Automatic General Lighting System (AGLS) Based on Movement by Micro-Controller

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Abstract: In this research, we will provide a suggested lighting system to reduce the consumption of lighting by those who take responsibility for providing power generation (governments and investors). Moreover, the need to follow the means of rationalization in the systems of street lighting and indoor and public places and vitality in cities. Moreover, to achieve the desired benefit for several aspects including the first in the reducing of consumed energy and saved in half because the suggested system depends on the conversion of the operation and extinguishing of lamps using the automatic control by depending on the reading of the sensor movement. Which in turn reduces the operating times which is appropriate nature is inactive. To our cities at night and be the other interest in convincing the final consumer (citizen) the need for the idea of rationalizing electrical energy.

Key words: AGLS, automatic general lighting system, micro-controller, URDINEO, electrical energy, idea

INTRODUCTION

The belief is one of the most important motives for doing something by people or societies which in turn comes from a conviction of a particular idea or behavior. This conviction is generated by equality in the application of a particular idea or action by promoters or adoption. Despite this period, the importance of saving electricity consumption and the plethora of government appeals to the idea of rationalization and the corresponding increase in the need for energy by citizens because of the constant and stable unavailability. In this research, we are trying to address part of this problem in the field of lighting, it is one of the energy using a field that we cannot leave it. The total electricity consumed in the field of lighting reaches at least 20% of the total energy consumption even with the use of advanced lighting systems in developed countries (Gutfleisch *et al.*, 2011), let alone the current traditional lighting systems. Moreover, through the application of the principle of consumption of energy necessary in the field of lighting for internal and external streets and important places and vital in the province of Muthanna or other cities of Iraq to match the circumstances and applied methods. This light is controlled by the use of the automatic controller with motion sensor and light sensor (Atzori *et al.*, 2010). Moreover, after the reviewing and meeting with the officials in the Department of Lighting, Muthanna

Electricity Department, especially Mr. Abu Anwar. Thankfully and study the current lighting system used in the lighting in the city which depends on its operation and extinguish it on the manual or optical cell. In the suggested system, the process of switching between operation and turn off is carried out under the supervision of the automatic controller (Vujovic and Maksimovic, 2015). Which has been defined as suitable for work in the city environment regarding lack of resources and the cost of licensing and ease of work on it and learning the programming language in which it is possible to train staff of lighting and maintenance departments in the concerned electricity departments? In addition to the efficiency of the work with the rest of the elements of the suggested system where the automatic control operates based on readings of the sensor of the movement of the infrared and light sensor and then the output of the controller is the process of switching between the operation and turn off lamps in the system.

Literature review: In the ISA system suggested by S. Suganya and others which used the latest lighting techniques, LED lamps and dynamic system of statistics by explorers, wireless communication between lamps and control station through the (ZigBee) protocol and the combination of timing devices and measuring the flow of traffic and the transistor (Photodues) (Leccese *et al.*, 2014).

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Fig. 1 : Explains some current lighting system problems

The study also included a suggested system from K.Santha and others. It also includes a time-reduction guest to conserve more energy, using a PIC-type microcontroller (Gs and Rudresh, 2015) and the intensity of light brightness by the algorithm.

ZigBee's remote lighting system that suggested by Srikanth and his colleagues to detect faulty and distorted lights and light control and to give an automatic resolution to switch between ON/OFF modes (Mnati *et al.*, 2017) when detecting movement of objects within the perimeter

Lighting system design by M. Abhishek company and Co. has been implemented according to the flow of traffic with the use of solar energy and the use of a series of controls on both sides of the road, so that, even the state turn off under the guidance of the controller (Fig. 1).

The other system suggested by Bhuvane Shwari and his colleagues based on the system of tracking the cars based on the intensity of light by the LDR sensor and output the reading to the Lm324 amplifier and the issuance (Mnati *et al.*, 2017) of orders through a microcontroller and also based on solar energy.

In a comparative study presented by steve shadwic on two cases established in Scotland and Wales, he explained the benefits and details of the technology used in both cases and called the name of Minos (Wang and Lu, 2013) which researched efficiently and successfully for more than 100000 units installed in the study.

A comparative study by som chaihiran vardom for street lighting system (PV) used three different types of lamps are low sodium pressure and high-pressure sodium (Conn *et al.*, 2013) and fluorescent and installed in the same unit and electric power with a timer in Thailand and within the rural environment and modern city environment.

A system suggested by rad hipriyasree in which a rational street lighting system was explained during the lower traffic hours based on the skin sensors and car space calculation equations which give an alert as the alarm in case of amplitude caused by the driver's swaying if it is under the influence of alcohol.

A system proposed by jerin George and his friends on the use of (PIR) techniques to control the conversion of luminance to on state and the transfer of data between elements of the system by (WSN) which supports (Leccese, 2013) the process of automation of lighting systems.

The study of all the above experiments, proposals and works has helped to generate ideas and solutions that are more suitable for the conditions and possibilities available to be used in the system of energy conservation used in lighting the streets and public places and vitality and continue to research for an effective system.

Current system: The current system of lighting in the streets and vital and public places in the province of Muthanna. As in most of the provinces of lamps of various types, including lamps of hydrogen, sodium and gas. And the power is connected to them through suspended or extended lugs between the columns carrying lamps that are controlled either using a control panel through a photovoltaic cell or a light sensor. That researches to connect the electrical power in the state of darkness after sunset and turn the lamps to the ON state and in turn also interrupts the power connection when sensing the sunrise at down and switching the lamps to off.

Moreover, there is another way to switch between ON and OFF modes is the manual conversion method which is still followed in lighting systems in some places.

It is clear to us, through the techniques used in the current system that the time of operation of the lamps or stay in ON state continuous and continuous consumption of electricity during the day is at least 13 h in winter and 9 h in the summer at least.

This is due to the extra time caused by forgetfulness when using the manual method and clouds or other factors that affect the coverage of light-sensitive cells which we often see in our daily life of street lighting and public places at daytime. To do this, we construct a matrix of paired criteria comparisons.

Suggested system: Through our review of the lighting system currently used in our cities, we note the high consumption of electrical energy regarding types of lamps used and times of operation and control method (Luo *et al.*, 2015). And is addressed by the problem through the development of the industry in the lighting systems of cities and technology in these industries and the construction of systems for control and control of or stay in ON state continuous and continuous consumption of electricity during the day is at least 13 h in Winter and 9 h in the Summer at least.

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Which reduces the consumption of electricity in public lighting systems through the use of electronic control with an infrared motion sensor to detect the movement of cars and pedestrians. According to, these data are controlled by switching the status of the lamps in the general lighting system between the OFF mode of the ignition and ON condition for operation by the controller and the operation of a set of lamps according to the direction of motion detected by the motion sensor readings.

Microcontroller: In this system, a URDINEO UNO microcontroller was used. The ATMEGA328 automatic controller is based on a microcontroller by Atmel company. The processor speed is 16 mHz. It has 14 digital ports. It starts from 0-13 and 6 of the analogue ports are called from A0-5 (Hughes, 2016).

The motherboard works on a 5 V voltage while this panel provides a maximum current of 250 mA and the maximum current output from the port is 40 mA when the outside voltage is 5 and 50 V when the outside voltage is 3.3 V. The memory that included control panel contains is three types:

Flash memory which is 32 kB in size is taken from a fraction of 0.5 kB for the boot loader which helps the motherboard to understand (Arduino c). This memory is used to store the program written language above after using the control panel.

SRAM memory the size of this memory is 2 kB and the function of this memory is to store the results and variables resulting from the processing and operation. EEPROM memory the size of this memory is 1 kB and stored data and variables to be recovered at any other time when running of the program as needed instead of SRAM memory which loses data when the power out. As the Arduino automatic controller is open source this is one of the reasons it is available in the market with Italian and Chinese manufacturers. The Chinese price starts at $3 and Italian $10.

Motion sensor: Is an electronic device that researches on the monitoring or vulnerability or reading of external influences within the environment and depends on the sensitivity of the detection of infrared radiation from living objects when moving. It workwithout the radiation and returns to receive (McLean, 2008) as in the sensors of ultrasound and radar systems.

These types of sensors are equipped with an external shell that can withstand and withstand the harsh external environmental and air conditions, allowing for use in the lighting system for the streets and public places and the

proposed vitality in addition to contain a pair of controllers, the first to control the angle of reading or sensitivity and the second to control the time. The distance between the motor readings within the outer perimeter is also controlled by the range of the subject to exploration and the price of this type of sensors about $2.

MATERIALS AND METHODS

Connect the light of type led 1 to the analogue port a_0 in the control panel. The sensor or kinetic sensor of the analogue port a_2 is then placed inside the control panel as an incoming signal.

Connect the ground wire from the sensor or sensor to the (gnd) port within the controller. In a straight connect mode we connect the lights to the 6-8 digital ports as outside signals.

We then reconnect the gnd port or the ground port within the electronic control panel to all the system components (lamps-sensors). Connect the power (V7-12) to the electronic controller used in the system by the converter of the controller (Fig. 2).

Suggested by the electronic controller. Which begins work of resistance or light sensor. Which in turn isolates the power supply when there is light in the sensor environment and when the darkening begins after sunset (Fig. 3). By reducing the level of insulation and then delivering the flow of electricity then the system to receive the signal reading by sensors by means of infrared measurement which controls the part of the processor at (89c51) from the control panel when the low level of illumination in the around which in turn do all basic electric panel by the voltage regulator to the control panel and the low power is the most important for the control
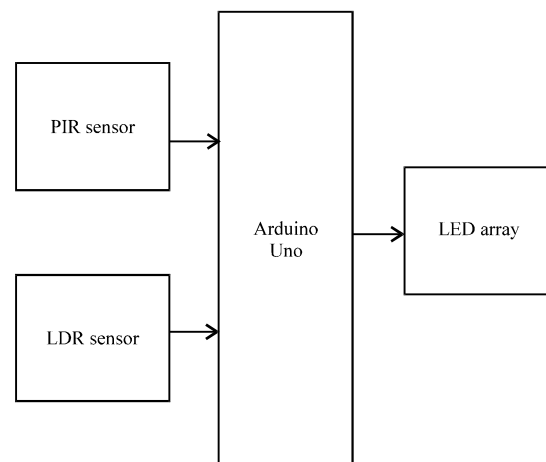
Fig. 2: Explains diagram of the method of connecting and connecting components of the lighting system

```
void loop() {
  lcd.setCursor(0,0);
  lcd.print("STREET LIGHT    ");
  x=analogRead(A0) * 7 + 200;
  if ( x>=6000) {
      detachInterrupt(0); // disable power
      lcd.setCursor(13,0);
      lcd.print("OFF    ");
      lcd.setCursor(0,1);
      lcd.print("                ");
    } // else
  else{
    // enable power
    attachInterrupt(0, acon, FALLING);
    lcd.setCursor(13,0);
    lcd.print("ON      ");
    lcd.setCursor(6,1);
    lcd.print((analogRead(A0) * 7) + 200);
    }
} // end loop
```

Fig. 3 : Explains programs written in the memory of Eprom

circuit (Banzi and Shiloh, 2014). The control of this controller is controlled by high-performance programming which is an integral part of the assembly language for programming and described in part of this program. System and the working environment through Fig. 3 to perform these tasks by storing programs written in the memory of Eprom.

Then comes the function of lights which is preferred to use the type of them because they are cheap, small and uncomplicated and the degree of reliability is high and low level of energy consumption by about half and when the implementation of the project on experimental aspects proved to research to reduce the consumption of electricity to a large extent (Yanine *et al.*, 2014) may reach 75% by working to reduce the consumption of LED lamps and even times of operation by the controller.

With the elimination of the need for manual research completely in the current lighting systems, the lighting system by electronic controls has become the basis for the research of intelligent systems advanced in the rationalization and energy saving from the human and electrical point of view.

RESULTS AND DISCUSSION

In this research will review the details of the practical part step by step to facilitate the task and clarify it for any person concerned and interest to do it himself. The review of all components of the system and are connected to each other by showing the stages in succession in an easy and simple (Hancock and Algozzine, 2015) as follows:

Initial preparation of all components of the suggested system by displaying each element for the other element by placing the sensor and connecting it with the uredo which in turn is connected to the external power supply cord with the resistors placed on the test board to control the flow of electricity.

In the second phase, the lamps are turned on for some seconds and then extinguished to indicate that they work when the darkness starts with the possibility of excluding some of the lamps to stay in continuous research if there are important places or for security reasons or intersections or to indicate the first road.

At this stage is monitoring the movement of the organisms and detection of a motion sensor or infrared sensor and representation of this reading signal input to the control panel and turn the transmission of the output signal to run the lamps continuously and for a specified period of time and can make them research according to the direction of movement of the body with the possibility of making the number of LEDs work and extinguish together as a set according to the program setup that controls the function of the controller (Arduino) to control and control elements of the suggested system of lighting (Fig. 4).

Fig. 4 : Explains experience about the proposed system

CONCLUSION

Through the suggested system of lighting in public places and streets, the excess amount of electrical energy can be supplied by replacing the LED lamps instead of the sodium or mercury vapour lamps used in the current system. In addition to the possibility of using the suggested system as an alarm system for security purposes because it senses the movement of all organism.

While preventing the waste of energy running lamps in the current system length of darkness while the suggested system only lights the lamps when moving in the place or street automatically and there is no need for manual intervention which in turn reduces human intervention in the current system.

This automatic operation of the lamps is achieved through the control of the control panel (Arduino) which provides an efficient and intelligent automatic lighting system with the help of infrared sensors at low cost with energy conservation.

This system is multiuse and adjustable and developed according to the needs of the user or place where it is possible to use sensors even during daylight hours with the possibility of using it in the high and fast ways. The possibility of development and expansion also characterizes the suggested system through the addition of sensors or measuring devices for energy used and the addition of alarms to report in cases of overruns and failures with the possibility of introducing additional ways to control and control the lights through the GSM wireless technology with networks and mobile.

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