SMART STREET LIGHT

A PROJECT REPORT

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Abstract

Our project for developing a smart street light system is reviewed. In this project, the street light system, in which lights on when needed and light-off when not needed. Currently, in the whole world, enormous electric energy is consumed by the street lamps, which are automatically turn on when it becomes dark and automatically turn off when it becomes bright. This is the huge waste of energy in the whole world and should be changed. Our smart street light system consists of a LED light, a brightness sensor, a motion sensor and a short-distance communication network. The lights turn on before pedestrians and vehicles come and turn off or reduce power when there is no one. It will be difficult for pedestrians and drivers of vehicles to distinguish our smart street lamps and the conventional street lights, since our street lamps all turn on before they come. The present status and the future prospects of our smart start light project will be reviewed.

Introduction

Street lights are doing more than ever in today's smart cities. With digital networks and embedded sensors, they collect and transmit information that help cities monitor and respond to any circumstance, from traffic and air quality to crowds and noise. They can detect traffic congestion and track available parking spaces. Those very same networks can remotely control LED lights to turn on and off, flash, dim and more, offering cities a chance to maximize low-energy lighting benefits while also improving pedestrian and bicyclist safety. With street lights creating a network canopy, those networks of data can be used by more than just lighting departments, empowering even schools and businesses via a lighting infrastructure that brightens the future of the digital city.

Advantages:

- If we uses this idea and implement to it in our society it will be helpful in saving enough amount of electricity and off-course money.

Components

1. Arduino Uno:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode. Revision 3 of the board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V. The second one is a not connected pin, that is reserved for future purposes.

- Stronger RESET circuit.

- Atmega 16U2 replace the 8U2. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Programming:

The Arduino Uno can be programmed with the Arduino software (download). Select "Arduino Uno from the Tools > Board menu (according to the microcontroller on your board). For details, see the reference and tutorials. The ATmega328 on the Arduino Uno comes preburned with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). You can also bypass the bootloader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available. The ATmega16U2/8U2 is loaded with a DFU bootloader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then resetting the 8U2.

- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode

2. IR sensor (4):

An infrared sensor is an electronic device, that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion.These types of sensors measures only infrared radiation, rather than emitting it that is called as a passive IR sensor. Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes, that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

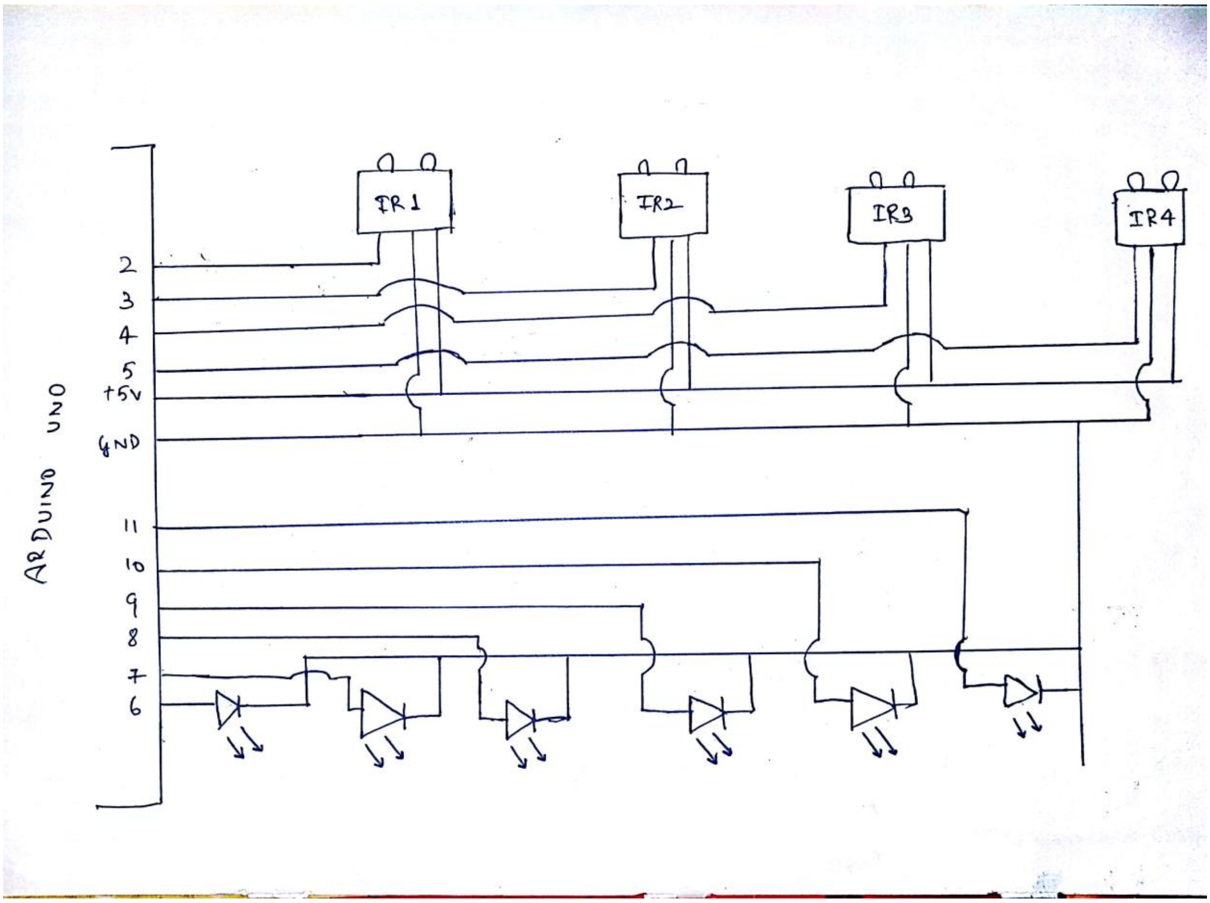
3. 10mm LEDs (6):

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p–n junction diode that emits light when activated. When a suitable current is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the colour of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LEDs are typically small (less than 1 mm2) and integrated optical components may be used to shape the radiation pattern.

Appearing as practical electronic components in 1962, the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are still frequently used as transmitting elements in remote-control circuits, such as those in remote controls for a wide variety of consumer electronics. The first visible-light LEDs were of low intensity and limited to red. Modern LEDs are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness.

4. connecting wire
5. Breadboard

Circuit Diagram

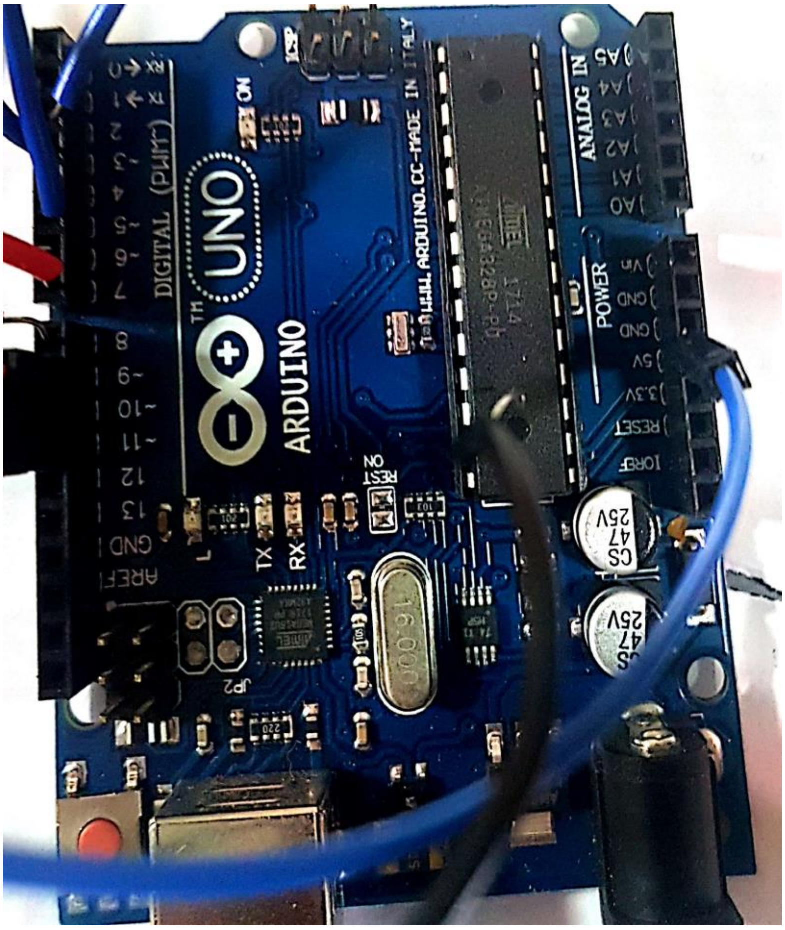


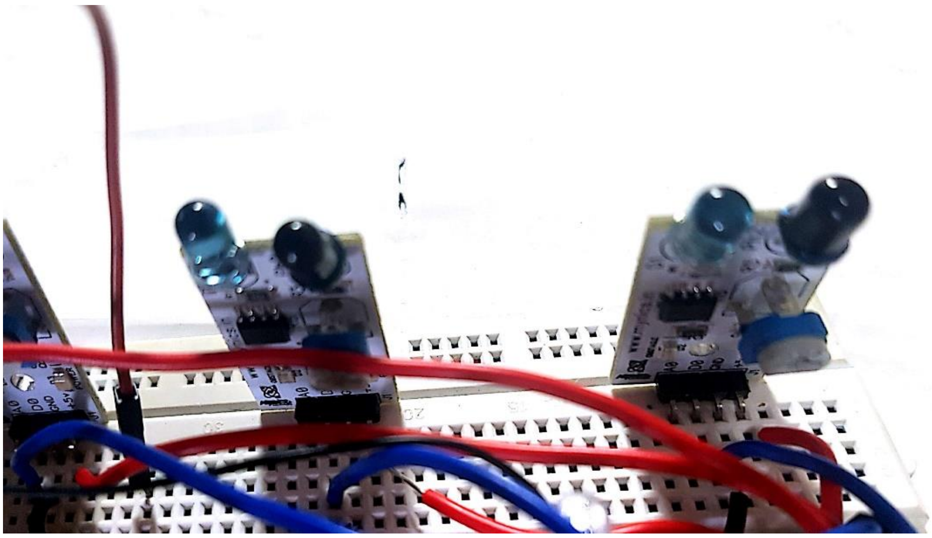
Source Code

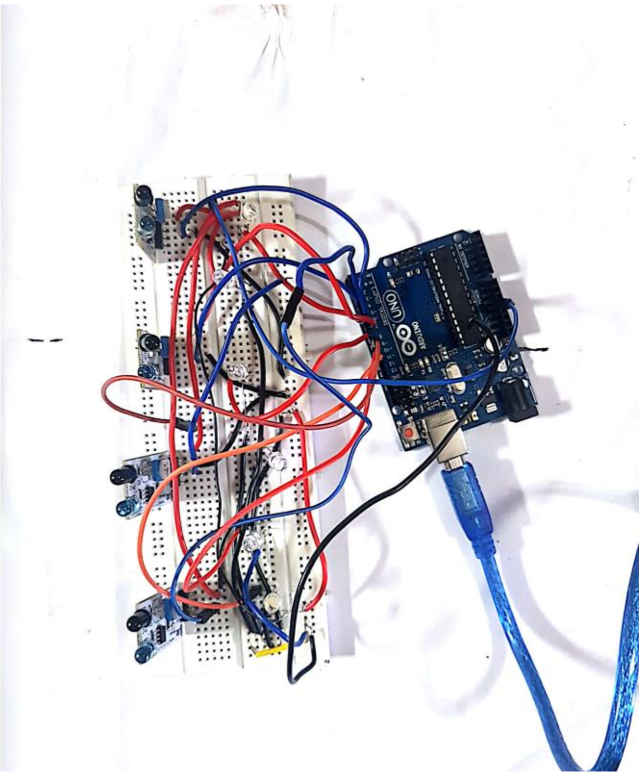
```
int ir1=2;
int ir2=3;
int ir3=4;
int ir4=5;

int led1=6;
int led2=7;
int led3=8;
int led4=9;
int led5=10;
int led6=11;

int proxy1=0;
int proxy2=0;
int proxy3=0;
int proxy4=0;
void setup()
{
  pinMode(ir1,INPUT);
  pinMode(ir2,INPUT);
  pinMode(ir3,INPUT);
  pinMode(ir4,INPUT);

  pinMode(led1,OUTPUT);
  pinMode(led2,OUTPUT);
  pinMode(led3,OUTPUT);
  pinMode(led4,OUTPUT);
  pinMode(led5,OUTPUT);
  pinMode(led6,OUTPUT);
}


void loop(){
  proxy1=digitalRead(ir1);
  proxy2=digitalRead(ir2);
  proxy3=digitalRead(ir3);
  proxy4=digitalRead(ir4);

if(proxy1==HIGH)
{
  digitalWrite(led1,HIGH);
  digitalWrite(led2,HIGH);
  digitalWrite(led3,HIGH);
}
else
{
  digitalWrite(led1,LOW);
  digitalWrite(led2,LOW);
  digitalWrite(led3,LOW);
}
```

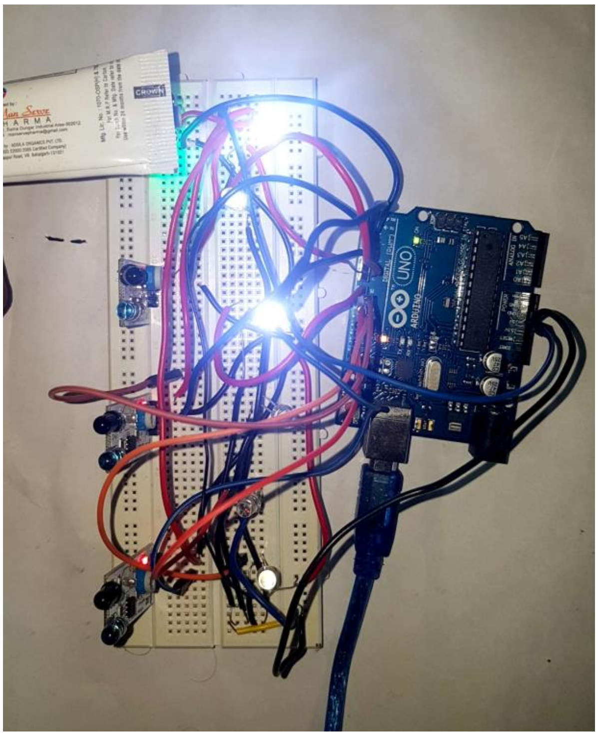
```
if(proxy2==HIGH)
{
  digitalWrite(led2,HIGH);
  digitalWrite(led3,HIGH);
  digitalWrite(led4,HIGH);
}
else
{
  digitalWrite(led2,LOW);
  digitalWrite(led3,LOW);
  digitalWrite(led4,LOW);
}

if(proxy3==HIGH)
{
  digitalWrite(led3,HIGH);
  digitalWrite(led4,HIGH);
  digitalWrite(led5,HIGH);
}
else
{
  digitalWrite(led3,LOW);
  digitalWrite(led4,LOW);
  digitalWrite(led5,LOW);
}

if(proxy4==HIGH)
{
  digitalWrite(led4,HIGH);
  digitalWrite(led5,HIGH);
  digitalWrite(led6,HIGH);
}
else
{
  digitalWrite(led4,LOW);
  digitalWrite(led5,LOW);
  digitalWrite(led6,LOW);
}
}
```

Working Model






UNO
ARDUINO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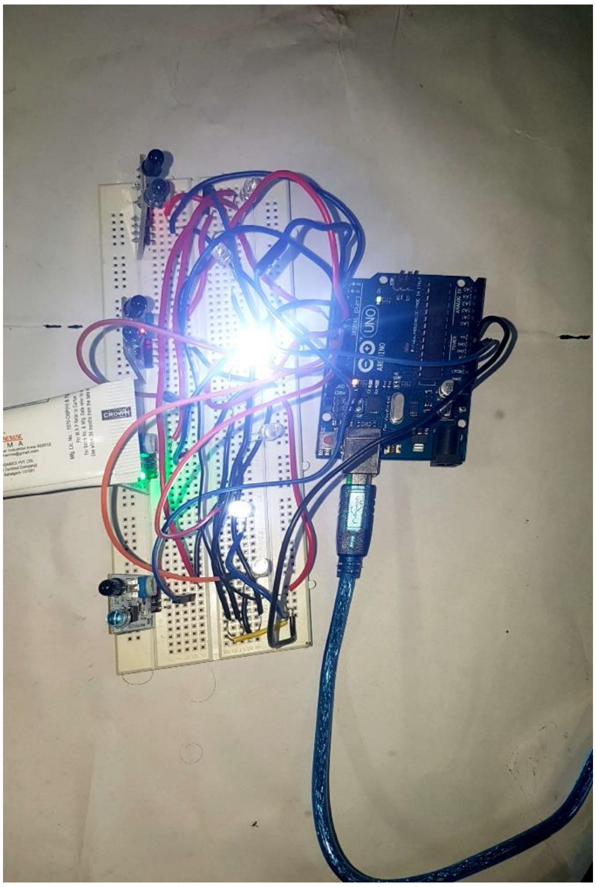
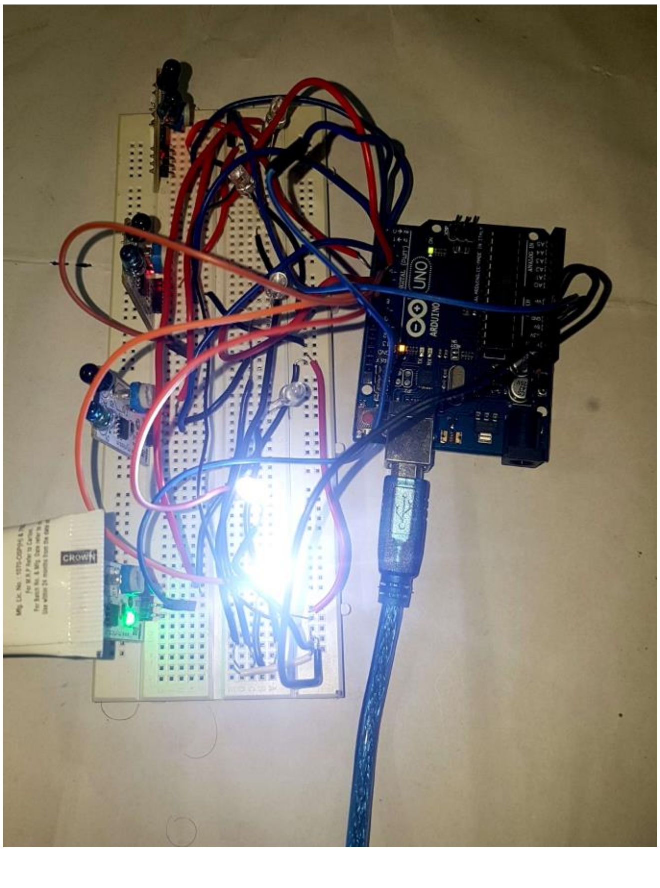
ARDUINO


UNO
CROWN


UNO
ARDUINO
CROWN

References

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