ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Website: www.ijareeie.com

Vol. 6, Issue 6, June 2017

Campus Automation Using ARDUINO

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ABSTRACT: The core of this paper is to develop a system which will make a step for the energy conservation.Energy conservation refers to reducing of energy consumption through using less of an energy service.This system consist of controlling of two different systems i.e. one is the street lights and another is the pump through which the level of the tank will be controlled automatically.The another system this paper is going to propose is the security system which is used on the main entrance gate,for the visual presentation of the system a prototype of the college campus is made.The controller used in the system is Arduino Uno.The interfacing of the system with arduino is very much easy and works successfully .Arduino increases the responsiveness of the system. The main objective of this system is to reduce the power consumption due to wastage of street lights, increase the security of the campus and to control the water level of the tank.

I. INTRODUCTION

Electronic and Electrical environment with respect to this context is any environment which consists of appliances such as street lights, water level control, security alarm etc. A remotely accessible environment is an environment in which each appliance can be accessed automatically and controlled using software as an interface, which includes an Program-ming and web application. Such remotely accessible systems are already available in the market, but have a number of drawbacks as well. This paper aims to perform a survey of all the existing systems and compare these systems with this system. The paper will also compare and contrast all the systems and look at their various features and disadvantages. A wide variety of options are available for the automation. The system proposed provides three means to control the street light, water level of tank and security alarm. The real time monitoring has been an important feature that can be used in the campus automation systems. As a change in the status of the devices occurs, the user can be informed in real time. The user commands are transferred to a server which is usually done by indicators. This can help control the devices. Arduino is used as a communication medium to help establish connection. The system makes use of a Atmega328 microcontroller for campus appliances control.

II. LITERATURE REVIEW

In this section, discussed different Campus Automation Sys-tem with their technology with features, benefit and limitations they have. Controlling lighting system by means of LDR and Arduino together is relatively a new concept and also water level control by shorting the wires and also security alarm. As per reference of Damala Rajesh Babu[2] research papers which were related to the same field and it was noticed that this paper is only about street light systems and they are Passive Infrared receiver based and they are controlled by means of timers and analog circuits . Some were controlled by wireless GSM/GUI networks .That being said they are no papers which coin all the lighting system under one umbrella and use LDR and Arduino system as their fundamental architecture to control it. Ancient Lighting system have been confined to two options on and off, due to it had their own share of disadvantage. This kind of operation meant energy loss due to continuous operation at maximum voltage though actual requirement might be less depending upon the outside lighting condition. The simplest solution to it is by calibrating the lights according to the outside lighting condition. This is what the paper aiming for in our smart lighting system.

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III. CIRCUIT COMPONENTS

All the circuit component we are using in the our project are described below.

Components	Specifications
1. LDR	max Voltage 150V;5mm;1.8gm
2. IR Sensor	5V
3. Buzzer	5V ; 1.2amp
4. Pump	3-6V ; 1amp

Table1: Specifications of the hardware components

A. Light Dependent Resister

Light Dependent Resistor as the name suggest the resistance is dependent upon the light incident on it. The light dependent resistor resistance changes with intensity of light, with increase in light intensity the resistance offered by the sensor decreases and with decrease in light intensity the resistance offered by the sensor increases. Hence it acts as variable resistor with change in light intensity. These helps in finding the amount of light intensity at that instant of time and thus helping in regulating the lighting of our lighting system accordingly.

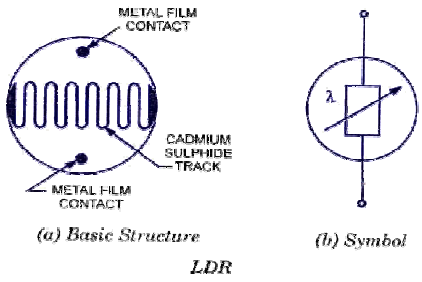

Fig. 1. LDR symbol and working [1]

When a light dependent resistor is kept in dark, its resistance is very high. This resistance is called as dark resistance as shown in the above graph. It can be as high as 1012 and if the device is allowed to absorb light its resistance will be decreased drastically. If a constant voltage is applied to it and intensity of light is increased the current starts increasing.

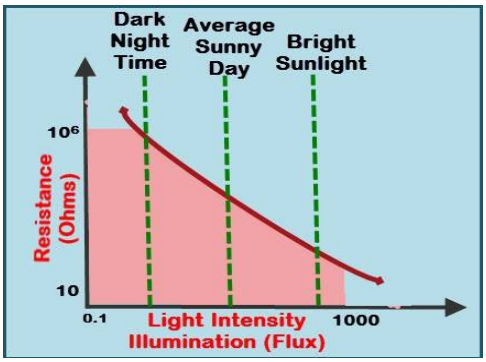

Fig. 3. Pin diagram for Arduino Uno [1]

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leads, electrons are able to recombine with holes within the LED, releasing energy in the form of photons which gives the light. Hence, it is a two-lead semiconductor light source Light emitting diodes represents our lighting system and the amount of light emitted by it is directly related to the amount of light in the environment that is when outside light is less than the light given by LEDS is more and visa-versa.

D. IR Sensor

An infrared sensor is an electronic instrument which is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. Infrared sensors are also capable of measuring the heat being emitted by an object and detecting motion.

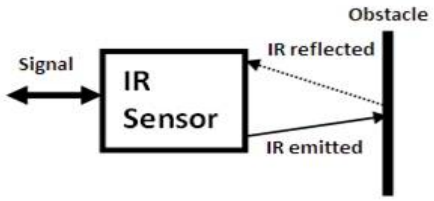

Fig. 2. Resistance (Ohms) Vs Illumination(Flux) graph[1]

B. Arduino Uno

Arduino is an open-source physical platform based on microcontroller board having the ATmega32 series controllers and Integrated Development Environment for writing and uploading codes to the microcontroller. It has input and output pins for interaction with the outside world such as with sensors, switches, motors and so on. To be precise it has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller

.It can take supply through USB or we can power it with an AC-to-DC adapter or a battery Arduino acts as the processing module of the system. It takes input from the LDR, process the data and gives the output to LEDS directly or through a relay and a transistor mechanism.

C. LEDs

A light-emitting diode (LED) is a pn junction diode, which emits light when activated. When we apply voltage across its

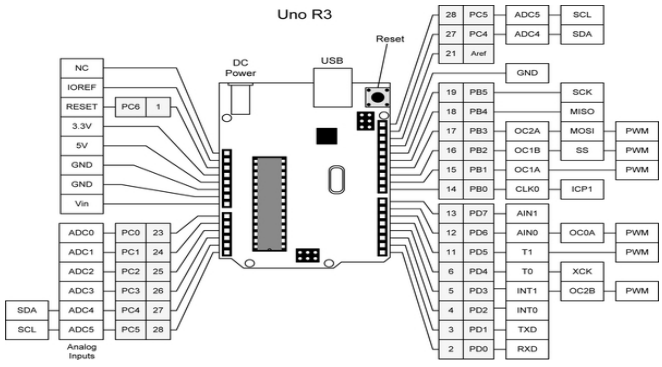

Fig. 4. Working of IR sensor[1]

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E. DC MOTOR

Electrical motors are everywhere around us. Almost all the electro-mechanical movements we see around us are caused either by a AC or a DC motor. Here we will be exploring DC motors. This is a device that converts DC electrical energy to a mechanical energy. Principle of DC Motor :- This DC or direct current motor works on the principal, when a current carrying conductor is placed in a magnetic field , it experiences a torque and has a tendency to move. This is known as motoring action. If the direction of current in the wire is reversed, the direction of rotation also reverses.

IV. WORKING PRINCIPLE OF STREET LIGHTS

LDR has the property to change its resistance according to the intensity of light. When a light of high intensity falls on LDR its resistance decreases and when it goes below our set point value our controller switches 'OFF' the light. When the intensity of light decreases the resistance increases and when it crosses the set point value our controller switches the light 'ON'. In this way our system works as automatic street light control. Which is very energy efficient in further topic we told how much we save from this system.

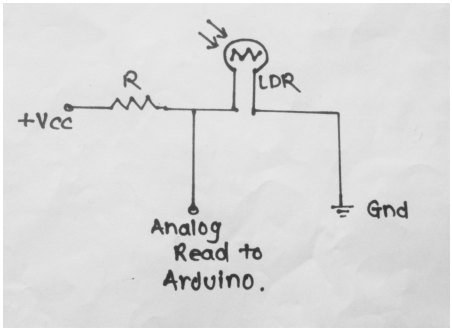

Fig. 5. Connections of LDR with arduino

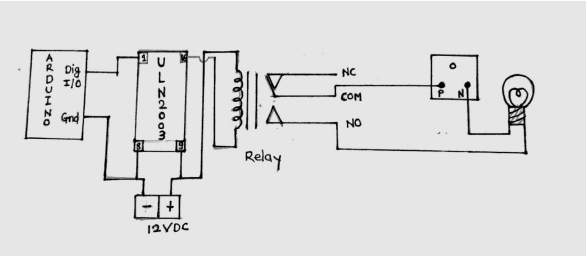

Fig. 6. Circuit diagram for actual model using relay and ULN2003

The above circuit is the actual circuit which should be implemented for controlling the 230V AC lights. The figure shows that the digital output of arduino is connected to pin no. 1 of ULN2003 IC and ground of both arduino and ULN are shorted. The 12V supply is required for controlling the relay which is given through the ULN. And our final control element is connected to the relay through 230V AC.

V. WORKING OF WATER LEVEL CONTROLLER

This system will help to fill the tank when it needed.When the tank is empty the pump will start and do not stop till the tank is full.When the tank gets full the pump will stop and remain as it is upto when the tank is not get empty and the process continue.For the detection of the full level and a empty level of tank system consist of wires which are

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working as a sensor.A 5V supply wire is kept at bottom of the tank and two wires for upper and lower level respectively.When the water reaches the upper level the connection get short and arduino gets the signal that the tank is full.Similarly it happens for the lower level.In this way the system successfully control the level of the tank.

VI. WORKING OF BURGLER ALARM

This IR sensor based Alarm can be used to give a warning alarm when someone passes through a protected area. The circuit is kept standby through a laser beam or IR beam focused on to the Photodiode. When the beam path breaks, alarm will be triggered. An infrared detector that sounds a buzzer when an IR beam is broken, meaning the IR signal is lost. A pulsed IR signal generator is necessary, but not included in this post. This application would be ideal for doorways or hallways to alert when someone enters or exits restricted area.

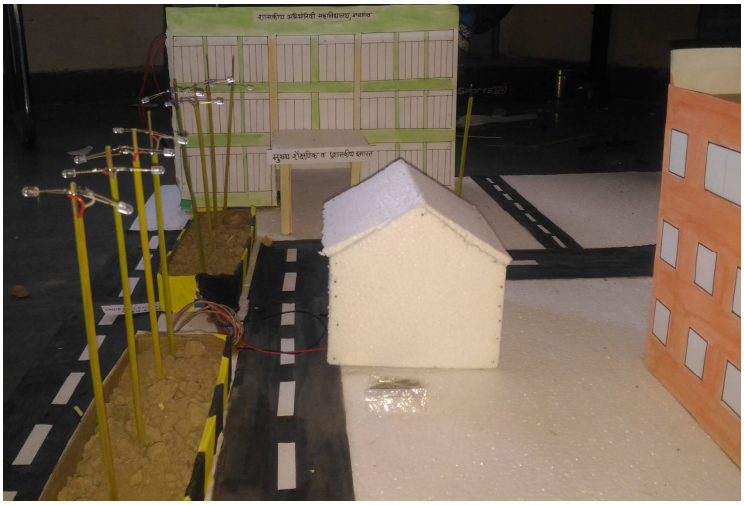

Fig. 7. Prototype for Street Lightning System

VII. PROGRAMMES

A. For Automatic Street Lightning system and Burgler Alarm

```
int oppin=0; int pin=7;

int IR=12;
int BUZ=11; int IR1=0; void setup() {
Serial.begin(9600);

pinMode(pin,OUTPUT);

pinMode(IR,INPUT);

pinMode(BUZ,OUTPUT); }
void loop() {

float rawvoltage=analogRead(oppin); Serial.print(rawvoltage); Serial.print(”LDR
VOLTAGE”); delay(300);

if(rawvoltage¿950) {
```

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```
digitalWrite(pin,HIGH); }
Else
{
digitalWrite(pin,LOW); }
IR1=digitalRead(IR);

if(IR1==1) {
digitalWrite(BUZ,LOW); }

else {

digitalWrite(BUZ,HIGH); delay(5000);}}
```

B. For Water Level Control

```
   int u=7; int l=8;

int pump=9; int ustatus=0; int lstatus=0; void setup() {
pinMode(u,INPUT);

pinMode(l,INPUT);

pinMode(pump,OUTPUT);

Serial.begin(9600); }

void loop() {

int ustatus=digitalRead(u); int lstatus=digitalRead(l); int flag=0;

if(ustatus==0 && lstatus==0) { digitalWrite(pump,HIGH); flag=1; }

if(ustatus==1 && lstatus==1) {digitalWrite(pump,LOW); flag=2; }

if(ustatus==0 && lstatus==1 && flag==1) { digitalWrite(pump,HIGH); }

if(ustatus==0 && lstatus==1 && flag==2) { digitalWrite(pump,LOW); }

delay(500); }
```

VIII. CALCULATIONS[1]

In this project by automatic street lights we are going to save lot much of energy per day. By saving energy we are stepping forward to our countrys development.

Our college have approximate 50 street lights. The lights used on our college streets are SODIUM VAPOUR lights. They are of 400 Watt each.

If we assume only more two hours our lights will be kept 'ON' one hour in morning and one hour in evening then the energy wasted will be 40 KWH per DAY.

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The per unit cost is INR 12/- hence we save INR 1, 72 ,800/- per year if only two hours more the light will be kept on.

Bulbs = 50

Wattage=400/blub

Wasted Hours =2 HR/day

Energy Wasted

= 50 400 2

= 40,000 WH/day

= 40 KWH/day

Energy Wasted Per Month

= Energy Wasted Per Day 30

= 1200 KWH/month
= 1200 12

= 14400 KWH/Year

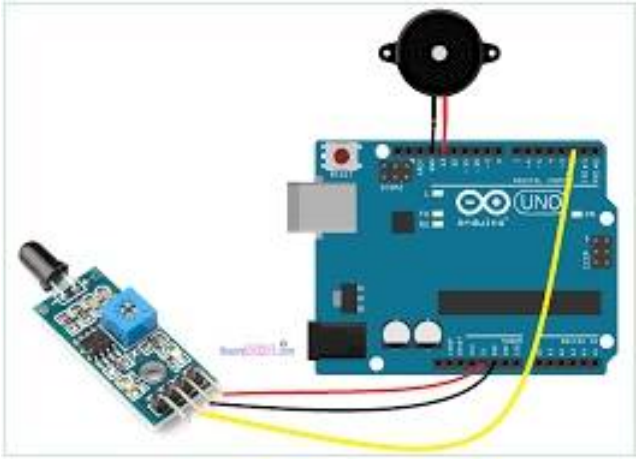

Fig. 8. Connection of IR and Buzzer with arduino

IX. CONCLUSION AND FUTURE SCOPE

Advantages of proposed system on current system

1. There is no need of any manual operator as the system is fully automatic.
2. Switching time changes according to the climate i.e. in summer lights where switched on at 19:00 pm and switched off at 6:00 am and timing also changes in winter and rainy season, hence as it is a closed loop system output will change accordingly.

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3. Energy is Conserved. However, with the help of this system we will conserve energy which indirectly leads our country to the development.
4. With the help of automatic level controller water that waste because of the carelessness of the operators will be saved. This system is economical and easy to implement and replace the current system. These circuit is totally based on arduino which here works as a micro-controller using the input from LDR, wires and IR sensor. This system can be easily implemented on our Indian streets,in any indus-try,houses, collges, Hostels, etc.

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