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Survey on Street Lighting System Based On Vehicle Movements

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***Abstract*—**Street Light Control System which operates automatically is not only easiest but also the intelligent system. This system can be set to operate in automatic mode, which regulates the streetlight according to brightness and dimness Algorithm and light intensity. This control can make a reasonable adjustment according to the seasonal variation. we can take the initiative to control streetlights through PC monitor terminal. This street light system also includes a time cut-out function, and an automatic control pattern for even more electricity conserving, when vehicles pass by, the light will turn on automatically, later turn off. This design can save a great amount of electricity compared to streetlamps that keep alight during nights. The design implements traffic flow magnitude statistics without adding any hardware, facilitating transportation condition information collecting. Furthermore, this system has auto-alarm function which will set off if any light is damaged and will show the serial number of the damaged light, thus it is easy to be found and repair the damaged light. The system can be widely applied in all places which need timely control such as streets, stations, mining, schools, and electricity sectors and so on. In addition, the system integrates a digital temperature and humidity sensor, not only monitoring the streetlight but also temperature and humidity. The core of the system is constructed based on the Microchip's PIC18F microcontroller. IEEE802.15.4 standard Microchip Wireless (MiWi) communication protocol is used here for implanting the wireless communication between street light unit and PC

Keywords—LED LAMPS,LDR,MOTION SENSOR, MIWI.

*I.*INTRODUCTION

Basically, street lighting is one of the important parts of a city's infrastructure where the main function is to illuminate the city's streets during dark hours of the day. Previously, the number of streets in the town and city is very small. Therefore, the street lamps are relatively simple but with the development of urbanization, the number of streets increases rapidly with high traffic density. There are several factors need to be considered in order to design a good street lighting system such as night-time safety for community members and road users, provide public lighting at cost effective, the reduction of crime and minimizing it is effect on the environment. At the beginning, street lamps were controlled by manual control where a control switch is set in each of the street lamps. It is called first generation of the original street light. After that, another method that has been used was optical control method. This method is using high pressure sodium lamp in their system. It can be seen that this method is widely used in the country nowadays. This method operates by set up an optical control circuit, change the resistance byusing of light sensitive device to control street lamps light up automatically at dusk and turn off automatically after dawn in the morning. Due to the technological development nowadays, road lighting can be categorized according to the installation area, performance and their used, for an example, lighting for traffic routes, lighting for subsidiary roads and lighting for urban center and public amenity areas. Meanwhile, street lighting technology can be classified according to the type of lamps used such as incandescent light, mercury vapour light, metal halide light, high pressure sodium light, low pressure sodium light, fluorescent light, compact fluorescent light, induction light and LED light..lamp choices are given below..

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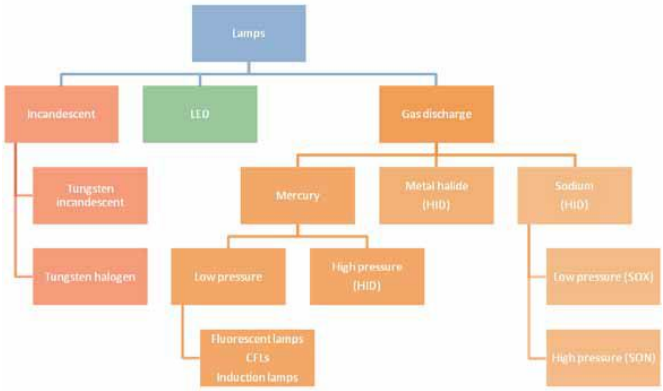

Over the last few years, LED street lamps have turned into real products that one can see on the road. They make sense for many reasons, such as their compact size, high efficacy (lumens per watt), longevity, and robustness. LED sources also allow for interesting new design forms, often with slimmer profiles than traditional metal halide arc lamps. LED is considered a promising solution to modern street lighting system due to it is behavior and advantages as emphasized. Apart from that, the advantages of LED are likely to replace the traditional street lamps such as the incandescent lamp, fluorescent lamp and High Pressure Sodium Lamp in future but LED technology is an extremely difficult process that requires a combination of advanced production lines, top quality materials and high-precision manufacturing process. Therefore, this paper highlights the energy efficient of street lighting design using LED lamps through intelligent sensor interface for controlling and managing.

The original contribution of this thesis is to design of a streetlight node based on which the system can be set to run in automatic mode, which control streetlight according to Sunrise and Sunset Algorithm and light intensity. This control can make a reasonable adjustment according to the seasonal variation.

II.MOTIVATION AND BACKGROUND

Automatic Street Light Control System is a simple and powerful concept, which uses transistor as a switch to switch ON and OFF the street light automatically. By using this system manual works are removed. It automatically switches ON lights when the sunlight goes below the visible region of our eyes. It automatically switches OFF lights under illumination by sunlight. This is done by a sensor called Light Dependant Resistor (LDR) which senses the light actually like our eyes. Automatic Streetlight needs no manual operation of switching ON and OFF. The system itself detects whether there is need for light or not. When darkness rises to a certain value then automatically streetlight is switched ON and when there is other source of light, the street light gets OFF. The extent of darkness at which the street light to be switched on can also be tailored using the potentiometer provided in the circuit. Moreover, the circuit is carefully designed to avoid common problems like overload, relay chattering and inductive kick back in relay.The main advantages of this system consist in the reduction of the costs related to energy consumption and maintenance by integrating a vehicle detection algorithm. The introduction of a vehicle detection algorithm further reduces the power consumption costs. Additionally, the system supports the monitoring of a large number of nodes (500 nodes for a single Gateway). The automated periodic reports enable the monitoring of the high traffic areas and represents tools to alleviate traffic congestion.

Working with the premise that public street lighting can and should be designed to meet the needs of people of all ages, including those with age-related vision loss, the research includes best management practices and lessons learned from cities where LED street lighting has been installed. The report outlines general recommendations regarding street lighting, as well as technical specifications for replacement LED fixtures on existing luminaire poles. It provides direction on ways to capitalize on the additional benefits of LED technology, such as the use of control systems for dimming, changing color, emergency events, and the use of accessory color lights for use in way finding, place making and event planning in business districts. It also suggests ways in which cities can go beyond street lighting to consider all public and private outdoor lighting in a comprehensive manner.

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III.LITERATURE REVIEW

Hengyu Wu, MinliTang[1], propose about The core technology of the street light control system is an AT89S52 single-chip microcomputer. It integrates a power circuit, a fault detect circuit, a photosensitive detection circuit, an infrared detect circuit, an LCD display circuit, a street light control circuit, an a1ann circuit, a pressed key control circuit and so on. This system cans automatically tum on or off the lights and controls the switches according to traffic flow. It expands the fault detect circuit and the corresponding a1ann circuit. It also has a convenient and flexible button control circuit to switch on and off fictions mentioned above. Main weakness is that they didn't say about the working principle behind the system. It also said to use fault detection circuit whichwhen it is damaged, the voltage is zero, so it will create a problem. This paper is and theoretic proof and shows only simulation result but not as a real time set up experiments. The focus of this paper to build a way for the framework which may leads to many follow up research activities in the Low-rate and also plan to investigate the applicability of this proposal to detect performance.

GongSiliang[2] describes a remote streetlight monitoring system based on wireless sensor network. The system can be set to run in automatic mode, which control streetlight according to Sunrise and Sunset Algorithm and light intensity. This control can make a reasonable adjustment according to the latitude, longitude and seasonal variation. Also this system can run in controlled mode. In this mode, we can take the initiative to control streetlights through PC monitor terminal. In addition, the system integrates a digital temperature-humidity sensor, not only monitoring the streetlight Real-time but also temperature and humidity. The system is equipped with the high-power relay output and can be widely applied in all places which need timely control such as streets, stations, mining, schools, and electricity sectors and so on.

But in this work a wireless network for streetlight remote control is discussed. In particular, the novelty of the proposal is in the location awareness of nodes, which cannot self-localize themselves. Prototypes have been built using costly hardware. The capability of the ranging measurements, the basis for localization, is not characterized and showing some problems on the order of one meter. In near future, location aware routing algorithms will developed that will improve the efficiency of the network.

Street lighting system

*Gustavo W. Denardin[3]*deals about a control network for a LEDstreet lighting system. The use of LEDs is being considered promising solution to modern street lighting systems, dueto their longer lifetime, higher luminous efficiency and higherCRI. The proposed control network enables disconnection of the street lighting system from the mains during peak load time, reducing its impact in the distributed power system automatically consumption, decrease the management cost and monitor the status information of each street lighting unit. In order to meet the system requirements, a wireless sensor network based on IEEE 802.15.4TM standard is employed. Its network layer is implemented using geographic routing strategy, which provides slow overhead and high scalability features. However, due to well-known drawbacks of the existing techniques, a novel routing algorithm is proposed. Simulations show that this algorithm leads to a significant improvement of routing performance when applied to sparse large scale scenarios, which is the case of street lighting system. Field tests have been performed on IEEE 802.15.4-compliant wireless control units. The obtained experimental results show that the proposed control network is able to meet the requirements of a LED street lighting system. It mainly deals about safer roadways with intelligent light system to reduce power consumption. This system has automatic street light intensity control based on the vehicular movement and switching ON and OFF of street lights depending on the light ambiance. This will help in reducing the power consumption during hours of meager road usage. The street light module is installed consequently for every certain distance. This paper also aims at reducing road accidents by detecting consumption of alcohol by the driver. This can be implemented using alcohol sensor module which contains skin sensor, breath alcohol sensor and proximity sensor. The skin sensor and breadth alcohol sensor detects the presence of alcohol content and the proximity sensor helps in detecting any kind of malpractice. The novelty of this paper is to effectively reduce the energy consumption of the street lights by controlling the street light's intensity, sensing both human as well as vehicular movement and injury and death caused by drunk driving can be prevented by prior sensing of the alcohol content in drivers by a simple.

*SomchaiHiranvarodom[4]*describes a comparative analysis of photovoltaic (PV) street lighting system in three different lamps. Namely, a low pressure sodium lamp, a high pressure sodium lamp and a fluorescent lamp have been used for installation in each mast to determine the suitable system to install in a typical rural area of Thailand. All three systems have been mounted with the same module type and wattage in different places within the Rajamangala Institute of Technology, Thanyaburi district, Pathumthani province of Thailand. An operation of solar street lighting system can be divided into 2 period of time, namely, at 18.00-22.00 hours and 05.00-06.00 hours. The design of a

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control circuit was experimentally done in this work. Protection of the battery from damage for deep discharge and overcharge by a controller was also considered. The life cycle cost analysis (LCCA) is the appropriate method for comparing three different lamps. The present worth of each system can be compared and the least cost option selected. LCCA was based on the key assumptions (year 2002). The results of comparative analysis of the PV street lighting systems with a fluorescent lamp have been the appropriate system for installation in a typical rural area of Thailand when the cost of lamps, system performance and possibility for purchasing the components of the system have been considered.

The results of this work can he stated that the average luminance in lux of the fluorescent lamp at design location, Pathumthani province of Thailand, has a highest value compared to the low- pressure sodium and high-pressure sodium. On the other hand, the lifetime of the fluorescent lamp has a shortest time compared to other lamps. Nevertheless, the aim of this work is to determine the appropriate system to install in a typical rural area or a typical rural village of Thailand when the cost of lamps and system performance and possibility for purchasing the components of the system are compared. while considering in other areas it is difficult.

*A.C.Kalaiarasan[5]*deal about solar energy based street light with auto-tracking system for maximizing power output from a solar system is desirable to increase the efficiency. In order to maximize the power output from the solar panels, one needs to keep panels aligned with the sun. As such a means of tracking the sun is required. This is a far most cost effective solution than purchasing additional solar panels. It has been estimated that the yield from solar panels can be increased by 30 to 60 percent by utilizing a tracking system instead of a stationary array. This paper describes an automatic tracking system which will keep the solar panels aligned with the sun in order to maximize efficiency. The sun tracking sensor is the sensing device, which sense the position of the sun at the time to time continuously and it gives the sensing output to the amplifier based on light density of the sun. Here the sun tracking sensor is LDR(light dependent resistor). The amplifier unit is used to amplify the LDR signals, which makes the low level signal into high level signals and this output is given to the comparator. The LM324 IC is used as an amplifier. Comparator compares the signals and gives the command to the AT89C51 microcontroller. The system presented in this paper will be an efficient method to use the solar energy in remote areas. This system consumes very low power and high efficient lightning. We employ the auto sun tracking system; this can improve the energy stored in battery. This system does not affect the environment because it is pollution free. Our system also consisting of automatic ON, OFF control of the LED lamp, so there is no manual operation and it is not required operators.

RadhiPriyasree[6] explains a system to reduce the power consumption of street lights by avoiding inefficient lighting which wastes significant financial resources each year. This is done by dimming the lights during less traffic hours. For this purpose PIR sensor is used which detects any movement. This work also aims at reducing the fatal crashes and road accidents caused due to alcohol consumption. This is done using skin sensors placed in vehicle doors and also using breadth sensors inside the vehicle. By implementing this death rates due to drunk driving can be reduced to a great extent. The prototype has been implemented and works as expected and will prove to be very useful and will fulfill all the present constraints if implemented on a large scale. It also aims at detecting consumption of alcohol by the driver and if it exceeds certain level it impairs the driver from entering into the Vehicle. This prevents occurrence of accidents or any fatal crashes. This initiative will help the government to save this energy and meet the domestic and industrial needs.

S.H. Jeong[7] describes about the Development of Zigbee based Street Light Control System which control and monitor status of street lights installed alongside load. Lights are switched to ON/OFF by this system's control command. Its local status information is also monitored by control system via communication channel. Status information which is monitored are on/off status information, energy saving mode status, control group status information and safety related information, etc. To transfer control command and status information between street light control system and remote street light control terminals which installed at each light pole, various communication media and communication protocols are using. As communication media, wireless or power lines are used generally. Various frequency bands from tens of MHz to Rebrands are used for wireless case. This Street light control system can save maintenance time and costs and which can improve safety level.

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COMPARITION OF TECHNIQUES IN PAPERS

PAPERS	COMPONENTS & TECHNIQUES	MERITS	DEMERITS
SOLAR LIGHTING SYSTEM	Solar Panel, Passive Solar Technologies.	i)operation cost is minimum. ii)less Maintenance iii)Non polluting source	i)Initial investment is higher. ii)cost of equipment is high. iii)climatic conditions may reduce the performance.
GSM BASED STREET LIGHTING SYSTEM	Gsm Modem,control circuitry devices,client server mechanism.	i)low cost ii)easy deployment iii)highly scalable	i)No appropriate communication protocol. ii)Not defined in semantic point of view.
STREET LIGHT CONTROL SYSTEM WITH SINGLE CHIP MICROCOMPUTER	Photo resistor &fixed resistor. Photosensitive technique.	i)Compact in structure. ii)low cost.	i)Maintenance must be done regularly.
Wireless self localizing system.	Wireless retrofitting of lamps.	Installation flexibility, lower cost.	Limited coverage.
Zigbee based system	Zigbee communication protocol	i)reduce the manual work. ii)saves more energy.	Complexity in design.

IV.ANALYSIS

One of the alternative strategies for the cost reduction is usage of energy-efficient lamps with advanced lighting technology. The newer technologies, such as light-emitting diode (LED), are reported to drastically reduce energy consumption in comparison to the more traditional high-pressure sodium (HPS) lights.

V.CONCLUSION & FUTURE WORK

The project work has been studied and implemented a complete working model using a PIC microcontroller. The programming and interfering of PIC microcontroller has been mastered during the implementation. This work includes the study of energy saving system in many applications. The design and verification of Automatic Street light successfully. The main advantage of the present system is power saving. It requires the initial cost only for designing and installation and not for utilization. Hence, such systems are very much useful for the government to reduce the utilization of conventional power (generated by hydraulic power stations).Therefore, such systems are once implemented on a large scale can bring significant reduction of the power consumption caused by street lights. This initiative will help the government to save this energy and meet the domestic and industrial needs. The other advantages of the circuit are that it is simple circuit, avoids constant supervision of time and flexibility in design.

After having implemented this Intelligent System, what remains is the scope for improvements. Firstly, we could directly go for Wireless Power Transmission which would further reduce the maintenance costs and power thefts of the system, as cable breaking is one of the problems faced today .In addition to this, controlling the Traffic Signal lights would be another feature that we could look into after successful implementation of our system. Depending on the amount of traffic in a particular direction, necessary controlling actions could be taken. Also emergency vehicles and VIP convoys can be passed efficiently. Moreover, attempts can be made to ensure that the complete system is self-sufficient on nonconventional energy resources like solar power, windmills, Piezo-electric crystals, etc. We hope that these advancements can make this system completely robust and totally reliable in all respects.

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