IoT Based Smart Street Light

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Abstract: A real-world proven solution for dynamic street light control and management which relies on an open and flexible Internet of Things architecture. Automatic street light system is smart and provides a safe night time environment for all road users including pedestrians. The Street light Automation system can reduce energy consumption and maintenance costs and also helps to reduce crime activities up to certain limit. The automatic street light system is mainly decided on the combination of sensors technology. This system would provide a remote access for streetlight maintenance and control. At present we have maintained a manual system where the street lights will be ON/OFF and due to this system the most of the power will be wasted and also it emits high carbon dioxide. This project mainly focused on reducing power wastage with increasing the light intensity during the movement of vehicles only. The proposed system gives a result for power saving and also reduce the carbon dioxide emission. Lighting control systems are projected from saving outlook and the relation to reduce the carbon dioxide emission is been consign. In this project Light Dependent Resistor is used to indicate a sunlight hours/hour of darkness and the Infrared sensors used to sense the progress of vehicles on the street. The lightning source is LED considering its photometric such as effectiveness, life span, cost, efficiency and power consumption. This will be help in monitor and control the street light system and also this will help in monitor and controlling of street light system and imperfection recognition of the lights through IOT module.

Keywords: Smart street light systems, internet of things, LDR, rain sensor, IR sensor nodeMCU, arduino IDE.

1. Introduction

This project aims at execute the sophisticated enlargement in IoT for the power saving of street lights. Energy resourceful technology and design system can shrink expenditure of the street lightning significantly. Providing the street light is the expensive responsibilities of the cities. Moreover, by replacing the common bulb consisting of energy saving LED lamps which can reduce the energy consumptions by 80% and it is also responsible of CO_2 emission. Life quality which comprises the prevention of human behavior, traffic safety measurements. Design methodologies of a well-groomed street light methodology optimize the light intensity by overprotective the turn ON/OFF at the estimated time gap or when the light strikes at a particular light intensity. In the real time have power over

unit which is assimilate to grip the street lights ON for the definite period of time based on the frequencies of transporting vehicles on the roads.

2. Related Works

To study about the smart street light system, we have to take an analysis on different aspects anticipated by other researchers. This is a description which is related to the work done on Smart Street Light with various components and by using different algorithms [1]. This was developed and implemented by different aspects in several platforms. On developing the rural area, electricity is the major need. This paper proposes that smart system which can make decision for the bright control [2]. In this project brightness will be controlled automatically and manually can also controls a brightness.

One threshold value will be set for this process, when the value is crossed the brightness will automatically low, when the value is below the threshold value brightness will be increased automatically. For some useful case's manual control of brightness will be also there. In that we can set the brightness value by Android application [3]. It controls the brightness of the bulb automatically based on atmosphere. In another case we control the brightness manually by using Android Application [4]. Emergency button is a device designed to help in alerting someone in case of emergency. In case of any emergency or danger the emergency button is placed on the pole, when any person caught danger can emergency this panic button which raises an alarm to the nearby police station.

3. Problem Statement

In most of the cities, the street lights are ON when it is not need and It is OFF when is not needed. Because of these situation the huge energy expenses for a city gets wasted. Usually, the lights are ON in the evening after the sunset, it continuous to be ON till the sun rises the next day morning. This paper focuses on reducing the energy by automatically switching ON and Off-street lights.

4. Existing System

At present we have maintained a manual system where the

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street lights will be ON/OFF. Due to this system the most of the power will be wasted and also it emits high carbon dioxide. We can't monitor the system by anywhere, Physical switching ON/OFF of Street Lights is Compulsory. Maintenance of this system requires a more cost. At present we are maintained manual system where the light will be switched ON/ OFF with the help of manpower during both dark and day hours. Hence a most of energy will be wasted during ON / OFF period.

1) Disadvantages of Existing System
- Manual switching off/on of street lights
- More energy consumption
- High expense
- More manpower

5. Proposed System

In most of the highways where the street lights is the one of the enormous power outflow for a city. At present we are maintained manual system where the light will be switched ON/ OFF with the help of manpower during both dark and day hours. Hence a most of energy will be wasted during ON / OFF period. The proposed system will help us to save lot of energy during both dark and daylight hours and it will help us to monitor the CO2 emission. In this system relay can be used to switch ON/OFF the street light automatically.

1) Advantages of Proposed System
- Energy saving
- Safety measurements
- CO2 less emission
- Reduction of manpower
- Maintenance cost reduction
- Reduced power
- Rain Detection
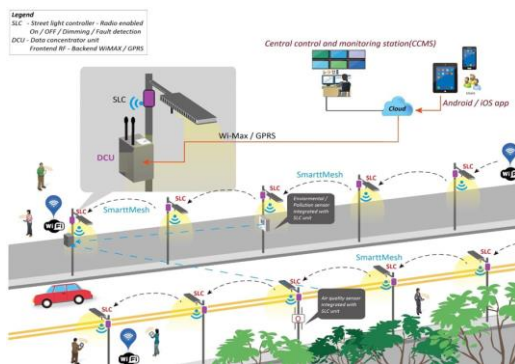
6. System Design

Fig. 1. System Design

This Smart Street Light System provides good energy efficiency. It reduces cost and gives more reliability. This diagram consist sensor, light, power system. This architecture is used to sense the vehicles and act accordingly. In this diagram street lights control by the sensors. It gets the data from object. When vehicles appear to sensor then automatically lights ON. That the object moved on from sensors lights turn OFF. In this diagram it represents the works of Smart Street Lighting System. When objects or vehicles appear to the sensors it is detect movements of the objects and street lights automatically ON. Then objects crossed to the sensor's lights go to turn OFF. It is used to save the power energy.

7. Implementation

Fig. 2. Shows the implementation of Smart Street Light

. Fig. 3. Shows the Android Application

1) Automatic Lights ON/OFF
If the ambient light is below a specific value the lights are turned on. When the sensor goes dark   the LED will be made on and when the sensor founds light the LED will be made off. When the failure of the LDR we can manually on/off the lights by using Android application.

2) Brightness Control
It controls the brightness of the bulb automatically based on atmosphere. In another case we control the brightness manually by using Android Application. In application we already set the threshold value in between 0-255. Using this threshold value set the light brightness.

3) Bulb Problem
In case of bulb burn, LDR is attached with the bulb that will notifies to the user about the bulb problem. In that situation status will update in the android application. In case bulb is not working in application it shows the blub is Burn otherwise it shows bulb working Fine.

4) Work progress
Red bulb is used to show the condition of the street. In case of any work is going on the road, that time manually we switch ON the Red Light by using android application. There is no

work in the road that time red light is OFF. That Red Light indicates to the people don't go to this street to find another way to reach our destination.

5) Emergency Button

Emergency button is a device designed to help in alerting someone in case of emergency. In case of any emergency or danger the emergency button is placed on the pole, when any person caught danger can emergency this panic button which raises an alarm to the nearby police station.

6) Rain Detector

By using the rain sensor, when it's raining the sensor get wet and it notifies to the user about Rain. By using this data, we can manually take necessary action. Using this we can reduce the power because rain not get occur in the whole world at a time, it occurs some some street in a different time that time rain sensor notifies the status to that street application, that situation applicant can take the actions like switch off lights or reduce the brightness of the light.

7) Covered Glass

We use the tilt sensor for the covered glass. Covered glass means it is the outer glass of the bulb and also it saves LED bulbs. In case by miss LED bulb outer glass is fall down it notifies covered glass is removed to android application that time applicant can take the actions to replace the covered glass otherwise it notifies covered glass is covered.

8. Conclusion and Future Enhancement

Smart Street light system is used to save very large percentage of available energy by introducing LEDs in the place of sodium vapor lamps and also incorporating new techniques to security implementations. The proposed method reduces the power wastages mainly caused by unattended street lights during sun light in day time. With the help of IR sensors, the power wastages are reducing. Constant utilization of LDR and IR sensors are widely used even in day time. It ensures that the street lights are not turned ON prior to the dusk [1]. With the help of QR code generator on a single scan the information such as calling option, messaging option, web access and Google location can be used to notify and to automate [2]. Chart contains information like, Power consumption, Total number of burning hours, and total number of interruptions.

References

[1] Li, Z.; Chen, C.; Wang, K. Cloud Computing for Agent-Based Urban Transportation Systems. IEEE Intell. Syst. 2011, 26, 73–79.

[2] Mohd. Saifuzzanman, and Nazmun Nessa Moon, Femaz Narin Nur. "IoT Based Street Lighting and Traffic Management System". IEEE Region 10 Humanitarian Technology Conference (R10-HTC), 2017.

[3] B. Abinaya, S. Gurupriya, and M. Pooja, "IoT Based ASED Smart and Adaptive Lighting in Street Lights". Second *International Conference on Computing and Communications Technologies* (ICCCT'17), 2017.

[4] M. Kokilavani, and A. Malathi, "Smart Street Lighting System using IoT", *International Journal of Advanced Research in Applied Science and Technology*, vol.3, no.11, 2017.

[5] Parkash, Prabu V, and Dandu Rajendra, "Internet of Things Based Intelligent Street Lighting System for Smart City". International Journal of *Innovative Research in Science, Engineering and Technology*, vol. 5, no. 5, 2016, pp. 7685- 7691, 2016.

[6] Lakshmana Phaneen manguluri, Yashwanth Sri Venkatesh sorapalli, Lokesh kumar Nakkala, and Venkat Tallari, "Smart Street Lights Using IoT", *International conference on applied and Theoretical Computing and Communication Technology*,2017.

[7] Li, F.; Voegler, M.; Claessens, M.; Dustdar, S. Efficient and Scalable IoT Service Delivery on Cloud. In Proceedings of the 2013 IEEE Sixth International Conference on Cloud Computing (CLOUD), Santa Clara, CA, USA, 28 June–3; pp. 740–747, 2103.

[8] Zaidi, S.; Imran, A.; McLernon, D.; Ghogho, M. Enabling IoT empowered smart lighting solutions: A communication theoretic perspective. In Proceedings of the 2014 IEEE.