we tend to implement the system of electrical power consumption analysis module during this system to prove its potency.

Keywords: Bluetooth, Wireless Sensor Network (WSN), PIR Sensor, Light Intensity Sensor, Automation, Smart Room, Energy conservation.

1. INTRODUCTION

Wireless sensing element primarily based energy conservation through Bluetooth could be a microcontroller-based application that may manage numerous devices at an area victimization through Bluetooth Wireless Technology. Bluetooth technology has become more and more integrated into devices like cell phones, laptop computer computers and tablets, and its fast acceptance has crystal rectifier several to explore the likelihood of assorted alternative applications that may be controlled through Bluetooth-enabled devices. The planned Wireless sensing element Platform is a shot to develop an energy conservation device which may be used at multiple areas like homes, colleges and public utilities to cut back the wastage of energy. A Bluetooth link facilitates purpose to purpose topology. The system consists of 2 main units-the sensing unit and also the load unit, each interacting via Bluetooth technology. The remainder of the paper is organized as follows. In Section II, we tend to introduce towards the key elements of the system. Section III illustrates the ability consumption for the developed system. The results for internet power saving for numerous load square measure listed in Section IV. The scope for the longer term work is additional in Section V. Finally, we tend to conclude the paper stating references and applications of the work done.

2. SYSTEM OVERVIEW

The sensing unit comprises of a micro-controller, PIR sensor, load on length controller, transmitter module and light intensity sensor. The output is generated by monitoring the input signals against a predefined algorithm. Since the energy conservation necessary fact, the system is developed in such however that minimum energy is consumed whereas the system is inactive. The sensing unit is low power device and therefore DC power is employed to power the system, that permits the sensing unit to possess straightforward quality, straightforward maintenance and long battery life.

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2.1. Sensing Unit:Transmitter Module

2.1.1. PIR Sensor

The PIR sensing element is employed to find the presence of human and sense motion. PIR sensors area unit glorious devices for WSN, being low-Cost, low-power, and having alittle size. Since the PIR sensing element is low-cost and low-power device it dead matches to the system demand. Hence, it's like minded for implementation on such WSN systems. Pyro electricity is referred because the electrical response of a polar, stuff material to a amendment in its temperature. A pyro electrical part converts incident IR flux into associate degree electrical signal through 2 steps: the engrossing layer transforms the radiation flux be converted into a amendment in temperature and therefore the pyro electric part performs a thermal to electrical conversion,, acting as a electrical device. The PIR sensors embody 2 sensitive components placed asynchronous with opposite polarization. The PIR sensors area unit used with physicist lenses to enlarge and form their FoV. the thought of dividing the PIR sensing element FOV into many, optically separated cones is that the PIR components find solely changes to incident IR radiation. If one lens is employed, as a

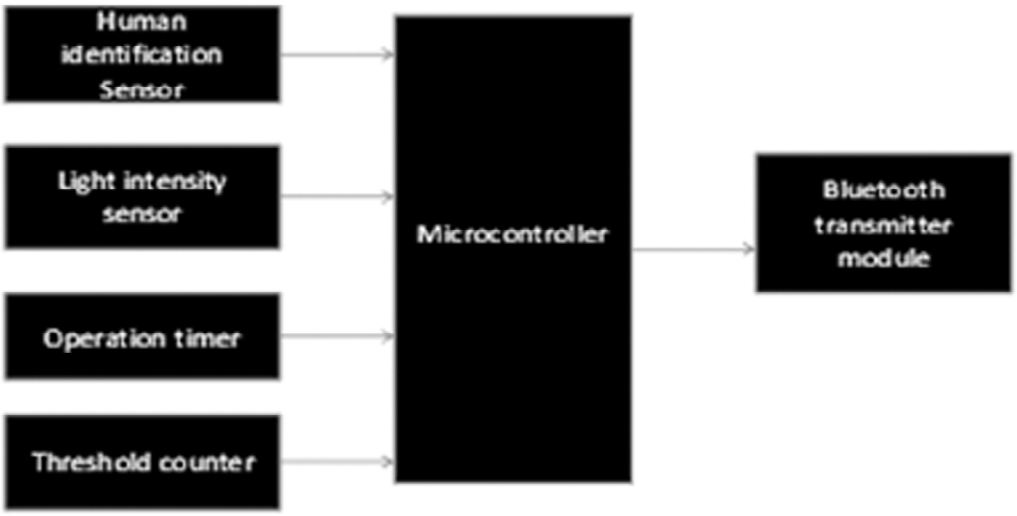


Figure 1: Overview of the Sensing Unit

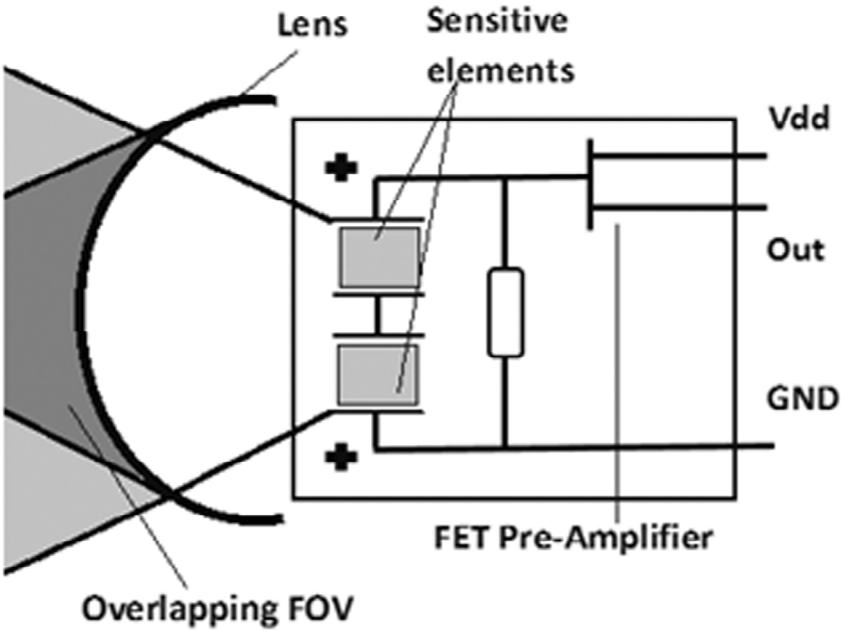


Figure 2: Schematic of COTS PIR

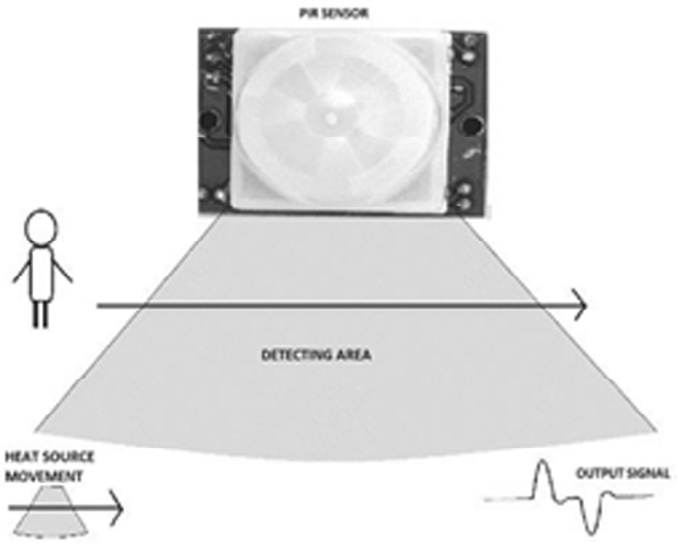


Figure 3: PIR Response of a moving object

body moves through the FoV of the PIR solely, negligible changes in input IR radiation are going to be perceived. Whereas, once victimization multiple lenses, the body moves between totally different cones of read and is perceived for the total traversal. In such a configuration, the PIR measurements is off by one another in order that the typical temperature of the FoV is faraway from the electrical signal; a rise of IR energy across the whole sensing element is self-cancelling and can not trigger the device.

This allows the device to resist false triggers of amendment within the event of being exposed to flashes of sunshine field. An example of PIR response to a moving object

2.1.2. PhotoTransistor

Photo electronic transistor may be a semiconductor unit that's sensitive to lightweight. easy transistors exhibit the sensitive effects if they're exposed to lightweight, the structure of the phototransistor is specifically optimized for photo applications. The semiconductor have a lot of larger base and collector areas than compared to a traditional transistor. Hetero-structures that use totally different materials on either facet of the tangency are additional standard as a result of the supply a high conversion potency. photograph transistors are operated in their active regime, though the bottom affiliation is left electric circuit or disconnected as a result of it's not needed. The bottom of the semiconductor would solely be accustomed bias the transistor so further collector current would flow and this is able to mask any current flowing as a results of the photo-action. The sunshine enters the bottom region of the phototransistor wherever it causes hole negatron pairs to be generated within the reverse biased based-collector junction. The hole-electron pairs move underneath the influence of the electrical field and supply the bottom current, inflicting electrons to be injected into the electrode.

2.1.3. **Microcontroller**

A 16 bit low power microcontroller is used to generate the algorithm for the system, to interface the sensors and the Bluetooth module. The microcontroller Power specification overview, as low as 0.1 μA RAM retention, 0.7 μA real-time clock mode, 200 μA / MIPS active and features fast wakeup from standby mode in less than 6 μs.

2.1.4. Ambient Light Threshold Controller

The ALTC is an analogous potentiometer used to set the maximum threshold value for the present ambient light condition. The potentiometer acts as a regulator to select a specific percentage of light below which the system triggers.

2.1.5. Bluetooth Transmitter Module

The Bluetooth transmitter module is used to transmit the data wirelessly. The Bluetooth features provides a secure channel for data transmission and also allows system to be compatible with the laptop and mobile phones. The Bluetooth module is connected serially to the microcontroller. A switch is provided in the sensing unit to make the system dependent or independent of the ambient light sensor, making it completely dependent/independent on the human motion. It is very important to note that the system has been so developed that the Bluetooth module only transmits data on any change in the system input, hence the Bluetooth module remains in-active for rest of the period and hence consumes minimum energy. The Bluetooth transmitter module is only active at the time of data transmission.

2.2. Load Unit:Receiver Module

The load unit comprises of a Bluetooth receiver module, microcontroller, peripheral driver, power consumption analysis, GSM Module and relay driver. The load unit is embedded in the normal switch boards and hence minimum level of maintenance is required for the system.

2.2.1. Relay Unit

A monolithic device which has a high voltage and current arranged in a Darlington Semiconductor array. The microcontroller drives the relays through the relay driver as per the rule. The remainder of the elements within the load unit acts just like those within the sensing unit.

2.2.2. Power consumption Analysis and GSM Module

A power consumption analysis is used to make a chart or rough outline of the power consumed by the users and the GSM module is a compactible device that is used to sent readings to the consumers.

3. POWER CONSUMPTION

In ideal/standby modem, the system will be designed and coded for energy consumption. the overall energy consumption for the sensing system in operating condition is close to one.90 W/hr that reduces to 0.24W/ hr in ideal/standby mode. world wide web decrease within the power consumption is eighty seven of the operating condition power consumption. the overall energy consumption for the load system in operating condition is 11.00 W/hr. Thereby world wide web power consumption is often but 13.00 W/hr.

Figure 4: Load Unit

4. RESULTS

The results are obtained by the coding here the system with wireless sensor network for energy consumption is been designed using the proteus software.

When the output will be depending on the input pulses given and the total no of units consumed will be calculated and it will be send it to the consumer.

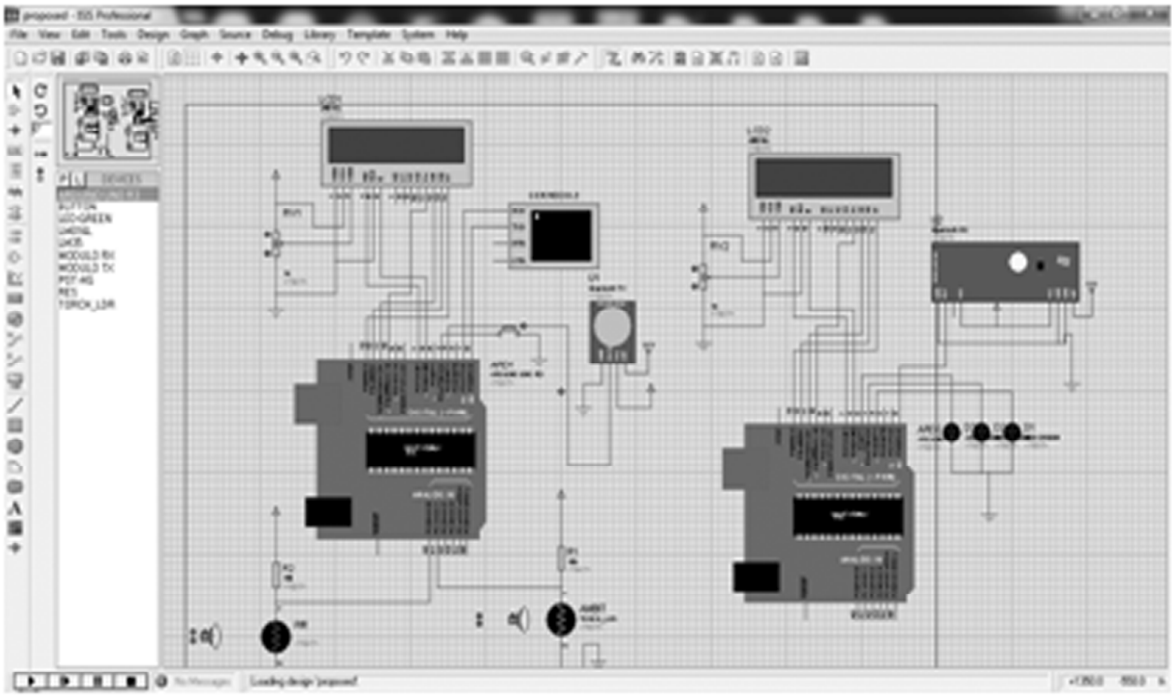


Figure 5: System Design for Simulation.

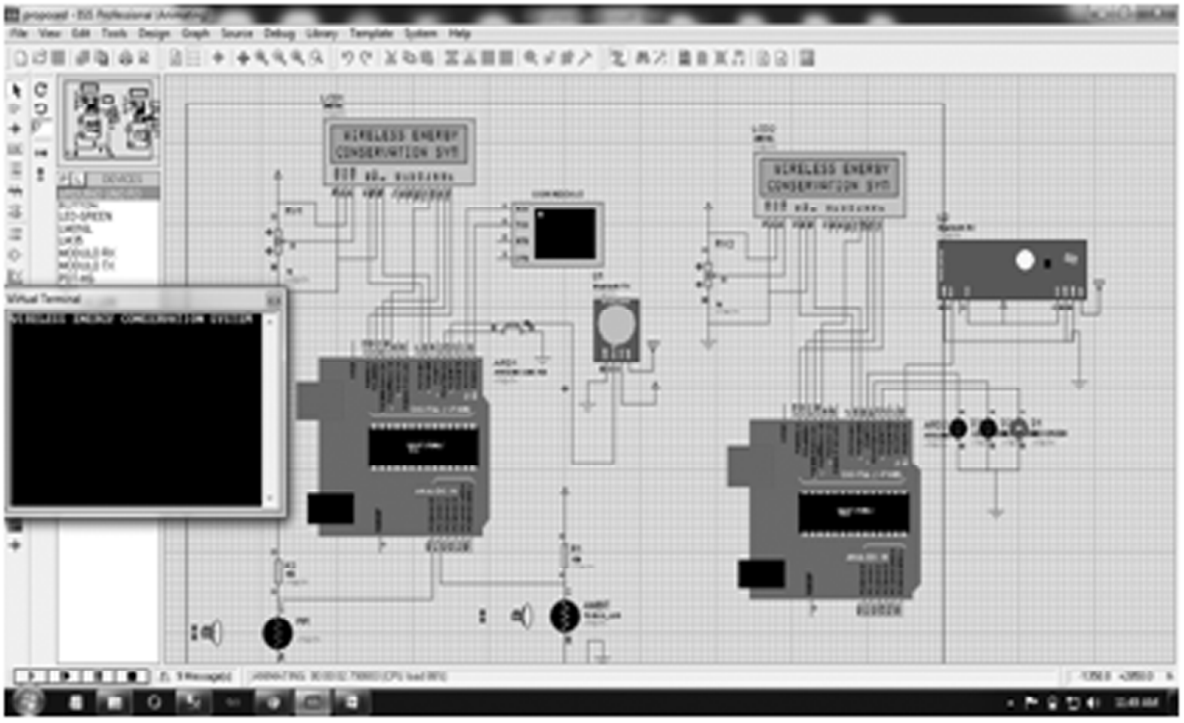
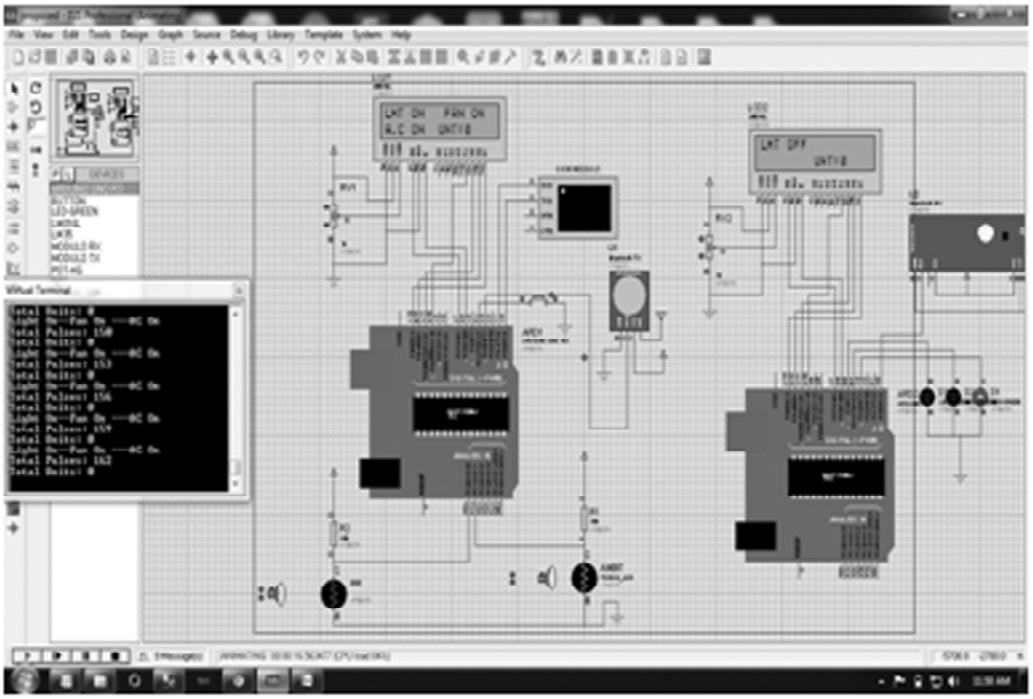


Figure 6: Coded with programming and system runs



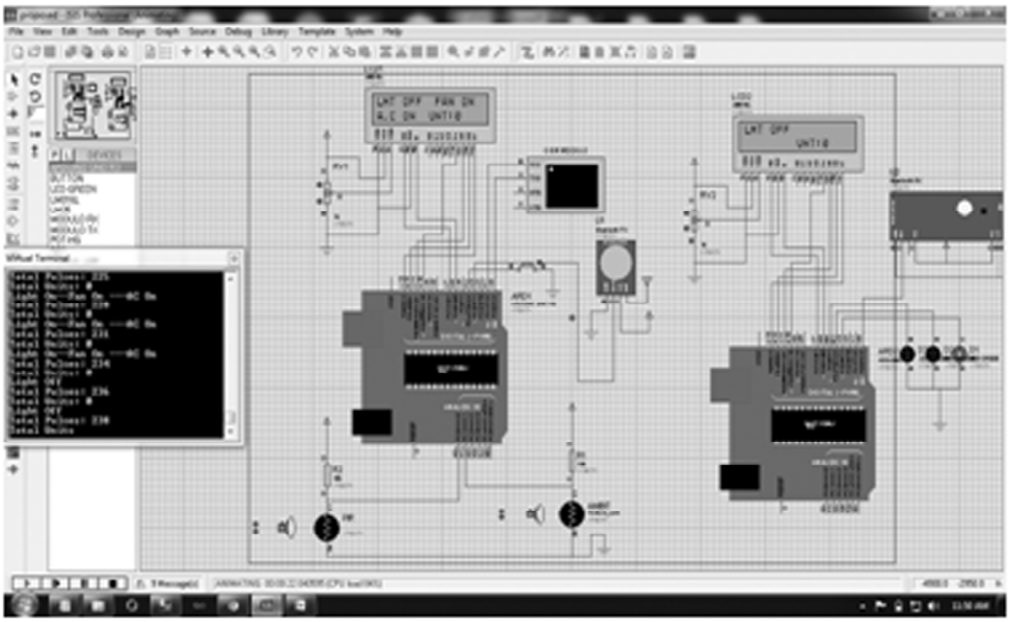


Figure 7 and 8: Pulses are given the devices are controlled ON and OFF

5. FUTURE SCOPE

1. Application for windows, android and ios platform can be design enabling the control of the load unit via laptop computers, tablets and mobile phones.
2. Voltage/current regulation can be implemented in order to vary the intensity/speed of different loads, thereby making the system more energy efficient.
3. Implementation of the star topology will allow access of the system over the internet but at the same time keeping the energy conservation technique in mind.
4. Interfacing Real time Chip (RtC) will allow the system to work independently and control the loads depending on the current system time.

5. Single Channel control in the load unit can be implemented.
6. The system can be modified for security purposes using other sensors such as IR sensors, Proximity Sensors, RIFID tags etc.
7. The Global Master can be controlled via the WLAN while the communication between the Global and Local Master can be on zigbee protocol. This will allow more efficient use of system. This will also allow the Global Master to be controller wirelessly.

6. CONCLUSION

The system has been designed over the Bluetooth platform in order to keep the power consumption low and provides easy access with available technology in the market. since the system is developed to be installed in vicinity hence use of WLAN is an expensive and high energy consumption option whereas the zigbee protocol restricts the system up gradation and easy interface with the available technology (like mobile phones, laptops etc) is possible. The disadvantage of using a RF (Radio Frequency) channel was the problem of interference which reduced the possibility of system expansion. the developed system follows a pushfit protocol i.e the load unit does not hamper the normal operating conditions of switch boards even in the absence of sensing unit. the current system is designed for 8 channels and its flexible to variation in load as more channel can easily be incorporated in the same system. the energy consumption with additional 8 channels increases only by 0.00036 W/hr at the load side, which shows the high efficiency and easy expandability of the system.

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