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Concept of Intelligent Automation System for Electrical Energy Distribution and Utilities

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Abstract— This system the normal street is convert into smart street means the street light are automatically on and In off according to the vehicle on that road .The main purpose of our project is to save the energy which is wasted in our streets and the smart lights are glow with high intensity when the vehicle is pass through that road otherwise it will off.In today' s automation world ,things are updating very quickly with a simple and easy method and this automation is nothing but a easy way to reduce the man power in the production of many industries. In the industrial sector the automation is one step greater than the mechanical man power because in man power the machinery are assign by Human operators where as in automation all work are dependent on the machine. This project how the saved power can be used in many works. It is answer to all that question that how can we save energy in different ways. We conclude that if there no vehicle on the street at the night time then the lights are off and the saved energy is used where there are high lights cut off .

I. INTRODUCTION

The automation play a key role in our daily life and living standard. These automatic system are preferred over to our old system and its other name is "AUTOMATIC STREET LIGHT SYSTEM". The light system means to our road streets which are used by pedestrians and cars and many more. Intelligent system means these light will glow with low brightness when there is no object and will glow with high brightness when the vehicle is passes on it. It is totally different from our traditional system and it will take time to adjust in our system. Our project shows how these street lights may save many energy. In the industrial sector the automation is one step greater than the mechanical man power because in man power the machinery are assign by Human operators where as in automation all work are dependent on the machine. Basically, these street may be not save energy which we are excepting but it will very profitable in the future because the construction work is increase day by day so the number of street lights are also increase automatically and street are increase then the traffic problems are also increase. But before designing these system we have to also think about the Night safety for road users also. In the early days the lights are controlled by the switch which is placed in the bottom of that light and these are the initial and old Street light. After that a new system is introduced in which the sodium lamp are used and now we can say that these system is used in the whole country. Due to the development of the technology in today's world ,So the light are divided into the many parts according to the area and work, Ex- light for traffic roads, lights in the village. The LED lights are best due to its advantage and it is best replacement for our incandescent light, fluorescent lamp but the of these LED is not easy because it require good quality material . Therefore our project focus on using led light with IR sensor and controlling it and how we can manage it.

II. LITERATURE REVIEW

"In this paper, author proposed that the a large amount of energy is waste in big cities and town. The street lights are very important so we cannot stop ,we have to find a method through which we can save electricity. A lot of electricity is wasting in the traffic system also so the electricity is very precious. The goal of the this paper is to aware the us about the wastage of electricity and how can we save it. This system is based on the microcontroller which control all the components. The main wastage of electricity is at the nights when the street light are on unnecessary." [1].

"In this paper Author proposed that the street lights are with auto intensity are controlled by the PWM technique and it is also controlled by some other device which is controlled by raspberry pi. In today's world everyone is trying to shift to the solar because it is the free source of energy and anyone can use it according to top its need.

The solar panel is work a bus in the path of electricity which collect the solar energy and then convert it into the electricity. The street light is glow at the rated intensity during the traffic dam and it will reduce according to the traffic. In the HID lamp there is no option of control the intensity but in the LED there is option of controlling the intensity so it can be control by the raspberry pi." [2].

"In this paper, Author proposed automatic control of the Street light with the help of the Zigbee. It has also a advantage that it give protection for the user which are using roads at the night time and it gives them a safe environment during night time. The main purpose of the this system is to save as much a possible energy when it is not in use. If there is theft run during the night then the street lights automatically on and he will caught. In this system only two main components are there first is sensors and

second is zigbee. The ZigBee is the main base in this system means all the management of lights are in the hand of the it [3]. "This paper discusses the Street lights which are automatically on or off are known as the intelligent system. The light are intensity is high or low according to the brightness of the sun. It is also varies according to the season means in the rainy days the sun brightness is not so proper so it requires the light full or in winter when there is fog then the intensity of the lights is full. This is design in a way that it will save a huge amount of electricity above our expectations . There is auto alarm system which will notify if there is any light is damaged or break by any natural cause . " [4].

III. COMPONENTS TO BE USED

A. Arduino Uno R3

The Arduino is a microcontroller device which is based on the ATmega328.It is a free or open source where anyone can implement there idea in the this. The Arduino consist 14 digital input/output pins ,6 analog input, a 16 Mhz crystal oscillator, a USB connection a power jack, an ICSP header and a rest button. It has all that which can in an normal microcontroller and it is very simple and easy to use we just have to connect it with our system with help of USB cable and give power supply it with the help of AC to DC adapter or battery.

The Arduino Uno R3 uses an ATmega16U2 instead of the 8U2 found on the Uno but not use FTDI which is uses in the previous generations.8U allows the microcontroller for faster transfer rates and more memory. There no need of drivers for the Linux or Mac. The Arduino Uno is totally different from the other preceding boards because it does not uses FTDI USB to serial driver chip but in that place it uses the Atmega 8U2 microcontroller chip programmed as a USB to serial converter.

Arduino Board

B. IR sensor

The infrared sensor is an device which use to sense if there is any object in the path of that beam which is emit from the sensor. It has so many advantage like we can measure the heat of some object and we can also detect if some object is in motion or in steady position. But there is only one disadvantage that it can only measure infrared radiation and it is also known as the passive sensor because it only emit the radiation but cannot generate it. It can be applicable for all most all object except some .

The radiation which is emit by the sensor cannot be seen by our naked eyes but it can be seen the mobile camera. This sensor consist of one IR led which emits the light and a IR photodiode which received the radiation. An IR sensor is an device which

IR Sensor

is used to detects the radiation and there are many types of IR sensor these are manufactured according to the need of application . These are some examples of the IR sensor :- Proximity sensor which is used in our phones ,Contrast sensor which is used in the Line Following Robots, Obstruction Sensor which is used for controlling goods and in the Burglar Alarm.

C. LED

The light emitting diode is two terminal device which has two terminal of positive and negative. The light is glow if it is activated and it is activated because it is an pn junction diode. The two terminal can be identify easily the long terminal is always positive and the short terminal is always negative. When a suitable amount of current is apply on the terminal then the electron present in it is able to combine with the holes and in this process the energy is release in the form of photons. The colour of the LED is depend on the energy band gap of the semiconductor. These are very small in size and very useful in our daily life.

LED

D. Source (Solar Panel)

Sun is the only source in the world which is free of cost for all of us So, it is better to use the solar energy instead of the limited source Because if we use the limited source the we have to pay for it and we can use only that amount of energy for which we can capable of paying. We should use photovoltaic cell which directly convert the solar energy into electricity. It's main advantage is that is eco friendly means it will never harm the environment. Now a days the administration is also supporting by giving subsidies in different states. Now the total solar plant of world produces approx 178 billion MW.

Solar panel are made by the many cells. When the many cells are connect in the series than it made a module. Many module are also connect in series than it make string. Many string are connect in the parallel then make array. The parallel connection are done to obtain maximum current at same level of voltage.

E. Adapter

This is the main source of power for our project. It give the power to the Arduino which is the base of the our project. All the management of the project is in the hand of the Arduino. The adapter is convert the main supply into to the 5v which is sufficient for the Arduino.

Adapter

IV. WORKING OF THE MODEL

Our project is work according to the sunlight means if there is low sunlight then the lights will on automatically or if the sunlight is high then the light is off automatically. Th e whole project base is Arduino which is responsible for every action in the project and it require a supply of the 5 V. If anything is on the road like any vehicle or any person then it will become obstacle in the path of radiation which is emitted by the IR sensor and it will not received at the IR photodiode so it will become barrier So the lights will on. The Arduino is microcontroller device which will control the whole circuit and there is a coding in that which is done by the Arduino IDR software and all these data is stored in the EPROM of the Arduino. When the object is go through the street then the light which is after the vehicle will automatically off and in this way we can save the energy and there is no need of any person which on /off the lights So there is less use of the man power. But there is a problem that there is no fault detector in this project so if there is some error occurred then there is need a technician to operate it.

V. STRENGTHS AND WEAKNESSES

A. Strengths

These smart streets can also used in our normal road light and highways etc. Our project is not limited to the roads it can be also used in other places also like parking. If this system is used in our Normal life then we can save a maintenance cost an can be use to increase the no. of lights. It is an automatic system so there is no need to on or off the lights so in this way we can save a lot of energy. There are also some advantage like it require less cost and less maintenance and has more efficiency.

B. Weaknesses

This is only capable for only one side of the road so in case of highways we have to use dual system which increases the installation cost. Now there is no any system through which we can detect the fault we should have to detect them every time

VI. EXPERIMENTAL RESULTS &ANALYSIS

The whole project making is explain in this by step by step system. Firstly the component are assemble After that connect them according to the circuit diagram. In step I The IR sensor are fixed in this way that all are next to the other one. After that our base of project Arduino is fixed at one corner so that we can easily give supply to the the Arduino.In step II In this step all the led which are playing the role of the street light are fixed on the board. All the connections are completed and ready to give the 5v supply.In the Step III If there is any object on the road then the led lights will glow.In step IV When the object is go forward then the led which after the object will off automatically.

VII. CONCLUSION

With the help of our project ,we can save the amount of energy which is surplus but for that we have to change the old (Sodium vapour lamp) with LED and it can also improve the security issue. It saves the electricity which is going to waste and use it where is necessary and it is automatic system there is no need of a manual switching in this system. It has higher efficiency then our on going system with help of the IR sensor and LED. Firstly its installation cost is low after that its maintain cost is also not high. This is designed in this way that it is totally adjust in any environment and its life is also long. But there is some limitation that it only applicable for one way traffic system ,for highway it require two system. The IR sensor is also consume energy in day time. It will only on after the sunset means after a certain darkness.

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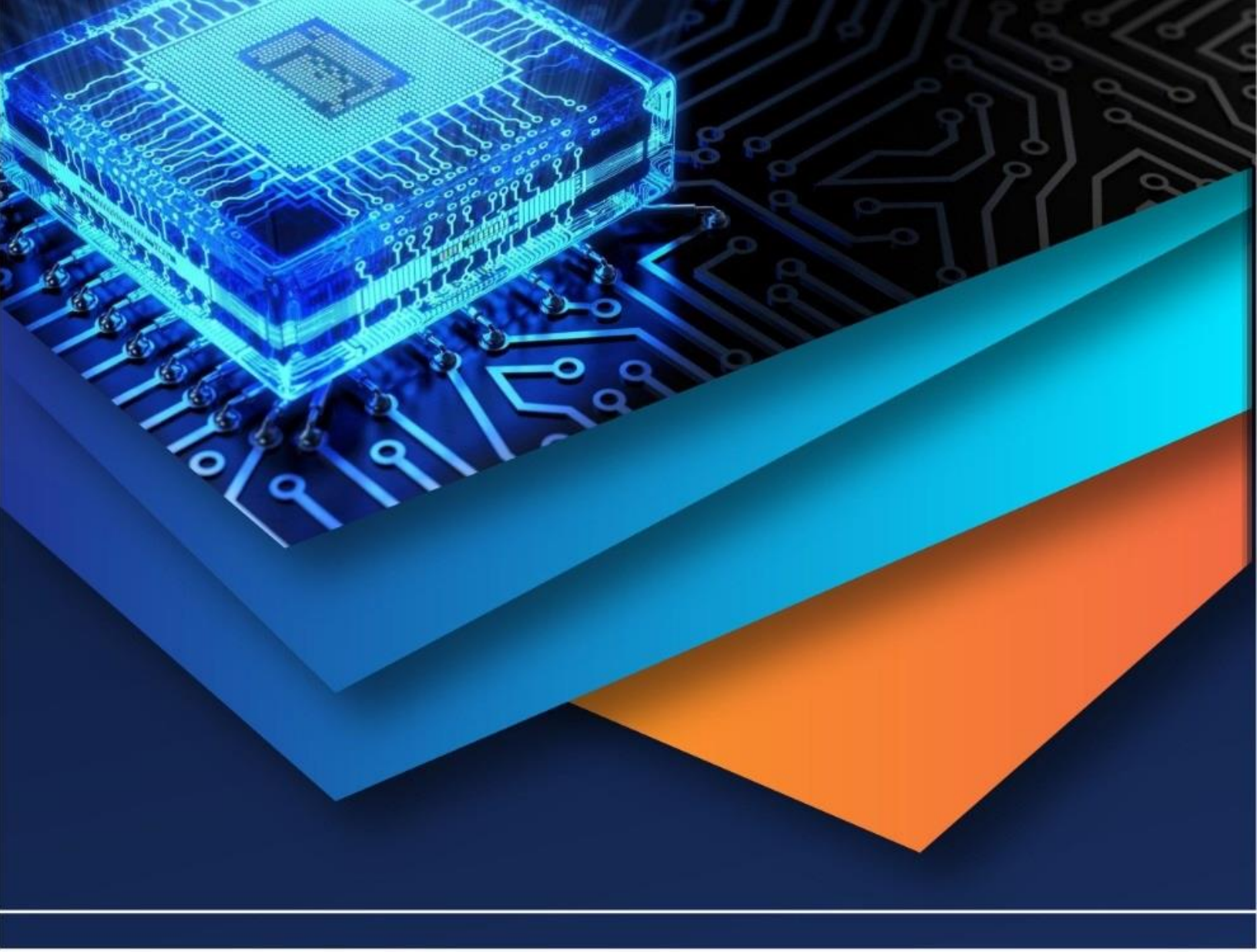

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