**CHAPTER 1: INTRODUCTION:**

* 1. Research Background:

There is no such ardiuno trainer at initial level so we have done a small effort and research out some come use sensors and industrial use type sensors that we have on a single board that can connect through an ardiuno. Another use of this trainer is that if a user is new so that he can use it to train himself on this prototype as to avoid any serious issue on the main project.

1.2 Overview of Introduction:

Industries today require more efficient work and a small damage can be dangerous and can be time consuming. For safety and for wasting of time we need some protection circuits. Modern electrical equipment continues to increase in complexity and importance in industrial, commercial, and residential installations. This equipment is often considered critical for normal system operations. As such, the importance of circuit protection and overall equipment protection continues to increase and is an important topic to understand. Determining whether a circuit is adequately protected can require a high-level view of the electrical distribution system, from the fault current available at the source of supply down to the end device connected in the system.

Circuit protection includes protection from smoke, gas, heat. Although mandated by code for any electrical installation, the proper implementation of circuit protection products can be confusing at times. Occasionally this confusion results in circuit protection products that are installed in circuits where their use is not appropriate.

A motor's purpose is to drive any load. Motors are used widely in factories, traction systems, etc where variable speed is needed as per the requirement. For example in saw mills, high speed motors are required to cut down logs or in some situations like in papers mills, we need low speeds. In traction systems, we need to slow down the engine on approaching the station whereas in between two locations, high speed is needed.

1.3 PROBLEM STATEMENT:

1. Some workers are sensitive to smoke residue like discomfort, health issues, and unpleasant odors. Smoke damage can cost thousands of rupees in repair cost. To avoid this, we need to install smoke sensors.
2. Electricity should be saving. We must avoid unnecessary usage of bulbs, tube lights. For this purpose light sensor is installed so that it will only on lights whenever there is darkness.
3. Control system is widely used to control improve the technology. DC motor speed control was build to conduct the motor. Motor was controlled manually. Now we can operate motor through software. RPM can be set through software.

1.4 AIMS AND OBJECTIVES:

1) To implement gas and smoke design in the project. At the very first time of smoke creation so that avoided the unwanted accident.

2) To save electricity and avoid unnecessary use of lights. When darkness fall, resistance of LDR increases and used to control switching of light.

3) The purpose of motor speed control is to take a signal representing the demanded speed and drive the motor at that speed.

1.5 SCOPE OF PROJECT:

1. Fire accidents can be controlled to a great extent. Fire accident leads to death and by this technique we can life of people. We can also detect chain smokers.
2. By using LDR the system is an ideal application for lightning.
3. Speed control technique through controller can be extended to other types of motors. We can vary the speed above and below rated speed.
4. Wireless connectivity to have a ease from the system.

**CHAPTER 2: LITERATURE REVIEW:**

2.1 INTRODUCTION:

The main purpose of this project is to analyze, identify and make conclusion based on this project. A literature review means a collecting related data, analyzed business process, identify underlying patterns and create a conclusion. Another description of the literature review is a systematic, explicit and reproducible method to identifying evaluating and synthesizing the exiting body of completed and recorded work produced by researcher, scholars and practitioners. In order to develop a successful project, the current system is identified. The system of conventional DC motor speed control based on microcontroller is analyzed. Studies of this system are significant to develop a valid, reliable and efficient up grade project. The literature review part acts as a mean to discover which methodology should be chosen in developing this system.

From the moment a fire begins, changes can be felt in the surrounding area. These changes from the ambient conditions are termed “fire signatures” and manifest themselves in the form of smoke, heat, light and gas. Saving electrical power is very important, instead of using the power in unnecessary times it should be switched off when not in use.

**Citations:**

1. DC MOTOR SPEED CONTROL USING MICROCONTROLLER by Ms Sarita S Umadi, Dinesh Patil
2. Natural selection and the regulation of defenses: A signal detection analysis of the smoke detector principle by Randolph M.Nesse.
3. Publication No: US6121885A by [Reagan Masone](https://patents.google.com/?inventor=Reagan+Masone), [Tony Masone](https://patents.google.com/?inventor=Tony+Masone) and [David Eddins](https://patents.google.com/?inventor=David+Eddins)
4. Fuzzy logic microcontroller implementation for DC motor speed control by [Y. Tipsuwan](https://ieeexplore.ieee.org/author/37266030500) ; [Mo-Yuen Cho](https://ieeexplore.ieee.org/author/37270002500)w

# Automatic Brightness Control Using LDR Sensors by Sanal Malhotra, Shiv Taneja

# 2.2 LITERATURE OVERVIEW:

# The DC Motor is an attractive piece of equipment in many industrial applications requiring variable speed and load characteristics due to its ease of controllability. Speed of a DC motor varies proportional to the input voltage. With a fixed supply voltage the speed of the motor can be changed by switching the supply on and off so frequently that the motor notices only the average voltage effect and not the switching operation. This project focuses on controlling the speed and direction of a DC motor using PWM technique (varying dutycycle of a square wave) and Data Acquisition Systems.

This project uses an Arduino micro-controller, MQ-2 smoke sensor to detect the presence of smoke. This project also uses a WIFI module to display and notify the presence of smoke. The MQ-2 sensor is very accurate and can detect the presence of smoke including different types of gas concentrations present. The MQ-2 library has in built value codes which makes it precise in the detection of different smoke and gas concentrations. Working smoke alarms reduce the risk of death in the event of housefire by 50%. Having a working smoke alarm with a long-lasting lithium battery on every level of the home is the recommended best practice according to the centers for disease control and prevention (Gielen,2014). The design of smoke alarm system in this project is more user friendly and reliable because of the high sensitivity of smoke sensor. This system is very economical which is easily affordable for anyone.

Automatic street light control system is a simple and powerful concept, by using this system energy consumption is also reduced because now a days the manually operated street lights are not switched off properly even the sunlight comes and also not switched on earlier before sunset. In sunny and rainy days, ON and OFF time differ significantly which is one of the major disadvantage of using manual operation. Moreover, the circuit is carefully designed to avoid common problems like overload, relay chattering and inductive kick back in relay.

**Citations:**

1. Automatic Street Light Control by More Pratibha Shankar, Patil Tejashree Vishwas, Handrale Puja Sahadev, Takmoge Sundar Pandit, Waghmare Kalpna Anil
2. Integrated DC servo motor and controller by [Robert A. Bigler](https://patents.google.com/?inventor=Robert+A.+Bigler)

[Punita Pandit Bigler](https://patents.google.com/?inventor=Punita+Pandit+Bigler)

1. Controller for automatic machine by [Atsushi Watanabe](https://patents.google.com/?inventor=Atsushi+Watanabe)

[Tetsuaki Kato](https://patents.google.com/?inventor=Tetsuaki+Kato)

# Tracking detection system of electrical servomotors by Volker Aab

1. A method for controlling and / or monitoring functions by [Jörg KORECKI](https://patents.google.com/?inventor=Jörg+KORECKI) [Bernd Weiss](https://patents.google.com/?inventor=Bernd+Weiss)
2. Motor vehicle with at least one controlled by a processor control unit by [Stefan Maiwald](https://patents.google.com/?inventor=Stefan+Maiwald), [Georg Sterler](https://patents.google.com/?inventor=Georg+Sterler), [Walter Streit](https://patents.google.com/patent/DE102004026383B4/en) and [Heinz-Willi Vassen](https://patents.google.com/?inventor=Heinz-Willi+Vassen)
3. Smoke sensor on the base of Bi2O3 sesquioxide by Z.NAdamian, H>V Abovian and V.M Aroutiunian

# Smoke sensor and monitor control system by [Takashi Suzuki](https://patents.google.com/?inventor=Takashi+Suzuki), [Ryuichi Yamazaki](https://patents.google.com/?inventor=Ryuichi+Yamazaki) and [Yuki Yoshikawa](https://patents.google.com/?inventor=Yuki+Yoshikawa)

# Smoke sensor by [Osami Minowa](https://patents.google.com/?inventor=Osami+Minowa), [Junichi Narumiya](https://patents.google.com/patent/US5502434A/en), [Tetsuya Nagashima](https://patents.google.com/patent/US5502434A/en), [Yoshihito Hirai](https://patents.google.com/?inventor=Yoshihito+Hirai) and [Mariko Ishida](https://patents.google.com/?inventor=Mariko+Ishida).

# Smoke detector by William J. Malinowski

# 2.3 Summary:

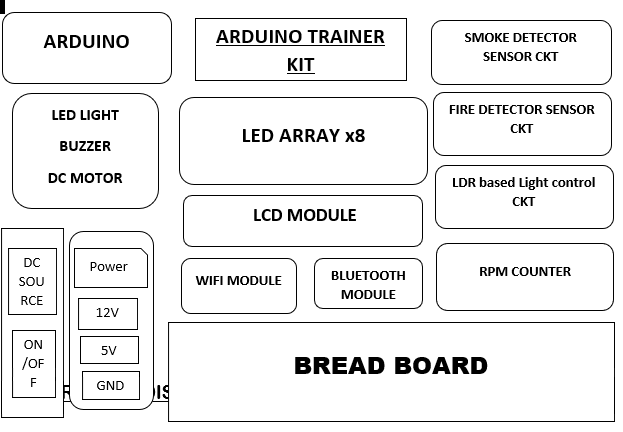
# DC motors, servo motor and stepper motor could change direction when one pin is high and other is low. When both pins are low than motor will be off. LDR will have max resistance during darkness and zero resistance during light. Smoke sensors detects the smoke and buzzer works as a alarm so that to alert people before fire and to avoid any casualties.

**CHAPTER 3:METHODOLOGY:**

3.1 INTRODUCTION:

Here we have made an ARDUINO TRAINING kit, basically we have use some of the industrial based sensors. Such as smoke sensor, LDR based circuit, RPM counter using hall effect sensor and give 3 types connectivity modules to transmit the data wirelessly.

BLOCK DIAGRAM:



# 3.2 PRE\_PROCESSING:

# We have made several ckts using some basic sensors and connectivity modules. The software programs are separately attached to this project file. For example controlling a dc motor by using WIFI ,Bluetooth, IR and keypad.

# BY KEYPAD:

# The keypad is connected through the Arduino in this way and according to your need a further operating circuit you can control through it.

# We interface a keypad to control the following ckts through it, the connection diagram of key pad to ARDUINO is as follows:

# LED CONTROL BY KEY PAD:

# DC MOTOR CONTROL BY KEYPAD

# SERVO CONTROL BY KEYPAD

# STEPPER CONTROL BY KEYPAD

# BY IR SENSOR

# 

# Here a IR sensor is connected through vin and gnd pin and any desire load can be connected to operate through it

1. LED CONTROL BY IR REMOTE

# DC MOTOR CONTROL BY IR REMOTE

# SERVO CONTROL BY IR REMOTE

# STEPPER CONTROL BY IR REMOTE

# BY BLUETOOTH

# Here 3.3v ,Gnd , TX , RX pin is used to make bluetooth functional and a additional controlling ckt is made up, we have control follow two through it.

# LED CONTROL BY BLUETOOTH

# DC MOTOR CONTROL BY BLUETOOTH

# BY WIFI

# Here also wifi module is first connected according to its pins only leaving GPO1 & GPO2 pins and a connector of module is used for ease to make the ckts more simplex.

# LED CONTROL BY WIFI

# DC MOTOR CONTROL BY WIFI

# 

# RPM COUNTER

# Here a hall sensor is connected to vcc , gnd and a digital pin working as a RPM counter.

# 

# LED CHASER

# Here LED array is connected to the digital pins of the arduino.

# 

# LIGHT DEPENDENT RESISTOR CKT

# SMOKE DETECTOR

# 

**CHAPTER 4: RESULTS & SIMULATIONS**

# 4.1 INTRODUCTION

# Industries today require more efficient work and a small damage can be dangerous and can be time consuming. For safety and for wasting of time we need some protection circuits. Modern electrical equipment continues to increase in complexity and importance in industrial, commercial, and residential installations

# Here we have made an ardiuno trainer by using some sensors and connectivity modules , smoke sensor to sense the smoke , rpm counter to count the rotation , servo motor and stepper motor control and for wireless connectivity we use Bluetooth , wifi, and an IR sensor.

# 4.2 EXPERIMENTAL SETUP

# We have used ardiuno to add up two or more components to make a single circuit as we use a hall effect sensor and a motor to hovor over it as it will count the rotation and display it on the screen. We have use DC motor with three different wireless connectivity.

# We use a keypad and assign different operation to the keys as pin1 will move the motor clockwise and pin2 will move the motor in counter clock wise direction and pin3 will move the motor in both direction with a delay and pin4 will as stop buton.

# 4.3 RESULTS

# After connecting your desire components to the ardiuno board you can do your labs our can easily handle your issues. And if you are successful in your work at initial base then you can make your circuit to work on any of the wireless modules.

# DC motors, servo motor and stepper motor could change direction when one pin is high and other is low. When both pins are low than motor will be off. LDR will have max resistance during darkness and zero resistance during light. Smoke sensors detects the smoke and buzzer works as a alarm so that to alert people before fire and to avoid any casualties.

# 4.4 SUMMARY

In this chapter we have assembled all the components and you can connect the components accordingly to your needs and then burn the code in the ardiuno and then have the results from that specific circuit.

As it is still on its initial leveland can be easily used and follow on the simple basic commands and codes of the ardiuno.

# CHAPTER 5: CONCLUSION/ FUTURE EXTENSION:

# 5.1 Conclusion:

# We have rotate motors in clock wise and anti clockwise direction through microcontroller. We have used different techniques to rotate motors by keypad, IR remote, Bluetooth and by Wi-Fi. We have also control RPM of motors by using hall sensor. We have also on and off LEDS by Bluetooth, keypad , IR remote and Wi-Fi. Smoke sensor is used to sense gas and buzzer works as a alarm so that people could move to safe place and to avoid any damage. LDR is used for automatic light switching to save electricity.

# 5.2 FUTURE EXTENSION:

# Motor speed can be control using microcontroller. Li-Fi could be used to control speed. Smoke detector can tell which type of gas is present. LDR could be replaced by phototransistor.

# 5.3 SUMMARY: It is basically an industrial protection circuit a prototype. Trainer contains protection circuits as well as servo, stepper and DC motor. We can use different techniques such as Bluetooth, keypad, IR remote and Wi-Fi to use circuits. Motors can rotate clockwise as well as anti-clockwise. LED’s can be switched and LDR is used for automatic switching. Smoke detector indicates any type of gas and heat. Hall sensor is used to measure RPM of motors.

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