

SOUND CONTROLLER OUTLET

PROJECT REPORT

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SEBERANG PERAI POLYTECHNIC

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PROJECT REPORT COMFORMATION

I hereby declare that the work in this report is my own except for quotations and summaries which have been duly acknowledged.

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ACKNOWLEDGEMENTS

First and foremost, we offer sincerest gratitude to our supervisor Pn. Che Fauziah Binti Adam for helping us to complete the final project. The knowledge that you have taught us are very important and useful.

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

The name of our final year project is Sound Controller Outlet. This is a project on the design and construction of sound activated switch for low power rated home appliances, which was made has though it were an extension box with two socket outlets that can be controlled independently via clap or any sound at all. It is capable of setting different mode of operation based on the level of sensitivity its users require. The basic idea behind this work is that an electret mic picks up sound from the user of the device, produces a small electric signal which is amplified by a transistor configured in the common emitter mode. The amplified output and the pins of a slider switch which was connected via resistor to 5V regulated power supply served as an input to a microcontroller (Atmega8). The analogue to digital converter(ADC) and the timer, which are peripherals of the microcontroller were used to control the input via code to give an output as appropriate which were sent to a relay via a relay driver. After construction, several test was carried out in the 3 modes of operation(high, low and away), its outcome showed that the device made was intelligent enough to select which outlet the sound made was to control while several low power rated home appliances such as television(TV) and bed lamp were plugged to it.

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF PROJECT

We have defined sound as a form of energy. Sound absorption is the ability of a material to transform acoustical energy into some other form of energy, usually heat. All materials absorb some acoustical energy. Some materials, such as gypsum board, absorb it poorly, reflecting most of the energy that strikes their surfaces, while other materials, such as fiber glass insulation, absorb most of it. The Clapper was a popular gadget in the '80s and '90s. It let you turn appliances on and off just by clapping. This can be pretty useful, but it has some limitations. First, there is the problem of loud noises accidentally turning the lights off. Also, you can't control multiple outlets independently of each other. So I decided to make programmable version of The Clapper using an Arduino microcontroller. The Arduino lets you set codes for each outlet, eliminating false triggering and letting you control multiple outlets independently. Your lamp could be turned on and off with one clapping pattern and your fan could be controlled with another pattern. The Arduino also lets you program how the outlets are turned on and off. For instance, if your internet router needs to be reset, you could program it to turn your router off for ten seconds and then turn it back on automatically. Or, you could turn a heater on for a few minutes and have it automatically turn itself off.

1.2 PROBLEM STATEMENT

- Lost or damage of remote control.
- Unable to control multiple outlets.
- Lazyness of human.

1.3 OBJECTIVE OF RESEARCH

- To design a sound activated circuit.
- To control multiple electronic appliance by sound (clap).

1.4 SCOPE OF PROJECT

The project scope involves a sound controller outlet. The starts from information research and research for reference whether printed or electronic. As well as information and advice from the supervisor is also very useful for the smooth running of the project. Then the project was sketched based on the information obtained. The circuit like the power supply circuit (12v) to be designed. After completion of the design of the circuit to be tested with simulations like multisim and then tested manually on board . After proven it is capable of functioning and then only its being mounted on the PCB. After that we also add the electret microphone circuit to our project to detect the clap as sound to activated the LED and Buzzer.

1.4.1 SOFTWARE

In order to work with this project, first the right of software implementation needs to be identified. The preliminary works for software searching are:

- i.** Learn the usage of the assembly language and its criteria based on the project objectives.
- ii.** Identified the software that will be used to load the program to the Arduino
- iii.** Check and explore the entire menu in the software used in order to achieve the project objectives.

1.4.2 HARDWARE

For the hardware part, there are several works that have been done before proceeding to the project requirements.

- i.** Design the house to control the LED and Buzzer.
- ii.** Searching for material that will be used such as ply wood, acrylic board, mounting board and etc.

Built the prototype according to the design and the project requirements.

1.5 SYSTEM LIMITATION

The proposed system causes a lot of vague situations. For example without the power supply, these systems will not function due to being fully dependent on the power supply. Besides, the limitation of this system is, it can only be reached by using a blinking LED to represent a message.

CHAPTER 2

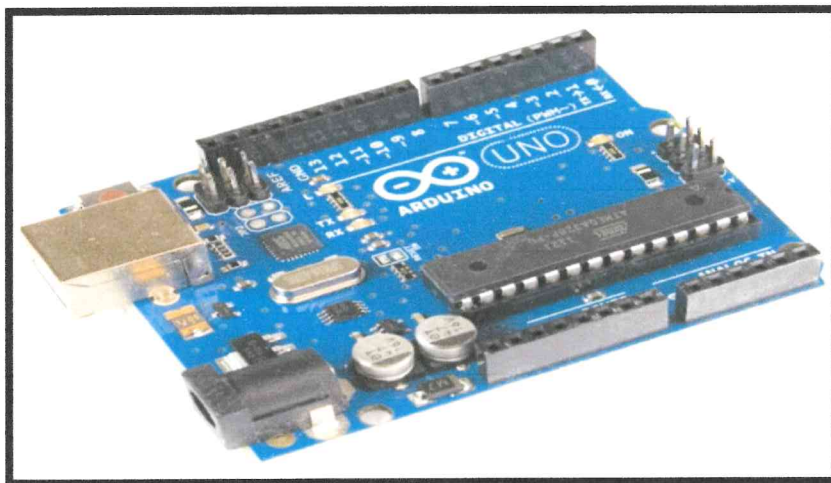
LITERATURE REVIEW

2.1 PROJECT DESCRIPTION

This is a project on the design and construction of sound activated switch for low power rated home appliances, which was made has though it were an extension box with two socket outlets that can be controlled independently via clap or any sound at all. It is capable of setting different mode of operation based on the level of sensitivity its users require. The basic idea behind this work is that an electret mic picks up sound from the user of the device, produces a small electric signal which is amplified by a transistor configured in the common emitter mode. The amplified output and the pins of a slider switch which was connected via resistor to 12V regulated power supply served as an input to a microcontroller (Atmega8). The analogue to digital converter(ADC) and the timer, which are peripherals of the microcontroller were used to control the input via code to give an output as appropriate which were sent to a relay via a relay driver.

2.2 DEVICE USED

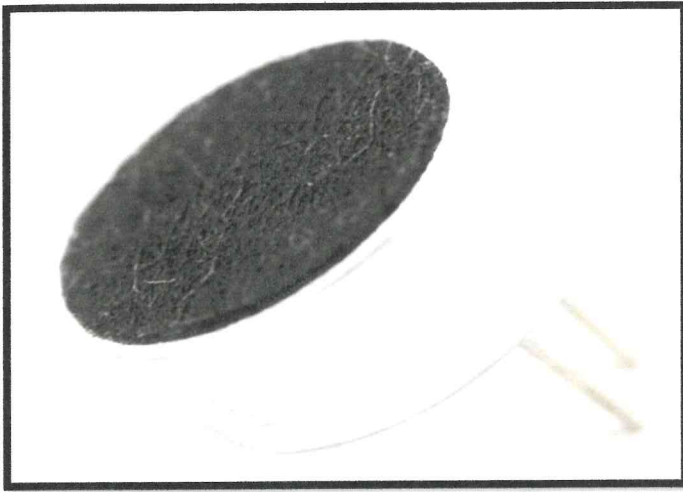
1.) Arduino microcontroller



- Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). 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; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again."Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328P) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328P)
EEPROM	1 KB (ATmega328P)
Clock Speed	16 MHz
LED_BUILTIN	13
Length	68.6 mm
Width	53.4 mm
Weight	25 g

2.) Electret microphone



- An electret microphone is a type of electrostatic capacitor-based microphone, which eliminates the need for a polarizing power supply by using a permanently charged material. An electret is a stable dielectric material with a permanently embedded static electric charge (which, due to the high resistance and chemical stability of the material, will not decay for hundreds of years). The name comes from electrostatic and magnet; drawing analogy to the formation of a magnet by alignment of magnetic domains in a piece of iron. Electrets are commonly made by first melting a suitable dielectric material such as a plastic or wax that contains polar molecules, and then allowing it to re-solidify in a powerful electrostatic field. The polar molecules of the dielectric align themselves to the direction of the electrostatic field, producing a permanent electrostatic "bias". Modern electret microphones use PTFE plastic, either in film or solute form, to form the electret.

2.3 FLOW CHART OF PROJECT

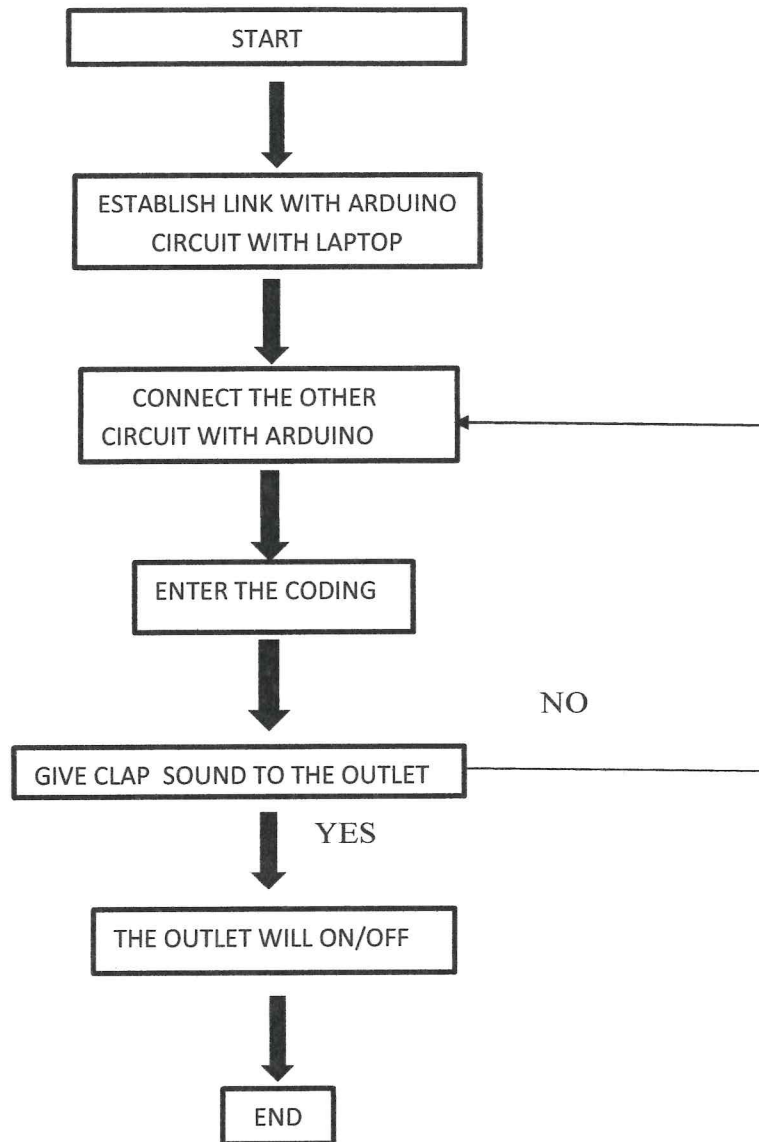


FIGURE 2.3.1 Flow chart of Project

2.4 FUNCTION OF COMPONENTS

1.) BRIDGE RECTIFIER

- A bridge rectifier is an arrangement of four or more diodes in a bridge circuit configuration which provides the same output polarity for either input polarity. It is used for converting an alternating current (AC) input into a direct current (DC) output. A bridge rectifier provides full-wave rectification from a two-wire AC input, therefore resulting in lower weight and cost when compared to a rectifier with a 3-wire input from a transformer with a center-tapped secondary winding.

2.) CAPACITOR

- A capacitor is a passive electronic component that stores energy in the form of an electrostatic field. In the most simple form, a capacitor consists of two conducting plates separated by an insulating material called a dielectric. Capacitance is directly proportional to the surface area of the plate, and is inversely proportional to the separation between the plates. Capacitance also depends on the dielectric constant of the material separating the plates.

3.) TRANSFORMER

- Transformers have a structure called the "core" which typically contain iron. Two coils wound around the core. One coil called the primary coil, and the other is called the secondary coil. The primary coil is connected to a source of electric current. It is important that the current source provides an alternating current in order to create a constant state of flux in the magnetic field. Changing magnetic fields cause another alternating current in the secondary coil, which is connected to a different electrical circuit. There are two types of transformers, depending on the voltage generated in the secondary coil relative to the primary coil voltage. Voltage produced in any balanced coil directly to the number of round wire for the coils. If the secondary coil has more turns than the primary, then the output voltage is higher than the input voltage. Transformer type is called an upward transformer. If the secondary coil has less turns than the primary coil, then the output voltage is lower than the input voltage. Transformers, transformer is called a step-down transformer. Transformers can be found in household appliances and equipment to ensure that the device receives the voltage required for operation. Transformer have a structure called the "core" which typically contain iron. Two coils wound around the core. One coil called the primary coil, and the other is called the secondary coil. The primary coil is connected to a source of electric current. It is important that the current source provides an alternating current in order to create a constant state of flux in the magnetic field. Changing magnetic fields cause another alternating current in the secondary coil, which is connected to a different electrical circuit.

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4.) DIODE

- Active Electronic Components Diode is made of a semiconductor material and has a function to send electric current to one direction but prevent electric current from the opposite direction. Therefore, it is often used as a rectifier diode in series Electronics. Diodes in general have two electrodes (terminals) are Anode (+) and cathode (-) and has a working principle based on the technology of semiconductor pn junction can drain current of the p-type side (anode) to the n-type (cathode) but can not flow in the opposite direction.

5.) IC 7812 (VOLTAGE REGULATOR)

- The **78xx** (sometimes **L78xx**, **LM78xx**, **MC78xx**...) is a family of self-contained fixed linear voltage regulator integrated circuit .
- The 78xx family is commonly used in electronic circuits requiring a regulated power supply due to their ease-of-use and low cost. For ICs within the family, the *xx* is replaced with two digits, indicating the output voltage (for example, the 7805 has a 5volt output, while the 7812 produces 12 volts).
- The 78xx line are positive voltage regulators: they produce a voltage that is positive relative to a common ground. There is a related line of **79xx** devices which are complementary negative voltage regulators. 78xx and 79xx ICs can be used in combination to provide positive and negative supply voltages in the same circuit.

6.) RESISTOR

- A resistor is a passive two-terminal electrical component that implements electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators.
- Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.

- Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms.
- Resistors are also implemented within integrated circuits. The electrical function of a resistor is specified by its resistance: common commercial resistors are manufactured over a range of more than nine orders of magnitude. The nominal value of the resistance falls within the manufacturing tolerance, indicated on the component.

2.5 PCB WIZARD

- PCB Wizard is a highly innovative package for designing printed circuit boards. Offering unrivalled productivity through powerful design tools and an ultra-friendly user interface, PCB Wizard is the choice for all your project work. Add to that, a wealth of clever features that do away with the steep learning curve normally associated with PCB packages, and PCB Wizard is hard to beat. It provides a comprehensive range of tools covering all the traditional steps in PCB production, including schematic drawing, schematic capture, component placement, automatic routing, Bill of Materials reporting and file generation for manufacturing. The software is supplied on a CD-ROM and requires Microsoft Windows 95, 98, Me, NT 4.0(with SP6), 2000, XP, Vista or 7. User guide and instruction are included with the software.

PCB Wizard Standard :-

- Large database of components
- Schematic design and capture
- Manual PCB design
- Single sided auto-routing
- User-defined components
- Copper pour
- Bill of materials report generation
- Gerber and N.C drilling export
- Integrated publishing with next, graphics and spell-checking support
- Import circuit from Livewire, order code N29A

2.6 ARDUINO GENUINO 1.6.12

The open-source Arduino Software (IDE) makes it easy to write code and upload it into a board . It runs on Windows , MacOS , and Linux . The environment is written in Java and based on Processing and other open-source software.

CHAPTER 3

METHODOLOGY

3.1 PROJECT METHODOLOGY

The electret microphone needs resistor R1 to supply voltage to the transistor inside the microphone. C1 stops any d.c. voltage from reaching the Arduino analog pin and only allows the audio voltage from the microphone through.

R2 pulls the Arduino analog pin down to GND to ensure that an analog value of zero is read when the microphone is not picking up the sound of a clap. The analog input would otherwise be floating at some value and picking up noise from the microphone.

When someone claps, the microphone picks up the sound and a tiny voltage reaches the analog pin which is read by the sketch running on the Arduino. If the value read from the analog pin is big enough, the LED will be toggled from off to on or on to off.

3.2 FLOW CHART

A flow chart is defined as a pictorial representation describing a process being studied or even used to plan stages of a project. Flow charts tend to provide people with a common language or reference point dealing with project or process.

3.2.1 Flow chart of project planning

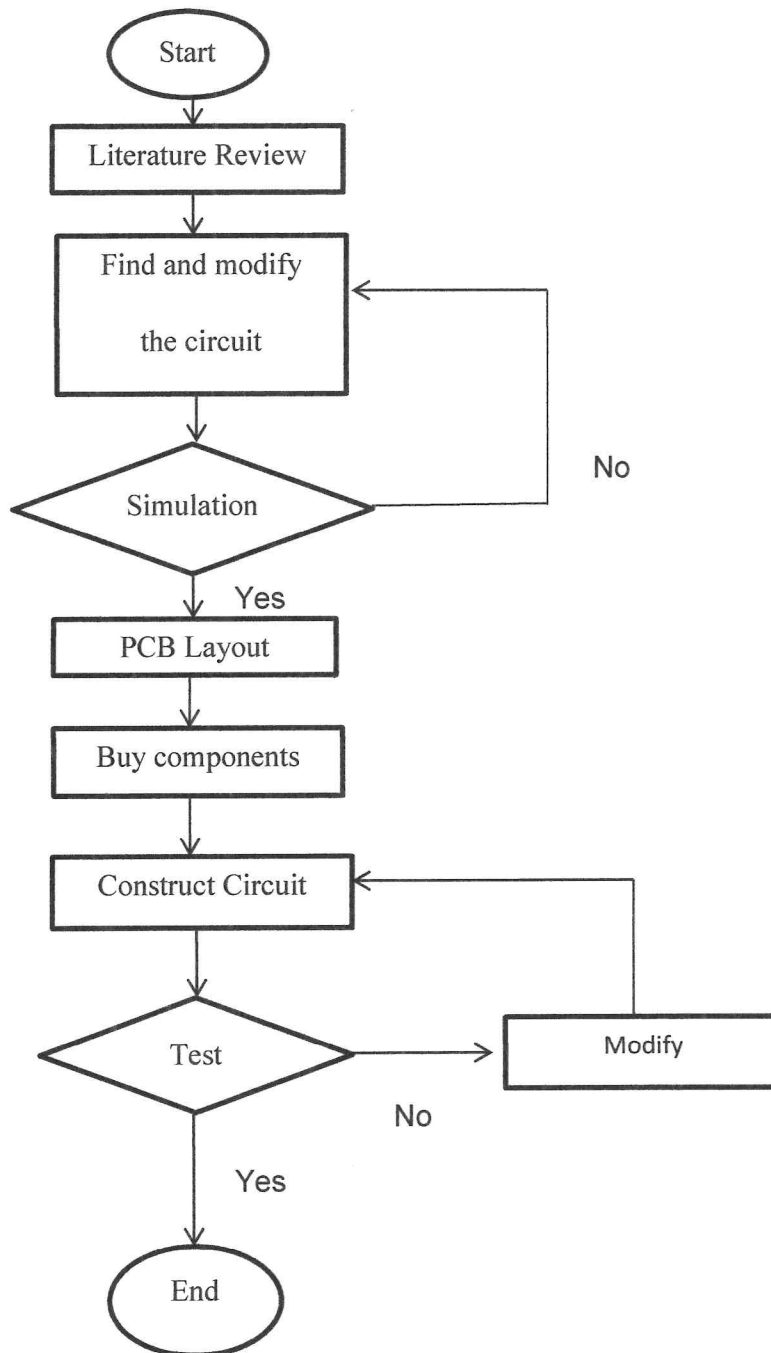


Figure 3.1.1 : Flow chart of project planning

3.3 MILESTONE TABLE

- Other than that, we will explain about planning job table. According to planning job table topic, we will show our Gantt during development this project. Gantt chart also known as milestone table that is use to show time start and end time for project. The duration of each job or task can be display in Gant chart has become a common technique for represent the phase and activities of a project work breakdown structure, so they can be understood by a wide audience.

3.3.1 MILESTONE TABLE

PROJECT PROGRESS / WEEK	2	3	4	5	6	7	8	9	10	11	12	13	14	15
BRIEFING ON PROJECT														
FIND PROJECT TITLE														
RESEARCH AND FINDINGS														
PROPOSAL WRITING														
WORK ON PROJECT														
TESTING PROJECT														
PROJECT PRESENTATION														

TABLE 3.3.1 : Project 1 Progress