DECLARATIONS

"We hereby declare that this report entitle "SMART STREET LIGHT SYSTEM" is the result of my own expect for quotes as cited in the references."

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Apart from that, we want to thank all our friends for helping us to finish this project. They have also helped us by giving an extra ideas for our project. The discussion about our final year project is a meaningful and useful moment it is because we have gathered a lot of ideas. Our mind are also open after gathered a lot of idea to make the project.

Next we want to thank to our parents for encourage us on this project. They support us very well for this project because they give us some money to buy the important material and component for our project.

Lastly, I offer my regards and blessings to my colleagues and all of those who supported us in any respect during the completion of the project.

ABSTRACT

Currently, light is one of the most important assets of human life. Smart light street system is the needed equipment of the people when travel at the night time. That because the condition when people travel at the night is dangerously, occurrence robberies and accident increase month by month. This equipment can be give benefit for people, country and safety to who use this street it. Besides that, our country able to saving money and more electric energy than another country because the coast to make this project is low and easy to make it. This model used Arduino UNO, Infrared (IR) Sensor, Light Emitter Resistor (LED) and Light Dependent Resistor. In this project, the main control of our project is Arduino Uno, if don't have Arduino Uno our Project will be very difficult. Next IR sensor have led that need together when use and function. Besides that, LDR is a sensor for detected brightness and we need to code if want low or high brightness and the output as light and LED. Our project used all of this component, and the operation will be when the brightness "LOW", Arduino UNO will switch 'ON' the current and IR sensor will function to detected thing. Next, if IR sensor detected thing the output will switch "ON" , the output is light.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

In this semester, the semester theme for this final project selected as an independent theme. Each group must produce a new product related to electricity and electronics, practical and theoretical studies and combined to produce an invention that is creative and can operate properly.

Light is one of the most important assets of human life does not matter where we are like supermarkets, bus stations, railway station, airports and so on. It is an important function and role. In an age of sophisticated and strive for excellence now many people flocked to pursue the passage of time. As we see now has a lot of facilities that produced by creative engineers to quickly and easily to users in Malaysia.

Smart light street system is the needed equipment of the people when travel at the night time. That because the condition when people travel at the night is dangerously, occurrence robberies and accident increase month by month. This equipment can be give benefit for people, country and safety to who use this street it. Besides that, our country able to saving money and more electric energy than another country because the coast to make this project is low and easy to make it. Thus, both of us suggest to make 1 equipment can afford help people and aid to reduce the case like what we have said.

The main parts in the project are Infrared Resistor, Light Dependent Resistor (LDR). Two kinds of sensors will be used which are light sensor and motion sensor. The light sensor will detect darkness to activate the ON/OFF switch, so the streetlights will be ready to turn on. In the other hand the motion sensor will detect movement to activate the streetlights.

1.2 History Of Technology

The idea of designing a new system for the streetlight that do not consume huge amount of electricity and illuminate large areas with the highest intensity of light is concerning each engineer working in this field. Echelon Company have invent a technology that reduce the amount of electricity which is needed to light up the city but with controlling it remotely and using an LED lights instead of mercury-vapor or high-pressure sodium lamps.

In this example prototype we made that have been used Sensor-Controlled Lighting System is infrared resistor (IR sensor) and light dependent resistor (LDR), and the main idea of this project is Arduino UNO.

This technology has been applied inMilton Keynes, UK. Moreover, it have succeeded by having reduced the energy usage by 30%, reduced light pollution and emissions, reduced maintenance costs and improved driver and pedestrian safety.

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1.3 Problem Statement

Currently, in the whole world, enormous electric energy is consumed by the street lights, 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.

The main aim of smart street light systems is that lights turn on when needed and light turn off when not needed. Moreover, the smart street light system in this paper behaves like usual street lights that turn on all night. The ideal behaviour of the smart street light system is that no one finds turn-off of street lights at night.

Whenever someone see street lights, they turn on and whenever no one see street lights, they turn off. The lights turn on before pedestrians and vehicles come and turn off or reduce brightness when there is no one. It will be difficult for pedestrians and drivers of vehicles to distinguish our smart street lights and the conventional street lights because our street lights all turn on before they come.

1.4 Objective

The objective of this project is to save more current energy that the our country or state use to much electric at the night. Next, the second objective of this project is to provide the facility when at the night. That because our country need more light at the street light because of trending now as jog and cycling at the night time.

1.5 Scope

- We using ARDUINO UNO as the main component in this project.
- These project are designed specifically for general/ public using
- This project make Engineering Student over look in life
- Practical experience on this board carries great educative value for Engineering Students.

1.6 Importance of Project

- To help the people travel in the night
- To save more electric and money

1.7 Operation

Using the full streetlight efficiency while there is no any kind of transportation onthe road is a waste of power, so this project is designed to work only when a car, human or anything crossed the road. And this will happened with the help oflight dependent resistor (LDR)sensors will be added but to activate the system to be ready for the infrared resistor (IR)sensors signals which will turn on the LED streetlights. To add on, time relay have been added as well to give the LED streetlight some time before turning them offafter the car gone.

1.8 Summary

Base on this chapter, we can summarize the Light Dependent Resistor (LDR) can provide the facilitate people travel at night because the light will 'ON' when low brightness (night). Besides we can save more electric energy than street light we used at street light.

Chapter 2

Literature review

2.1 Introductory Chapter

In this chapter, we must recognize that our tools and component to deeper also make some research about that. Besides that, we able to increase knowledge about out component project. Furthermore, this helps when we are go interview and working out later.

2.2 Theory

2.2.1 Light Dependent Resistor (LDR)

The theoretical concept of the light sensor lies behind the LDR (Light Dependent Resistor) which is used in this circuit as a darkness detector. The LDR is a resistor and its resistance varies according to the amount of light falling on its surface. When the LDR detect light its resistance will get decreased, thus if it detects darkness its resistance will increase. (Photocells a.k.a CdS cells, photoresistors, LDR) (Photoresistor) PIR motion

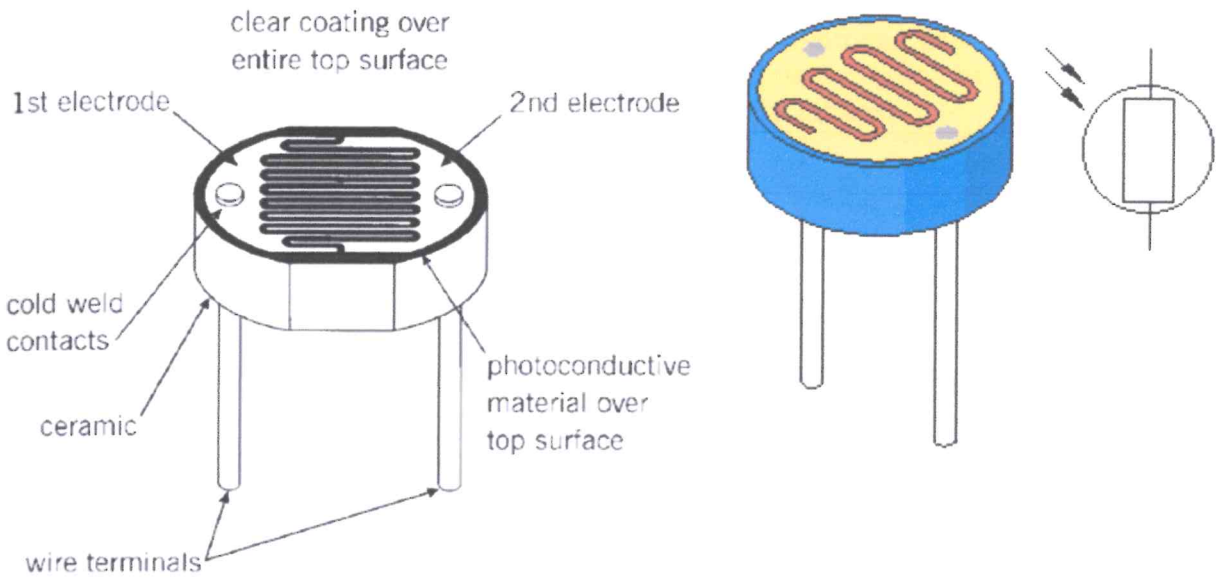


Figure 2.2.1

2.2.2 Infrared (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. Infrared waves are not visible to the human eye. In the electromagnetic spectrum, infrared radiation can be found between the visible and microwave regions. The infrared waves typically have wavelengths between 0.75 and 1000μm.

The wavelength region which ranges from 0.75 to 3μm is known as the near infrared regions. The region between 3 and 6μm is known as the mid-infrared and infrared radiation which has a wavelength greater higher than 6μm is known as far infrared.

Infrared technology finds applications in many everyday products. Televisions use an infrared detector to interpret the signals sent from a remote control. The key benefits of infrared sensors include their low power requirements, their simple circuitry and their portable features.

Night Vision Devices

Infrared technology is 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 conv

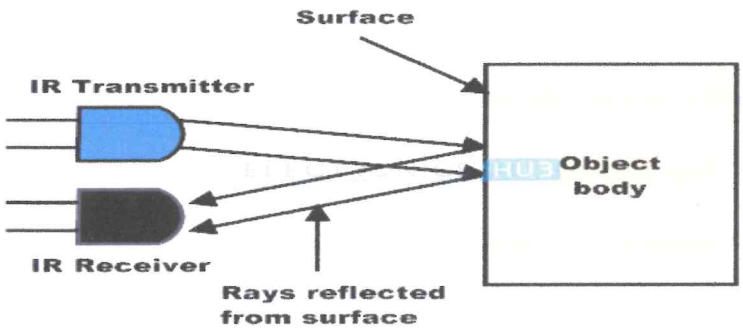


Figure 2.2.2

2.2.3 Resistance

Resistance is the opposition that a substance offers to the flow of electric current. It is represented by the uppercase letter R. The standard unit of resistance is the ohm, sometimes written out as a word, and sometimes symbolized by the uppercase Greek letter omega: Ω

When an electric current of one ampere passes through a component across which a potential difference (voltage) of one volt exists, then the resistance of that component is one ohm. (For more discussion of the relationship among current, resistance and voltage, see Ohm's law.)

In general, when the applied voltage is held constant, the current in a direct-current (DC) electrical circuit is inversely proportional to the resistance. If the resistance is doubled, the current is cut in half; if the resistance is halved, the current is doubled. This rule also holds true for most low-frequency alternating-current (AC) systems, such as household utility circuits. In some AC circuits, especially at high frequencies, the situation is more complex because some components in these systems can store and release energy, as well as dissipating or converting it.

The electrical resistance per unit length, area, or volume of a substance is known as resistivity. Resistivity figures are often specified for copper and aluminum wire, in ohms per kilometer.

Opposition to AC, but not to DC, is a property known as reactance. In an AC circuit, the resistance and reactance combine vectorially to yield impedance. Resistance contrasts with conductance, which is a measure of the ease with which electrical current flows through a substance.

2.2.4 Symbol resistance

2.2.4 Printed circuit board (PCB)

A printed circuit board (PCB) mechanically supports and electrically connects electronic components using conductive tracks, pads and other features etched from copper sheets laminated onto a non-conductive substrate. Components – capacitors, resistors or active devices – are generally soldered on the PCB. Advanced PCBs may contain components embedded in the substrate.

PCBs can be single sided (one copper layer), double sided (two copper layers) ormulti-layer (outer and inner layers). Conductors on different layers are connected with vias. Multi-layer PCBs allow for much higher component density.

FR-4 glass epoxy is the primary insulating substrate. A basic building block of the PCB is an FR-4 panel with a thin layer of copper foil laminated to one or both sides. In multi-layer boards multiple layers of material are laminated together.

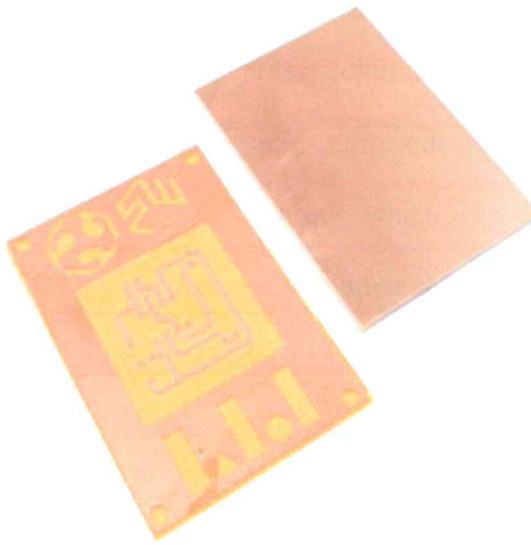
Printed circuit boards are used in all but the simplest electronic products. Alternatives to PCBs include wire wrap and point-to-point construction. PCBs require the additional design effort to lay out the circuit, but manufacturing and assembly can be automated. Manufacturing circuits with PCBs is cheaper and faster than with other wiring methods as components are mounted and wired with one single part. Furthermore, operator wiring errors are eliminated.

When the board has no embedded components it is more correctly called a printed wiring board (PWB) or etched wiring board. However, the term printed wiring board has fallen into disuse. A PCB populated with electronic components is called a printed circuit

assembly (PCA), printed circuit board assembly or PCB assembly (PCBA). The IPC preferred term for assembled boards is circuit card assembly (CCA),[1] and for assembled backplanes it is backplane assemblies. The term PCB is used informally both for bare and assembled boards.

Before etching

After etching



PCB board

2.2.5 Light-emitting diode (LED)

In the simplest terms, a light-emitting diode (LED) is a semiconductor device that emits light when an electric current is passed through it. Light is produced when the particles that carry the current (known as electrons and holes) combine together within the semiconductor material. Since light is generated within the solid semiconductor material, LEDs are described as solid-state devices. The term solid-state lighting, which also encompasses organic LEDs (OLEDs), distinguishes this lighting technology from other sources that use heated filaments (incandescent and tungsten halogen lamps) or gas discharge (fluorescent lamps).

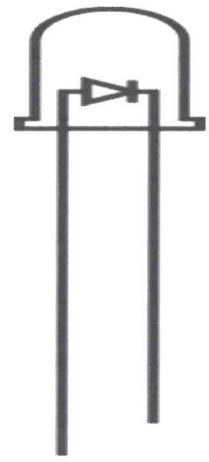
Different colors

Inside the semiconductor material of the LED, the electrons and holes are contained within energy bands. The separation of the bands (i.e. the band gap) determines the energy of the photons (light particles) that are emitted by the LED.

The photon energy determines the wavelength of the emitted light, and hence its color. Different semiconductor materials with different band gaps produce different colors of light. The precise wavelength (color) can be tuned by altering the composition of the light-emitting, or active, region.

LEDs are comprised of compound semiconductor materials, which are made up of elements from group III and group V of the periodic table (these are known as III-V materials). Examples of III-V materials commonly used to make LEDs are gallium arsenide (GaAs) and gallium phosphide (GaP).

Until the mid-90s LEDs had a limited range of colors, and in particular commercial blue and white LEDs did not exist. The development of LEDs based on the gallium nitride (GaN) material system completed the palette of colors and opened up many new applications.



Benefits of LEDs and IREDs, compared with incandescent and fluorescent illuminating devices, include:

- **Low power requirement**: Most types can be operated with battery power supplies.
- **High efficiency:** Most of the power supplied to an LED or IRED is converted into radiation in the desired form, with minimal heat production.
- **Long life:** When properly installed, an LED or IRED can function for decades.

Typical applications include:

- **Indicator lights:** These can be two-state (i.e., on/off), bar-graph, or alphabetic-numeric readouts.
- **LCD panel backlighting:** Specialized white LEDs are used in flat-panel computer displays.
- **Fiber optic data transmission:** Ease of modulation allows wide communications bandwidth with minimal noise, resulting in high speed and accuracy.
- **Remote control:** Most home-entertainment "remotes" use IREDs to transmit data to the main unit.
- **Optoisolator**: Stages in an electronic system can be connected together without unwanted interaction.

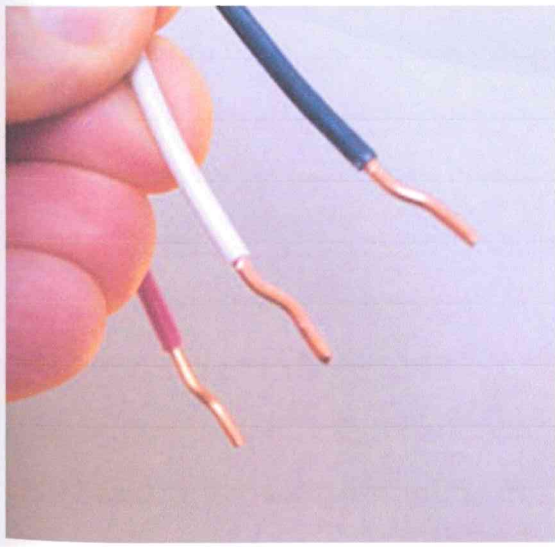
Main LED materials

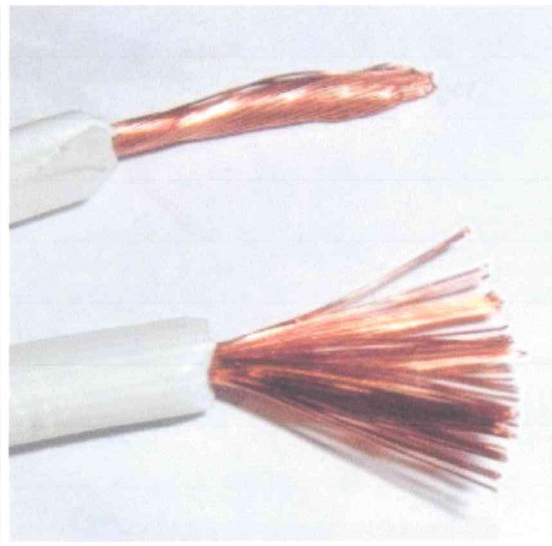
The main semiconductor materials used to manufacture LEDs are:

- **Indium gallium nitride (InGaN):** blue, green and ultraviolet high-brightness LEDs
- **Aluminum gallium indium phosphide (AlGaInP):** yellow, orange and red high-brightness LEDs
- **Aluminum gallium arsenide (AlGaAs):** red and infrared LEDs
- **Gallium phosphide (GaP):** yellow and green LEDs

2.2.6 Wire

Simple definition of wire is a thin and very flexible thread of metal. Furthermore , wire is a thread of metal that is covered with plastic, rubber, etc. Next, the wire used to send or receive electricity or electrical signal. Besides that, wire is a small microphone that is worn under clothing in order to secretly record a conversation. Electricity is useless without a way to move it around, so in order to accomplish that task somebody invented the wire. A wire is nothing more than a conductor wrapped up in a jacket of insulation. This insulation prevents conductors from making unwanted contacts, and prevents *you* from making unwanted contact and shocking yourself.

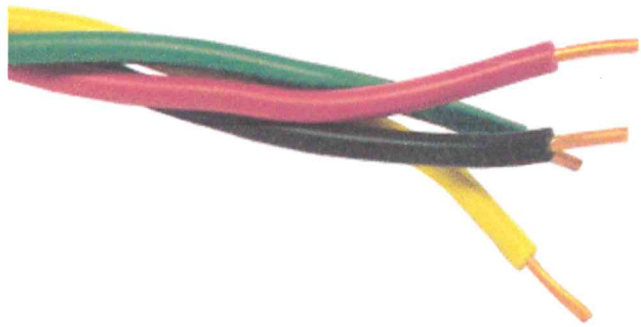




In general there are two types of wires.. The first type of wire is called solid wire [left pic], and this consists of a solid piece of copper or

aluminum wrapped up in some insulation. Solid wire is cheap to make and sell, and that's why they it's used for wiring houses. It has a downfall however, and that downfall is that it is stiff and fragile. It is stiff because it's a large strand of metal, and it is fragile due to metal fatigue. Simply put, if you bend it enough it'll break.

The second type of wire is called stranded wire [right pic], and this type is used when a the conductor needs to be flexible. Inside stranded wire are small strands of metal. These strands are easier to flex and can withstand more bending than a solid wire, so this type of wire is used in cables and computers. The more strands a wire contains, the bendy-er it is. The flexibility of stranded wire can vary from pretty stiff to wet noodle, depending on the the wire's insulation and the number of strands. Although rather uncommon, silicone insulation is the most flexible.



Single copper

Multiple copper wire

2.2.7 Arduino UNO

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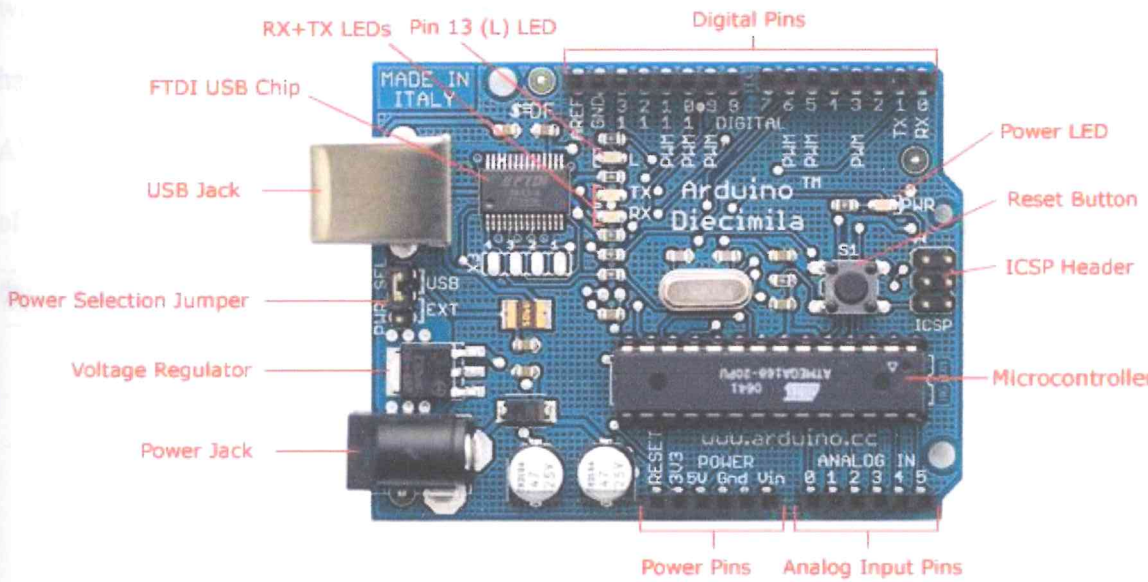
The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to 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 Atmega8U2 programmed as a USB-to-serial converter. "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 Arduno, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform

The power pins are as follows: • VIN. The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin. • 5V. The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply. • 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA. • GND. Ground pins.

The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed. The Arduino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed.