Abstract - As the generation is developing and the rate of innovation is increasing rapidly, the requirement of electricity would be numerous. So we must need to concern about, how to conserve the electricity. In this thesis our foremost aim is to conserve the energy and minimize the wastage of unusual electricity because the modern homes remain 'ON' for whole night, where a great quantities of energy is waste, therefore in this thesis work, the IR sensor is implemented in order to switch "ON" when the object moves towards the sensor and switch 'OFF' when the object moves away from the sensor. In this thesis, is suggested to control the electricity. A circuit with Arduino, IR sensor to sense the objects and LED for the illumination are designed and implemented to conserve the electricity automatically. The main aim of our thesis work is to conserve the energy. So for the conversation energy we have used solar panel. It will conserve the energy and make it in use when required.

System requirements:

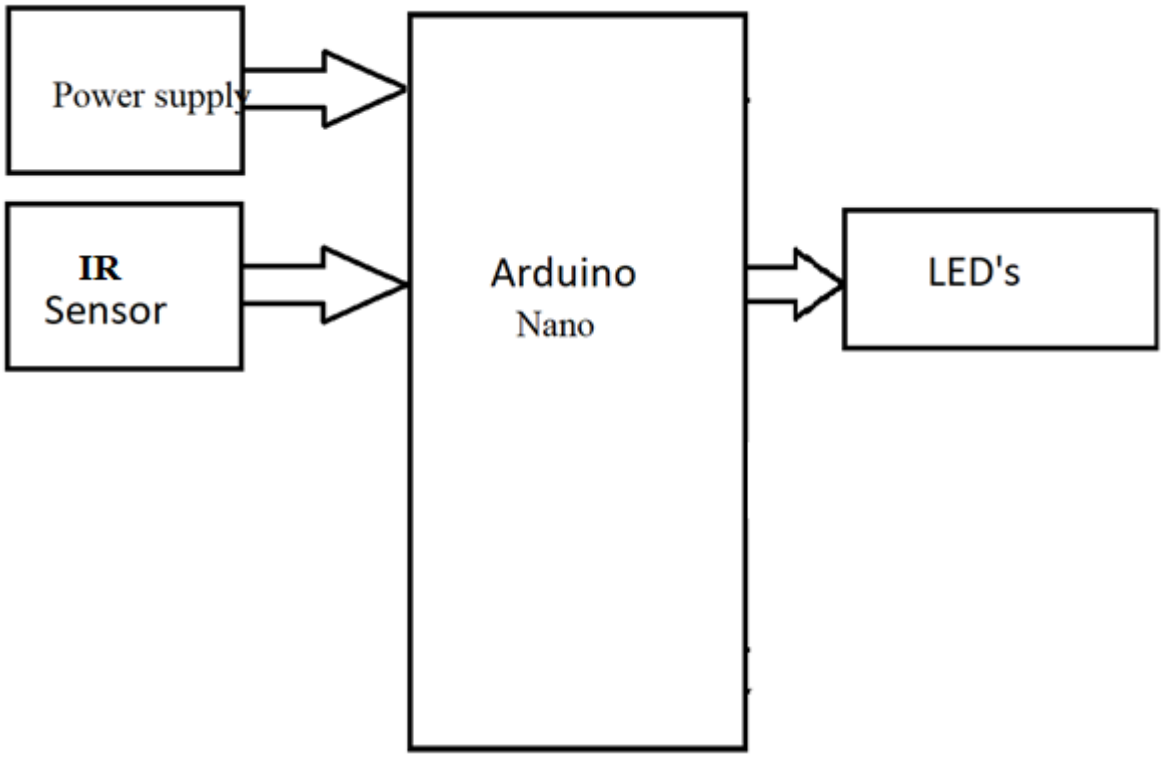
Hardware:

1. Arduino nano
2. LED's
3. Bread board
4. Jumper wires
5. Power supply
6. IR sensor module

Software:

1. Arduino IDE
2. Embedded C

Block diagram:



INTRODUCTION:

In this modern era we all are bounding by lot of electronic products, we cannot imagine a single day without electricity or electronic devices. It is one of the major discover of mankind, more over the light. It was the great achievement for the people survive and hence the discovery of the street light . In ancient days, when the home light was discover it got advanced as continue by the human on the basis of ON and OFF system. But now as we can see, the home light which work in many process with new electronic devices. As we work on the home light with Arduino, and IR (infrared sensor) sensor. When peoples passes from IR sensor then automatically the home light turns “ON ” by the help of Arduino, which will work as an automatic light.

Hardware description:

1.1.Arduino Nano:

Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. It is like the brain of a project.

Because it is so flexible and open source, Arduino is the best solution if you are interested in creating interactive objects or environments no matter you are artists, designers or hobbyists.

One of Seeed Studio's motto is "Grow the Difference", which has now become part of the culture of the company. This is not just reflected from what we are doing in popularizing open source culture, but also from our products. Ever since the company funded, we are continuously creating our own open platform to differentiate from the existing one.

Here at Seeed, you can find not only Arduino boards, such such as Arduino Nano and Arduino Mega, but also many boards that derived from Arduino such as Seeeduino, a joint effort by Seeed Studio and Arduino. Seeeduino is compatible with Arduino while has more powerful functions and lower price. To start with, you can try the latest version Seeeduino V4.2 or Seeeduino Mega that corresponding to Arduino Mega.

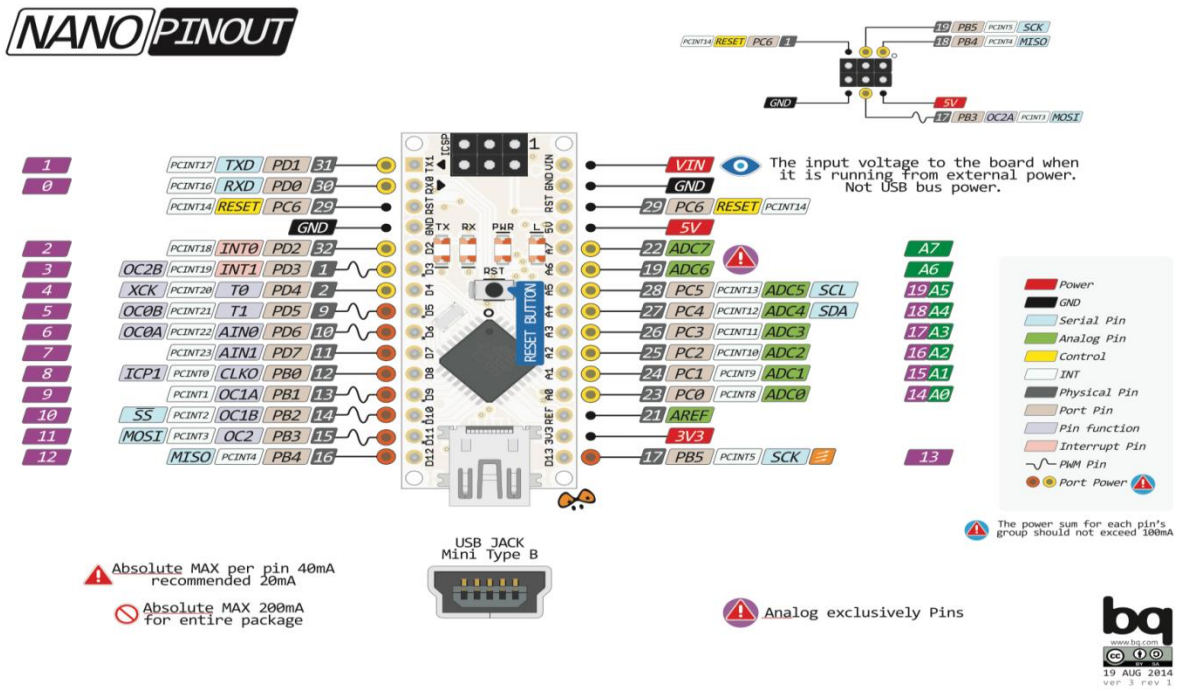


Fig.2. Arduino nano pin out

Arduino is an open-source platform used for building electronics projects. Arduino consists of both a physical programmable circuit board (often referred to as a microcontroller) and a piece of software, or IDE (Integrated Development Environment) that runs on your computer, used to write and upload computer code to the physical board.

The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware (called a programmer) in order to load new code onto the board – you can simply use a USB cable. Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program. Finally, Arduino provides a standard form factor that breaks out the functions of the micro-controller into a more accessible package.

- The micro-USB connector is not soldered to the board very well and is easily broken.

There are multiple versions of this board with different connectors. Refer to the pictures for examples. You can increase the strength by re-soldering the connector and possibly covering the connector in epoxy glue or hot-melt glue.

- The 3.3V voltage regulator is a very small, knock-off device. It overheats quickly and often has no thermal protection, feeding through its input voltage when it fails.

It's recommended to power external components with another regulator so that the power draw on the Blue Pill does not exceed 100 mA.

- Analogue power and ground is connected directly to digital power and ground, which can cause additional noise on the ADC input.
- The reset button on some of these boards is very hard to press.
- There is no dedicated USB reset circuitry on this board.
- There is no Schottky diode between USB +5V and system VIN power. So you cannot power the board directly from a 5 Volt supply, and use USB at the same time.
- Most bluepill boards have the wrong pullup resistor value which prevents native USB from working properly. The R10 resistor should have a value of 1k5 and be pulled up to 3v3. In

spite of this flaw, native USB will work on some PCs. Try the board on your PC before you bother changing the resistor.

- Microcontroller:- most of the arduino board makes use of Atmel AVR. Microcontroller is the place where all your codes stored and executed.Microcontroller used in most coomonly used arduino UNO is the ATmega328p.
- Pins:- these pins are used to make connections with sensors and module.Common pins on arduino boads are 5V, 3.3V, GND, Digital, PWM, Analog, AREF.
- Power supply and USB:- USB is used to upload the code onto your arduino board along with it you can power your arduino board via USB but it might not be always handy to power your arduino with USB in that case you can use barrel jack which is provided for power supply.A power supply anywhere between 6-12 volt will be good to power your arduino.
- (Note:-Do Not use a power supply greater than 20 volt which might overpower your arduino and destroy it.)
  Reset button:- this button is used to restart your arduino and make it to run the code from the beginning.
- Power LED indicator:- on the arduino board you will find a LED just next to 'ON' this LED glows when you connect your arduino to a power supply.If this LED does not glow either there is problem in the board or you have not connected the arduino board with power supply properly.
- RX and TX LED:- first of all RX and TX is short term for receive and transmit respectively.When ever there is data transfer while uploading code or communicating with bluetooth module etc these LED glow.
- Voltage regulator:- this controls the amount of voltage which is let into arduino by turning away extra voltage which may dame our board. This regulator also has a limit so Do Not burn up arduino by supplying power more than 20 volts.
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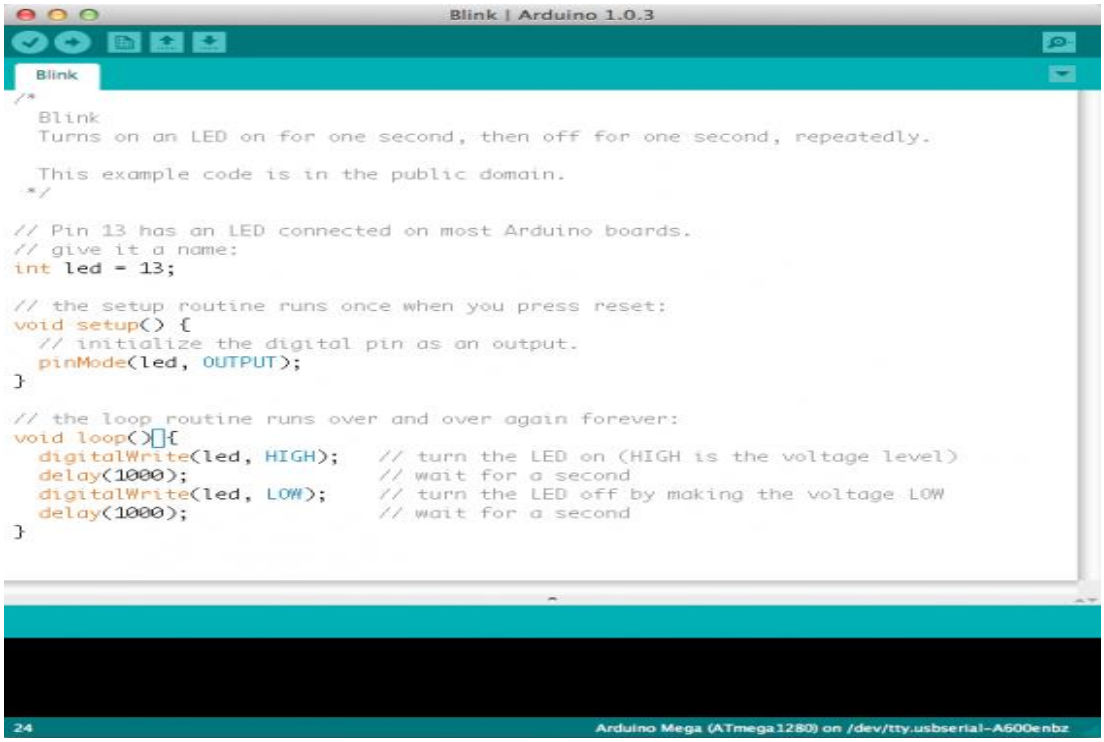
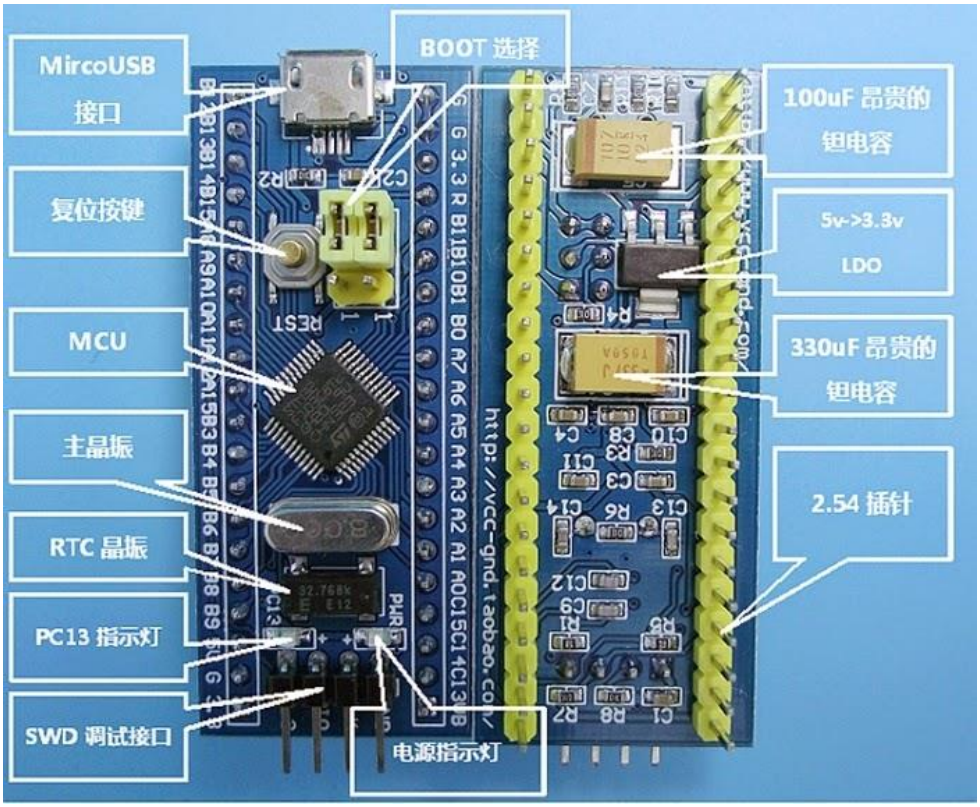


Fig. 3. Arduino IDE

`The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.0) or ATmega168 (Arduino Nano 2.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one. The Nano was designed and is being produced by Gravitech. The Nano 328 is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.0) or ATmega168 (Arduino Nano 2.x).It have an integrated on-board USB. As the function, It has almost all the analog and digital pins that the UNO or Duemilanove has and the same function as Duemilanove or UNO. This Nano 328(Arduino compatible) can go with the IO Shield for Arduino Nano, it would be more friendly and convenient for users to enter the Arduino world and make use of Arduino to make their dream into reality.

As an upgrade version of Arduino Nano, This Nano 328 is 100% compatible to Arduino Nano and its shield and IDEs. On the hardware part, remarkable changes are taken to improve the flexibility and user experience. The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3.x). It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License(GPL),[1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits.



Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.

The Arduino project started in 2003 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.

1.2.LIGHT EMITTING DIODE (LED):

LED's are special diodes that emit light when connected in a circuit. They are frequently used as "pilot" lights in electronic appliances to indicate whether the circuit is closed or not. A clear (or often colored) epoxy case enclosed the heart of an LED, the semi-conductor chip.

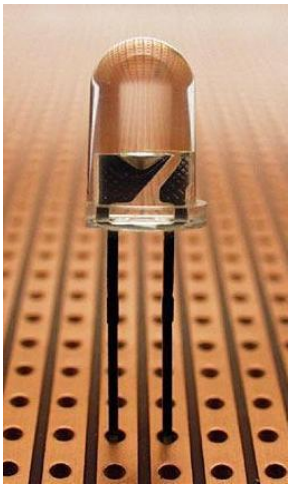


Fig.4 : LED View

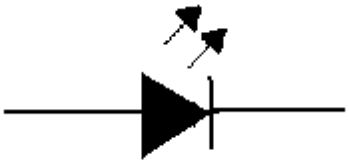


Fig: LED Symbol

LED’s must be connected the correct way round, the diagram may be labeled a or + for anode and k or - for cathode. The negative side of an LED lead is indicated in two ways:

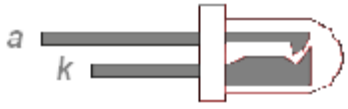


Fig.5 : LED Internal View

1) By the flat side of the bulb.

2) By the shorter of the two wires extending from the LED.

If you can see inside the LED the cathode is the larger electrode (but this is not an official identification method). The negative lead should be connected to the negative terminal of a battery. LED's operate at relative low voltages between about 1 and 4 volts, and draw currents between about 10 and 40 mille amperes. Voltages and currents substantially about these values can melt a LED chip. The most important part of light emitting diode (LED) is the semi-conductor chip located in the center of the bulb as shown below. The chip has two regions separated by a junction. The p region is dominated by positive electric charges, and the n region is dominated by negative electric charges. The junction acts as a barrier to the flow of electrons between the p and n regions. Only when sufficient voltage is applied to the semi-conductor chip, can the current flow and the electron cross the junction into the p region? In the absence of the large enough electric potential difference (voltage) across

the LED leads, the junction presents an electric potential barrier to the flow of electrons.

A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices and are increasingly used for other lighting. Appearing as practical electronic components in 1962, early LEDs emitted low intensity red light, but modern versions are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness.

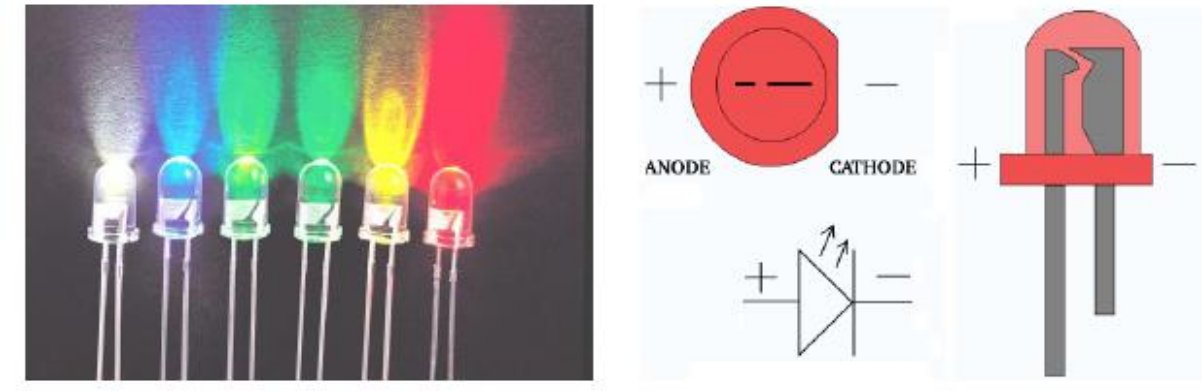


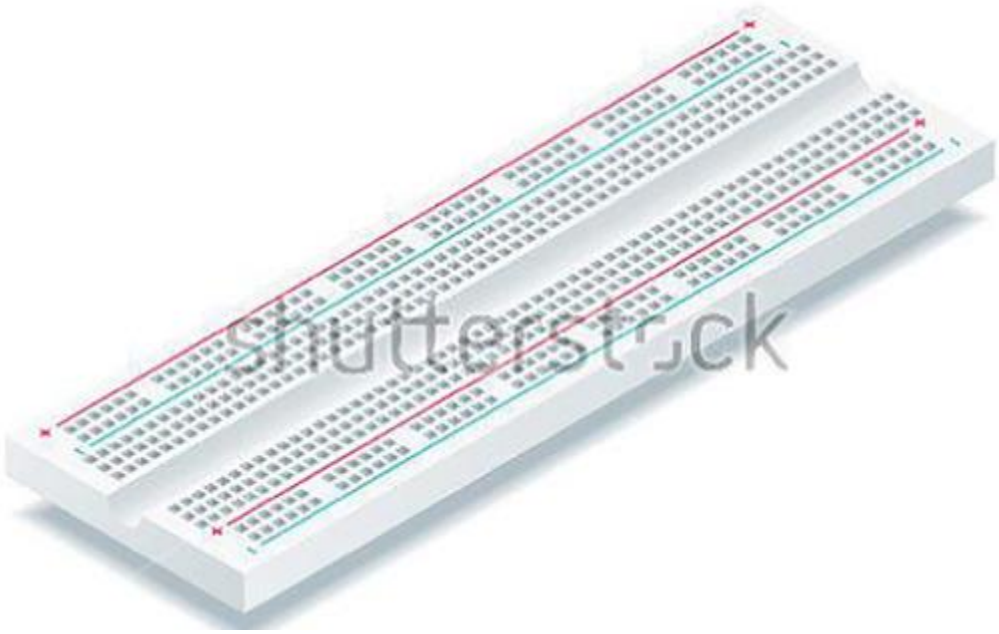
Fig.6. Light Emitting Diode

When a light-emitting diode is switched on, electrons are able to recombine with holes within the device, releasing energy in the form of photons. This effect is called electroluminescence and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. An LED is often small in area (less than 1 mm2), and integrated optical components may be used to shape its radiation pattern. LEDs present many advantages

over incandescent light sources including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. However, LEDs powerful enough for room lighting are relatively expensive and require more precise current and heat management than compact fluorescent lamp sources of comparable output.

1.3.Bread board:

Breadboards are temporary work boards for electronic circuits. The general shape of a breadboard is shown in Fig. 6.3. Compatible with most breadboards, 24-gauge wire is used to connect circuits; solid wire, not stranded. Sometimes, kits may be available with various colors of fixed lengths to specifically fit breadboards. These are a nice convenience.



The horizontal rows are connected throughout the row and may make a complete row with the addition of a simple jumper at the center point. These rows are noted with red and blue or black markings.

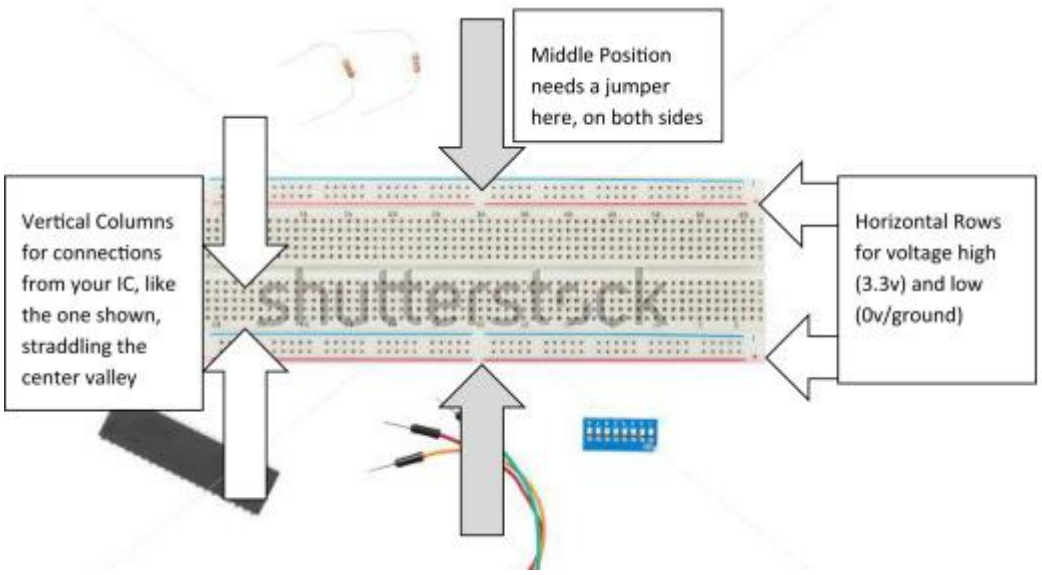
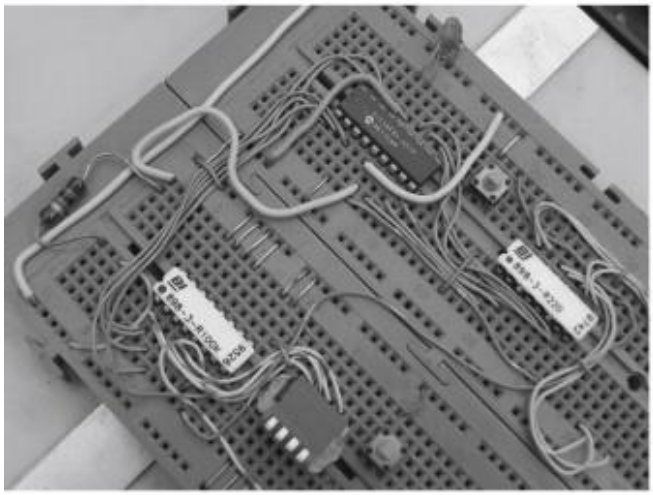


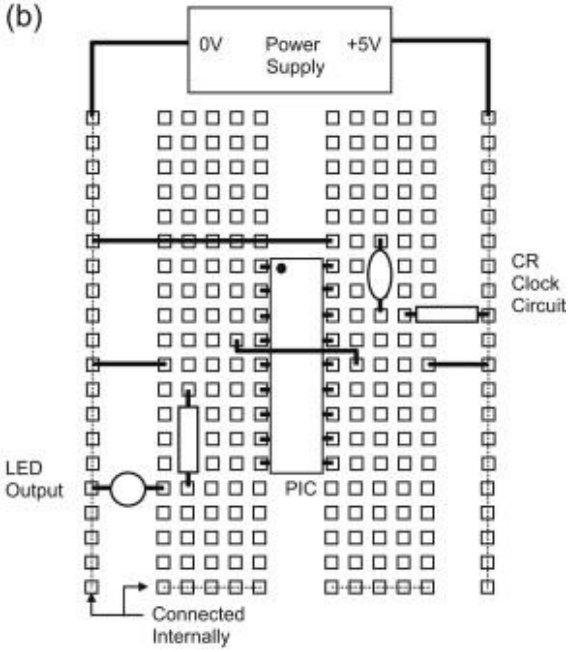
Fig.7. Bread board connections

Breadboard (plugboard) has sets of miniature sockets laid out on a 0.1 inch grid which will accept the manual insertion of component leads and tinned copper wire (TCW) links. It has rows of contacts interconnected in groups placed either side of the center line of the board, where the integrated circuits (ICs) are inserted, giving multiple contacts on each IC pin. At each side of the board, there are long rows of common contacts, which are used for the power supplies. Some types of breadboard are supplied in blocks that link together to accommodate larger circuits, or are mounted on a base with built-in power supplies.

(a)



(b)



Breadboarding Techniques

The breadboard is both the designer's playground and proving ground. It is there that Reality resides, and paper (or computer) designs meet their ruler. More than anything else, breadboarding is an iterative procedure, an odd amalgam of experience guiding an innocent, ignorant, explorative spirit. A key is to be willing to try things out, sometimes for not very good reasons. Invent problems and solutions, guess carefully and wildly, throw rocks and see what comes loose. Invent and design experiments, and follow them wherever they lead. Reticence to try things is probably the number one cause of breadboards that “don’t work”. Implementing the above approach to life begins with the physical construction methods used to build the breadboard.

A high speed breadboard must start with a ground plane. Additionally, bypassing, component layout and connections should be consistent with high speed operations. Because of these considerations there is a common misconception that breadboarding high speed circuits is time consuming and difficult. This is simply not true. For high speed circuits of moderate complexity a complete and electrically correct breadboard can be assembled in 10 minutes if all necessary components are on hand. The key to rapid breadboarding is to identify critical circuit nodes and design the layout to suit them. This permits most of the breadboard's construction to be fairly sloppy, saving time and effort. Additionally, use all degrees of freedom in making connections and mounting components. Don’t be bashful about bending IC pins to suit desired low

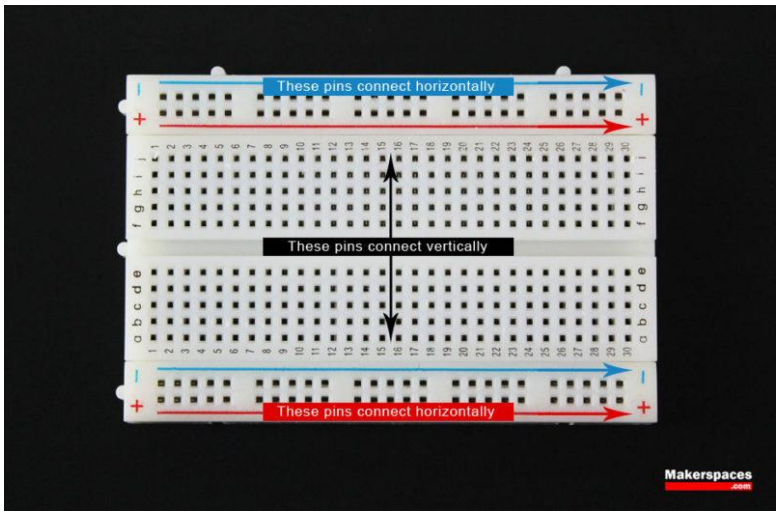
capacitance connections, or air wiring components to achieve rapid or electrically optimum layout. Save time by using components, such as bypass capacitors, as mechanical supports for other components, such as amplifiers. It is true that eventual printed circuit construction is required, but when initially breadboarding forget about PC and production constraints. Later, when the circuit works, and is well understood, PC adaptations can be taken care of.

1.4.Arduino Power Supply:

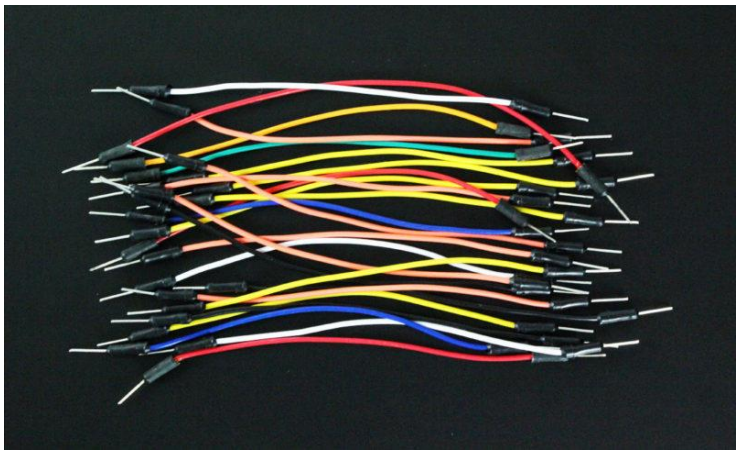
The Arduino Uno needs a power source in order for it to operate and can be powered in a variety of ways. You can do what most people do and connect the board directly to your computer via a USB cable. If you want your project to be mobile, consider using a 9V battery pack to give it juice. The last method would be to use a 9V AC power supply.

Arduino Breadboard

Another very important item when working with Arduino is a solderless breadboard. This device allows you to prototype your Arduino project without having to permanently solder the circuit together. Using a breadboard allows you to create temporary prototypes and experiment with different circuit designs. Inside the holes (tie points) of the plastic housing, are metal clips which are connected to each other by strips of conductive material.



On a side note, the breadboard is not powered on its own and needs power brought to it from the Arduino board using jumper wires. These wires are also used to form the circuit by connecting resistors, switches and other components together.



Here is a visual of what a completed Arduino circuit looks like when connected to a breadboard.

Communication:

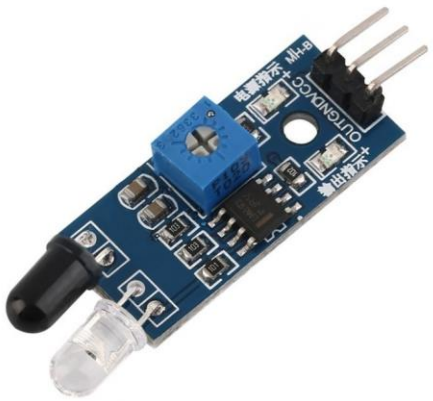
The Arduino/Genuino Uno has a number of facilities for communicating with a computer, another Arduino/Genuino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from

the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A SoftwareSerial library allows serial communication on any of the Uno's digital pins.

1.6. **IR sensor:**

In the **electromagnetic spectrum**, the infrared portion divided into three regions: near infrared region, mid infrared region and far infrared region.

IR sensor is an electronic device, that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the **infrared spectrum**, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations.



The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode . Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

There are five basic elements used in a typical infrared detection system: an infrared source, a transmission medium, optical component, infrared detectors or receivers and signal processing. Infrared lasers and Infrared LED’s of specific wavelength used as infrared sources.

The three main types of media used for infrared transmission are vacuum, atmosphere and optical fibers. Optical components are used to focus the infrared radiation or to limit the spectral response.

Types of IR Sensor

There are two types of IR sensors are available and they are,

- Active Infrared Sensor
- Passive Infrared Sensor

Active Infrared Sensor

Active infrared sensors consist of two elements: infrared source and infrared detector. Infrared sources include the LED or infrared laser diode. Infrared detectors include photodiodes or phototransistors. The energy emitted by the infrared source is reflected by an object and falls on the infrared detector.

Passive Infrared Sensor

Passive infrared sensors are basically Infrared detectors. Passive infrared sensors do not use any infrared source and detector. They are of two types: quantum and thermal. Thermal infrared sensors use infrared energy as the source of heat. **Thermocouples**, pyroelectric detectors and bolometers are the common types of thermal infrared detectors. Quantum type infrared sensors offer higher detection performance. It is faster than thermal type infrared detectors. The photo sensitivity of quantum type detectors is wavelength dependent.

IR Sensor Working Principle

There are different types of infrared transmitters depending on their wavelengths, output power and response time. An IR sensor consists of an IR LED and an IR Photodiode, together they are called as PhotoCoupler or OptoCoupler.

IR Transmitter or IR LED

Infrared Transmitter is a light emitting diode (LED) which emits infrared radiations called as IR LED's. Even though an IR LED looks like a normal LED, the radiation emitted by it is invisible to the human eye.

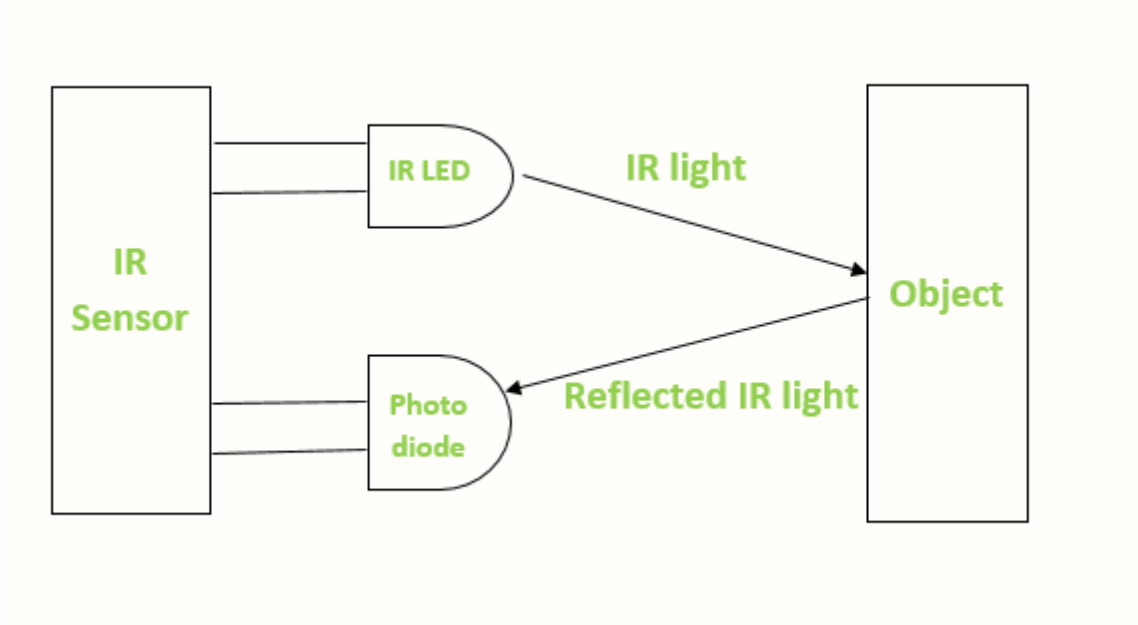
The picture of an Infrared LED is shown below.

IR Receiver or Photodiode

Infrared receivers or infrared sensors detect the radiation from an IR transmitter. IR receivers come in the form of photodiodes and phototransistors. Infrared Photodiodes are different from normal photo diodes as they detect only infrared radiation. Below image shows the picture of an IR receiver or a photodiode,

Different types of IR receivers exist based on the wavelength, voltage, package, etc. When used in an infrared transmitter – receiver combination, the wavelength of the receiver should match with that of the transmitter.

The emitter is an IR LED and the detector is an IR photodiode. The IR photodiode is sensitive to the IR light emitted by an IR LED. The photo-diode's resistance and output voltage change in proportion to the IR light received. This is the underlying working principle of the IR sensor.



When the IR transmitter emits radiation, it reaches the object and some of the radiation reflects back to the IR receiver. Based on the intensity of the reception by the IR receiver, the output of the sensor defines.

Applications of IR Sensor

IR sensors use in various projects and also in various electronic devices. They all are as follow,

Night Vision Devices

An Infrared technology implemented in **night vision equipment** if there is not enough visible light available to see unaided. Night vision devices convert ambient photons of light into electrons and then amplify them using a chemical and electrical process before finally converting them back into visible light.

Radiation Thermometers

IR sensos uses in radiation thermometers to measure the temperature depend upon the temperature and the material of the object and these thermometers have some of the following features

- Measurement without direct contact with the object
- Faster response
- Easy pattern measurements

Infrared Tracking

An Infrared tracking or Infrared homing, is a missile guidance system which operates using the infrared electromagnetic radiation emitted from a target to track it.

IR Imaging Devices

IR image device is one of the major applications of IR waves, primarily by virtue of its property that is not visible. It uses for thermal imagers, night vision devices etc.

Other Key Application Areas

Other key application areas that use infrared sensors include:

- Climatology
- Meteorology
- Photobiomodulation
- Flame Monitors
- Gas detectors
- Water analysis
- Moisture Analyzers
- Anesthesiology testing

- Petroleum exploration
- Rail safety
- Gas Analyzers

1.7.Automatic (software) reset:

Rather than requiring a physical press of the reset button before an upload, the Arduino/Genuino Uno board is designed in a way that allows it to be reset by software running on a connected computer. One of the hardware flow control lines (DTR) of the ATmega8U2/16U2 is connected to the reset line of the ATmega328 via a 100 nanofarad capacitor. When this line is asserted (taken low), the reset line drops long enough to reset the chip.

This setup has other implications. When the Uno is connected to a computer running Mac OS X or Linux, it resets each time a connection is made to it from software (via USB). For the following half-second or so, the bootloader is running on the Uno. While it is programmed to ignore malformed data (i.e. anything besides an upload of new code), it will intercept the first few bytes of data sent to the board after a connection is opened.

The compilation process:

The arduino code is actually just plain old c without all the header part (the includes and all). when you press the 'compile' button, the IDE saves the current file as arduino.c in the 'lib/build' directory then it calls a makefile contained in the 'lib' directory.

This makefile copies arduino.c as prog.c into 'lib/tmp' adding 'wiringlite.inc' as the beginning of it. this operation makes the arduino/wiring code into a proper c file (called prog.c).

After this, it copies all the files in the 'core' directory into 'lib/tmp'. these files are the implementation of the various arduino/wiring commands adding to these files adds commands to the language

The core files are supported by pascal stang's procyon avr-lib that is contained in the 'lib/avrlib' directory

At this point the code contained in lib/tmp is ready to be compiled with the c compiler contained in 'tools'. If the make operation is succesfull then you'll have prog.hex ready to be downloaded into the processor.

NOTE:the next release will see each architecture (avr/pic/8051) to treated as a 'plug-in' to the IDE so that the user can just select from a menu the microcontroller board to use and the IDE will pick the right compilation sequence.

2. Testing:

System Testing

The purpose of testing is to discover errors. Testing is the process of trying to discover every conceivable fault or weakness in a work product. It provides a way to check the functionality of components, sub assemblies, assemblies and/or a finished product It is the process of exercising software with the intent of ensuring that the Software system meets its requirements and user expectations and does not fail in an unacceptable manner. There are various types of test. Each test type addresses a specific testing requirement.

Types of Tests:

Unit testing

Unit testing involves the design of test cases that validate that the internal program logic is functioning properly, and that program inputs produce valid outputs. All decision branches and internal code flow should be validated. It is the testing of individual software units of the application .it is done after the completion of an individual unit before integration. This is a structural testing, that relies on knowledge of its construction and is invasive. Unit tests perform basic tests at component level and test a specific business process, application, and/or system configuration. Unit tests ensure that each unique path of a business process performs accurately to the documented specifications and contains clearly defined inputs and expected results.

Integration testing

Integration tests are designed to test integrated software components to determine if they actually run as one program. Testing is event driven and is more concerned with the basic outcome of screens or fields. Integration tests demonstrate that although the components were individually satisfaction, as shown by successfully unit testing, the combination of components is correct and consistent. Integration testing is specifically aimed at exposing the problems that arise from the combination of components.

Functional test

Functional tests provide systematic demonstrations that functions tested are available as specified by the business and technical requirements, system documentation, and user manuals. Functional testing is centered on the following items:

Valid Input : identified classes of valid input must be accepted.

Invalid Input : identified classes of invalid input must be rejected.

Functions : identified functions must be exercised.

Output : identified classes of application outputs must be exercised.

Systems/Procedures: interfacing systems or procedures must be invoked.

Organization and preparation of functional tests is focused on requirements, key functions, or special test cases. In addition, systematic coverage pertaining to identify Business process flows; data fields, predefined processes, and successive processes must be considered for testing. Before functional testing is complete, additional tests are identified and the effective value of current tests is determined.

System Test

System testing ensures that the entire integrated software system meets requirements. It tests a configuration to ensure known and predictable results. An example of system testing is the configuration oriented system integration test. System testing is based on process descriptions and flows, emphasizing pre-driven process links and integration points.

White Box Testing

White Box Testing is a testing in which in which the software tester has knowledge of the inner workings, structure and language of the software, or at least its purpose. It is purpose. It is used to test areas that cannot be reached from a black box level.

Black Box Testing

Black Box Testing is testing the software without any knowledge of the inner workings, structure or language of the module being tested. Black box tests, as most other kinds of tests, must be written from a definitive source document, such as specification or requirements document, such as specification or requirements document. It is a testing in which the software under test is treated, as a black box .you cannot “see” into it. The test provides inputs and responds to outputs without considering how the software works.

Unit Testing:

Unit testing is usually conducted as part of a combined code and unit test phase of the software lifecycle, although it is not uncommon for coding and unit testing to be conducted as two distinct phases.

Test strategy and approach

Field testing will be performed manually and functional tests will be written in detail.

Test objectives

- All field entries must work properly.
- Pages must be activated from the identified link.
- The entry screen, messages and responses must not be delayed.

Features to be tested

- Verify that the entries are of the correct format
- No duplicate entries should be allowed
- All links should take the user to the correct page**.**

Integration Testing

Software integration testing is the incremental integration testing of two or more integrated software components on a single platform to produce failures caused by interface defects.

The task of the integration test is to check that components or software applications, e.g. components in a software system or – one step up – software applications at the company level – interact without error.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

Acceptance Testing

User Acceptance Testing is a critical phase of any project and requires significant participation by the end user. It also ensures that the system meets the functional requirements.

Test Results: All the test cases mentioned above passed successfully. No defects encountered.

FUTURE SCOPE AND CONCLUSION:

The advancement of home automation system is continuously progressing on by using latest technology. The design of our work can be implemented in the future to save the energy in the large amount by doing certain changes in the programming of the controller to add some advance features in the existing system. There are already many home light systems were designed and been implemented. This project have a

advancement which will save the energy in more efficient way by using the lower power consumption ICs as per the Nano technology fabrication and the saved energy can be used to recharge the vehicles, running on battery in future.

REFERENCES

[1] Zain Mumtaz, Saleem Ullah, Zeeshan Ilyas, Shuo Liu, Naila Aslam, Jehangir Arshad Meo, Hamza Ahmad Madni, "Automatic Streetlights that Glow on Detecting Night and Object using Arduino".

[2] I. Oditis and J. Bicevskis, "The concept of automated process control," Sci. Pap., vol. 756, pp. 193–203, 2010.

[3] E. Adetiba, V. O. Matthews, A. A. Awelewa, I. A. Samuel and J. A. Badejo, "Automatic electrical appliances control panel based on infrared and Wi-Fi: A framework for electrical energy conservation," Int. J. Sci. Eng. Res., vol. 2, no. 7, pp. 1-7, July.2011.

[4] S. A. E. Mohamed, "Smart street lighting control and monitoring system for electrical power saving by using VANET," Int. J. Commun. Network Syst. Sci., vol. 6, pp. 351-360, 2013

[5] A. S. Jalan, "A survey on automatic street lightning system on indian streets using Arduino," Int. J. Innovative Res. Sci. Eng. Technol., vol. 6, no. 3, pp. 4139- 4144, 2017.

[6] G. Benet, F. Blanes, J.E. Simó and P. Pérez, "Using infrared sensors for distance measurement in mobile robots," Rob. Auton. Syst., vol. 40, no. 4, pp. 255-266, 2002.

[7] L. Louis, "Working principle of arduino and using it as a tool for study and research," Int. J. Control Autom. Commun. Syst., vol.1, no.2, pp. 21-29, 2016.

[8] A. Jalan, G. Hoge, S. Banaitkar and S. Adam, "Campus automation using arduino", Int. J. Adv. Res. Electr. Electron. Instrum. Eng., vol. 6, no. 6, pp. 4635- 4642, 2017.

[9] H. Satyaseel, G. Sahu, M. Agarwal and J. Priya, "Light intensity monitoring & automation of street light control by Iot," Int. J. Innovations Adv. Comput. Sci., vol. 6, no. 10, pp. 34-40, 2017.

[10]] S. Srivastava, "Automatic street lights," Adv. Electron. Electr. Eng., vol. 3, no. 5, pp. 539-542, 2013.