AUTOMATIC STREET LIGHT CONTROL BY DETECTING VEHICLE MOVEMENT

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***Abstract*—Street light automation system is the most highly reduces the human effort of manually switching OFF/ON of street lights time to time. The Street light Automation system helps in decreasing the energy consumption. It also reduces maintenance costs. Also helps to reduce crime actions and accidents up to certain limit. In this work, two types of sensors namely, IR sensor, which is a motion sensor used to sense some aspects of the surroundings and to identify passage of vehicles or walkers and LDR is a light sensor which will detect strength of sun light. Wi-Fi module is a wireless communication intermediate, used to send/receive information from/to street lights and control unit. Presently we have a manual system where the street lights will be switched ON in the evening before the sunsets and they are switched OFF in the next day morning after there is adequate light on the outside. During nighttime all the lights on the highway remain ON for the vehicles, but lots of energy is wasted when there is no vehicle movement. But the actual timing for these lights to be switched ON is when there is complete nightfall. With this, the power will be wasted up to some amount. The automatic street light provides a key for saving energy.The project is aimed to detect vehicle movement on highways to switch ON and to switch OFF the lights to save energy.**

***Keywords*— Internet of Things, Arduino UNO, LCD Display, Arduino IDE,IR Sensor.**

I. INTRODUCTION

In paper designed to detect the vehicle measure roadways to switch ON just a block of road lights in front of it, and to turn OFF the losing lights to save energy [1]. Lighting can reason for 10–38% of the total energy poster in typical cities worldwide. Street lighting is a particularly dangerous concern for public authorities in developing countries because of its strategic importance for economic and social strength [2]. Street lights play a vital role in our municipal service transfer sector and also plays a critical role in providing light for safety during night time travel on our roads. Maintenance and service for millions of street lights become a nearly impossible task [3]. Basically, street lighting is one of the essential parts. Therefore, the street lamps are moderately simple but with the increase of urbanization, the number of streets increases quickly with high traffic density. There are some factors need to be considered in order to design a good street lighting system such as night-time safety for public members and road users, provide public lighting at cost effective, the reduction of crime and minimizing it is effect on the environment [4]. street light is save the energy and useful for night time.

II. COMPONENTS USED

A. Arduino UNO

As shown in Fig.1, the Arduino Uno [6] is a microcontroller board which is based on the ATmega328 series controllers and has an IDE (Integrated Development Environment) for writing, compiling and uploading codes to the microcontroller. It has 14 digital input and output pins (of which 6 are PWM) and 6 analogue inputs for communication with the electronic components such as sensors, switches, motors and so on. It also has 16 MHz ceramic resonators, a USB connection jack, an external power supply jack, an ICSP (in-circuit serial programmer) header, and a reset button. Its operating voltage is 5v, input voltage 7 to 12v (limit up to 20v) [6].

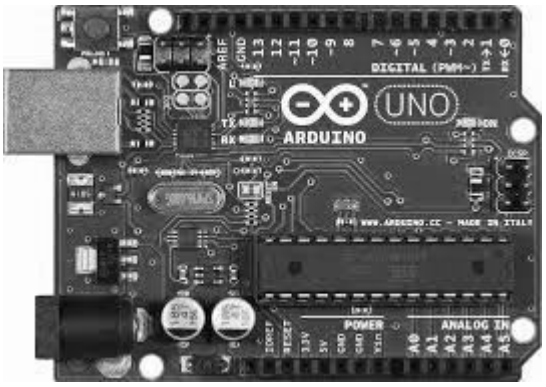

Fig. 1 Arduino UNO

B. Ir sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surrounds. An IR sensor can measure the heat of an object as well as senses the motion. These types of sensors measures only infrared radiation, rather than releasing that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations [4]. They are of two types: quantum and thermal. Thermal infrared sensors use infrared energy as the basis of heat and are independent of wavelength. Thermocouples, pyroelectric sensors and bolometers are the mutual types of thermal infrared detectors. The photosensitivity of quantum type sensors is wavelength dependent. Quantum type sensors are further classified into two types: intrinsic and extrinsic types.

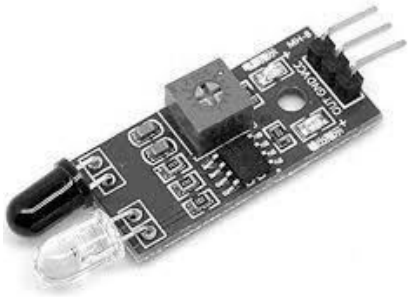

Fig. 2 ir sensor

C. LDR

A Light Dependent Resistor (LDR) or a photo resistor is a device whose resistivity is a occupation of the incident electromagnetic radiation. Hence, they are light sensitive devices. They are also called as photo conductors, photo conductive cells or just photocells . They are made up of semiconductor materials having high resistance [5]. When voltage as input is given to the LDR and no light is falling on it the the LDR will not produce the output .But as the voltage is provided and the light is falling on the LDR the output will be generated [7]. Light Dependent Resistor as the name suggests the resistance is dependent upon the light incident on it. The theoretical concept of the light sensor lies behind, which is used in this circuit as darkness detector [10]. An LDR is a resistor that contains a resistance (variable) which changes with the light intensity sensed. LDRs, light dependent resistors or photo-resistors are often used with LED circuits as simple photo-detectors.In dark conditions the resistance between the terminals is high – up to 1 MΩ or so. The resistance falls with

collective light levels down to a few hundred ohms at high brightness.

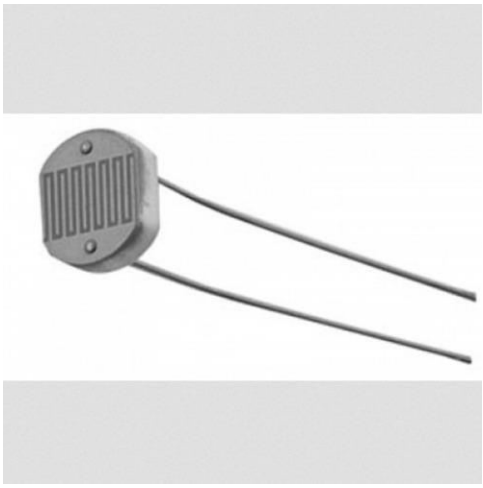

Fig. 3 LDR Sensor

D. LCD DISPLAY

It is specially manufactured to be used with microcontrollers. It is used for displaying different communications on a miniature liquid crystal display. The model described here is for its low price and great capabilities, most frequently used in practice [9]. The devices made up of Liquid Crystal Displays (LCDs) like computers, digital watches and also DVD and CD players. They have become very mutual and have taken a giant leap in the screen industry by visibly replacing the use of Cathode Ray Tubes (CRT). CRT draws more authority than LCD and are also bigger and heavier. LCD's have made shows thinner than CRT's. Even while comparing the LCD screen to an LED screen, the power consumption is smaller as it works on the simple principle of blocking light rather than dissipating. Let us take a look at the occupied of an LCD.

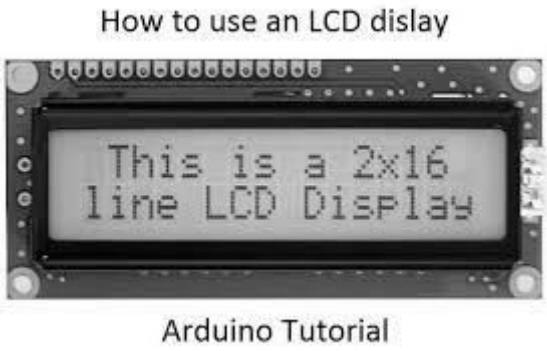

Fig. 4 LCD DISPLAY

E. WIFI Module

ESP8266 is a system on chip low-cost WiFi module with inbuilt TCP/IP stack. By ESP8266 we can send or receive information remotely by authenticates the user. The ESP8266 help the device or sensors for connecting to internet . Wi-Fi(Used ESP8266 due to very low cost Wi-Fi microchip) is also used to send or receive the information to or from the server or control room, so that lights can be also controlled from server [11]. This module has a great sufficient on-board dispensation and storage ability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip addition allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existence interfaces; it holds a self-calibrated RF allowing it to work under all working conditions, and involves no external RF parts.

Fig. 5 WIFI Module

F. Arduino IDE

The **Arduino Integrated Development Environment**(**IDE**) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of 3rd party cores, other vendor expansion boards. The Arduino IDE maintenances the languages C and C++ . The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output actions.

III. CONCLUSIONS

The implemented model is a less cost, pragmatic, eco friendly and the most secure approach to save energy. As per the statistical information 35%-40% of electrical energy is currently utilized by the national highways, state highways and local street lights. The initial investment cost and erection may be the disadvantage, but with the bulk production of the module the overall cost of investment can be reduced further due to advancement in innovation and technology the cost of the project can be further reduced. The project has scope in different applications like providing lighting for office, building, grounds, walking paths and parking garages of large shopping centres. This can also be utilized for security surveillance in corporate buildings, businesses centres, school premises etc.

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