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DESIGN AND DEVELOPMENT OF LORAWAN PROTOCOL AT NODE

Sohail Jamadar[1], Amisha Bhatia[2], Riya Agrawal[3], Shamika Jog[4]

[1-4] (*Department of Electronics and Telecommunications Engineering , NBN Sinhgad school of Engineering/ SPPU, India)*

Corresponding Author: riya.navneet.agrawal@gmail.com

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Abstract: *IOT is the Field which handles the high data in real time application that's why it is one of the fastest growing field. All street lamp applications are available in the one direction, there is no communication between node and base station. All Systems available in market are manual, it requires human to turn on and turn off the light. Here Lora technology is used. Lora is very effective technology for communication. The study also covers the energy saving street lights based on Iot. For data transfer Lora uses radio frequency transmission which offers long range of communication and it is totally free of cost. The different operating frequency bands for Lora technology are 433MHz, 915Mhz and 868Mhz.*

Key Word: *Lora Technology, Node, base station,.*

I. Introduction

Global urbanization is the latest trend over the past one or two decades, it brought tremendous technological advancement in the different fields, the streetlight technology is one of them. Street lights are very important responsibility of government. The total street light energy bill of typical cities are around 10% to38%, and that it is very expensive. Thus, we need to start investing in smart street lights. It will give us economic stability and improves the lighting quality. Thus this system is good alternative to the existing system. In this system High pressure sodium vapor (HPS) lamps and metal halide lamps are replaced by light emitting diode (LED) lamps, LED lamps have considerable advantage in the terms of energy saving and optical illusion. The Lora Wan technology is used to make entire system secure, low power and cost efficient.

II. Material And Methods

Street light consist of power-adjustable LED, motion sensor, for communication we used LORAWAN protocol, and the controller. The lamp will be turn on whenever there is some motion detected by the sensor in the range of 30m which is applied on the lamp. After sensing motion, the system will send message to other units. The lamp will be turned off if there is no motion detected by the sensor in the range of 30m around the street light.

Sensors consist of the motion sensor, the LORAWAN and the controller. This system sends message to other units if any motion is detected. This system will be applied on every street light to ensure that every lamp turns on as pedestrians are in the range of 30m from the street light.

Communication system consist of the communication device LORAWAN and the controller. This system will be used in communicating the information given by sensor to other units for large distance. As for communication devices, a low-power wide area device, such as LORAWAN, is preferable for our system.

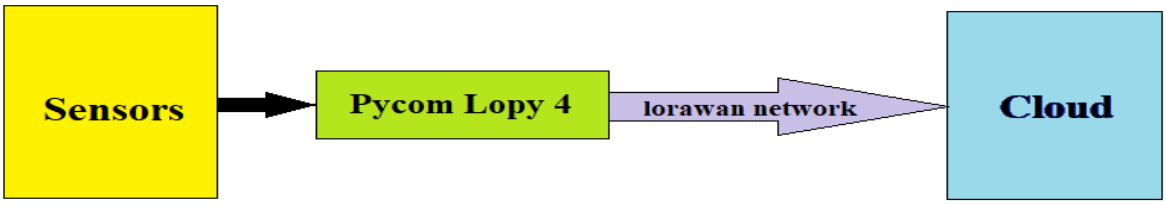
The street light turns as any motion is detected in the range of 30m and turn off or reduce power when there is no motion by means of a distributed-installed sensor network.

Briefing about the Technology -

LORAWAN is a Long-Range wide area network, this protocol enables connectivity, immediate analysis, communication, and additional functions such as geo-location. It is preferable in urban area and indoor environments, communicating with the sensors which are about 15-30 miles away in rural areas, its battery life time is also very good which will reduce the maintenance cost, supports millions of message per base station, for less power consumption it is used in tracking the application without the use of GPS or any other power consuming cause, LORAWAN specification ensures interoperability between different applications, Internet of Things (IoT) solution providers and telecom operators, embedded end to end AES-128 encryption of data ensuring optimal privacy and protection & reduces upfront infrastructure investments, as well as operating and end-node costs.

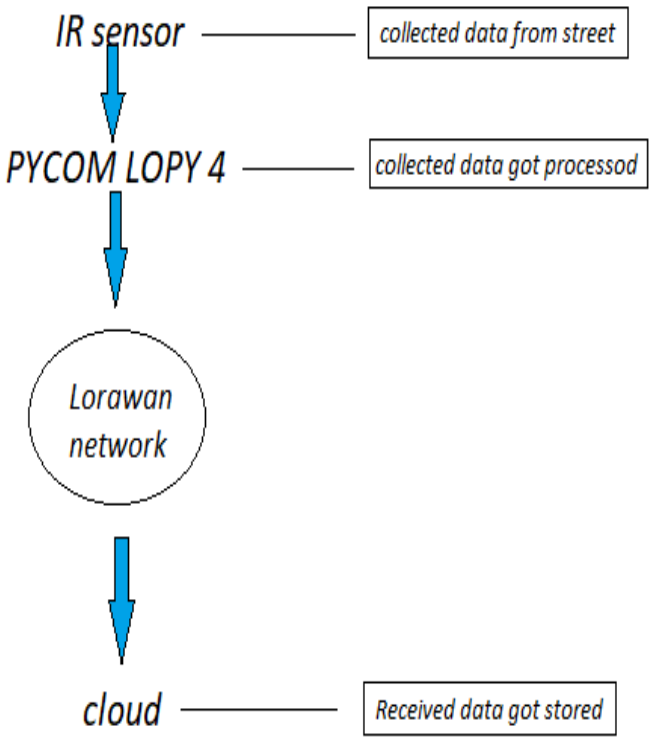
Block diagram:

Figure No 1: System Block Diagram.



Sensors like IR sensor is connected to the Pycom Lopy 4 which process the whole received data and forward it to the cloud location through LORAWAN network.

Figure No 2: Flowchart- the system flow is shown below



Procedure:

Step1: Data is collected by IR sensor.

Step 2: collected data is sent to the PYCOM LOPY 4 controller.

Step 3: Data received at PYCOM LOPY 4 is processed.

Step 4: Processed data is sent to the cloud location through Lora wan network

Step 6: Data received at cloud location is stored for observation purpose.

Step 7: By observing the stored data we can conclude which street light is faulty, or which area actually needs the maintenance.

III. Result

Thus, our project successfully implemented LORAWAN protocol at node. The result is shown below. we successfully achieved remote turn on and turn off of the street light and also stored this data at the cloud location.

Figure No 2: Motion is not detected.

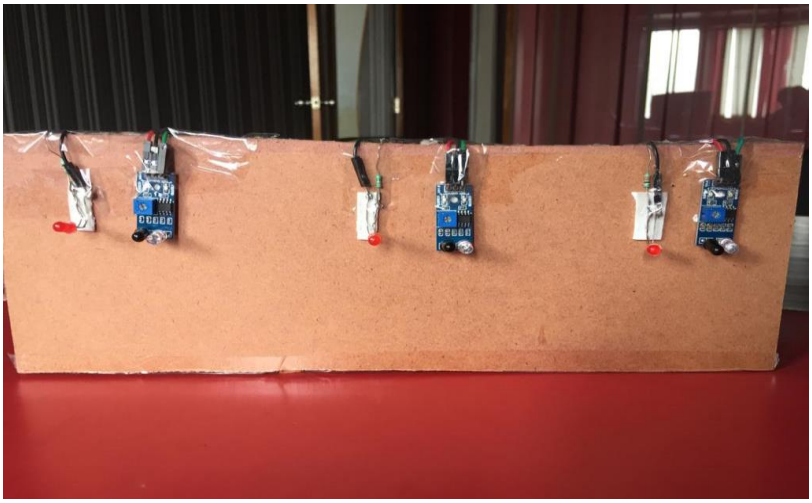
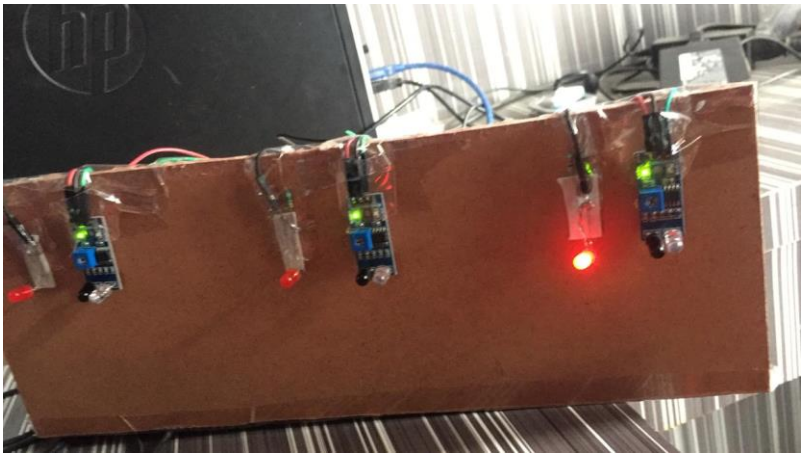


Figure No 3. When motion is detected



IV.DISCUSSION

We have discussed ab0ut need for investing in smart street lighting solutions as it will simulate economic and social stability. In addition, improved lighting quality and the expansion of such services would also improve the safety conditions for both vehicle traffic and pedestrians by allowing them safe travel at night. To make the entire process secure, standardized and low power and cost effective, we have used the Lora Wan technology for wireless communication.

V. Conclusion

Hence, we are successfully implemented the automatic street lights. By using this this kind of street light, we can control power consumption and energy bill. And also, by storing data we can monitor the performance of each street lamp. Lora wan protocol is wide range and totally free, hence sending and receiving the data for long range is possible and it is totally cost free.

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