Design and Fabrication of Android Operated Fire Fighting Vehicle

Course Title: Project and Thesis Course Code: ME 400

Submitted By:

Rason Chakma Md Shohanur Rahman Md Masud Rana Osman Gani



Faculty of Science & Engineering Department of Mechanical Engineering Sonargaon University (SU)

FEBRUARY 2020

Design and Fabrication of Android Operated Fire Fighting Vehicle

Project and Thesis

Rason Chakma ID No.: BME-1602009065 Md. Shohanur Rahman ID No.: BME-1602009036

Md. Masud Rana ID No.: BME-1602009071 **Osman Gani** ID No.: BME-1602009051

Supervised By:

Md. Mahedy Hasan Lecturer of Mechanical Engineering Sonargaon University.

Submitted To:

Faculty of Science & Engineering Department of Mechanical Engineering Sonargaon University .

In Partial Fulfillment of the Requirements for the Award of the Degree of Bachelor of Science in Mechanical Engineering

FEBRUARY 2020

Design and Fabrication of Android Operated Fire Fighting Vehicle

Project and Thesis By

Rason Chakma ID No.: BME-1602009065 Md. Shohanur Rahman ID No.: BME-1602009036

Md. Masud Rana ID No.: BME-1602009071 **Osman Gani** ID No.: BME-1602009051

Signature

Md. Mahedy Hasan Lecturer of Mechanical Engineering Sonargaon University.

Submitted to

Faculty of Science & Engineering Department of Mechanical Engineering Sonargaon University.

In Partial Fulfillment of the Requirements for the Award of the Degree of Bachelor of Science in Mechanical Engineering

FEBRUARY 2020

ACKNOWLEDGEMENT

The authors are grateful to almighty Allah for showing us the right path at the right moment, giving us the strength to complete the project and thesis successfully. Then the authors would like to express heartiest honor and thankful to **Md. Mahedy Hasan**, Lecturer, Department of Mechanical Engineering, for his continuous guidance, suggestions and motivation to complete this project and thesis. The authors would like to most thanks **Md. Mostofa Hossain**, Head, Department of Mechanical Engineering, Sonargaon University for giving all support and facilities to complete this project and thesis. Finally, the authors would like to thank those who helped us directly and indirectly by their different suggestions and motivation.

-THE AUTHORS

ABSTRACT

Automatic fire reorganization with smart security system is now a days used worldwide for better safety and security. In the recent year, Vehicles are turned out to be an ingredient over which many people had shown their interest. Vehicles has gained popularity due to the advancement of many technologies of computing and nano technologies. So, we proposed to design something that can make humans life easier and comfortable. This project, which is or endeavor design a fire fighting Vehicle. Comprises of a machine which not only has the basic features of the Vehicle, but also has the ability to extinguish it by command of operator. The need of the hour is make a device which can detect fire, even if it is small and take the necessary action to put it off. Many house hold item catch fire when someone is either sleeping or away and that lead many hazardous conditions in the fire is not putted off in time. So, be work as an mechanical engineer is to design and built system that can automatically detect fire. This advanced project allows a user to control a fire fighter Vehicle equipped with water tank and gun remotely wirelessly for extinguishing fires. For this purposes the system uses Bluetooth communication for remote operation along with Bluetooth based microcontroller Circuit for operating the Vehicle and water pump. The android based communication system transfer's user's commands through Bluetooth which are received by the receiver circuit. The receiver circuit now decodes the data commands sent. It then forwards to the microcontroller. Now the microcontroller processes these instruction and then instructions the motors to run the Vehicle in desired direction. It also operates the solenoid valve to spray water based on user's commands. This allows the user to operate the Vehicle and put off the fire by standing at a safe distance.

TABLE OF CONTENTS

| ACKNOWLEDGEMENT.ivABSTRACTvTABLE OF CONTENTS.viLIST OF FIGURES.ixLIST OF TABLES.ix | COVER PAGE | i |
|--|-------------------|----|
| TABLE OF CONTENTSviLIST OF FIGURESix | ACKNOWLEDGEMENT | iv |
| LIST OF FIGURES ix | ABSTRACT | v |
| | TABLE OF CONTENTS | vi |
| LIST OF TABLES ix | LIST OF FIGURES | ix |
| | LIST OF TABLES | ix |

Chapter 1: Introduction

| 1. 1 Fire Fighting Vehicle | 1 |
|--|---|
| 1.2 Objective | 3 |
| 1.3 Working of Fire Fighting Vehicle Project | 3 |

Chapter 2: LITERATURE REVIEW

| 2.1 Thermite RS1-T4 (1,250 GPM) | 5 |
|----------------------------------|---|
| 2.2 THERMITE RS3-T1 | 6 |
| 2.3 Vehicle firefighter Colossus | 7 |
| 2.4. Fire Ox | 8 |

Chapter 3: Theory & Methodology

| 3.1 Introduction | 9 |
|---|----|
| 3.2 NodeMCU | 10 |
| 3.3 Fire Sensor | 11 |
| 3.4 Bluetooth Module | 11 |
| 3.5 Motor driver | 12 |
| 3.6 Pump | 13 |
| 3.7 Gear motor | 14 |
| 3.8 Port description of Easier Pro | 15 |
| 3.9 Arduino | 15 |
| 3.10 Arduino Nano | 16 |
| 3.11 Programming on Arduino | 17 |
| 3.12 Arduino Project 1: Blink an LED | 20 |
| 3.13 Connect The Parts | 21 |
| 3.14 Upload The Blink Sketch | 21 |
| 3.15. Arduino Nano is better than Arduino Uno | 23 |
| 3.16 What is Thunkable? | 24 |
| 3.17 Overview of Thunkable | 26 |

| 3.18 Block Diagram of Fire Plot Identification | 27 |
|--|----|
| 3.19 Principle | 27 |
| 3.20 Block Diagram of Fire Fighting Vehicle | 28 |
| 3.21 Principle | 29 |
| 3.22 Experimental Setup | 29 |
| 3.23 Working procedure | 30 |

Chapter 4: RESULT

| 4.1 RESULT | 31 |
|-----------------------|----|
| 4.2 Photographic View | 32 |

Chapter 5: CONCLUSION AND FUTURE WORK

| CONCLUSION | 33 |
|-------------|----|
| FUTURE WORK | 33 |
| Appendix | 34 |
| References | 36 |

LIST OF FIGURES

| Figure 2-1: Thermite RS1-T4 (1,250 GPM) in application field | 5 |
|---|----|
| Figure 2-2: THERMITE RS3-T1 in application field | 6 |
| Figure 3-1: NodeMCU Pinout | 10 |
| Figure 3-2: Flame sensor | 11 |
| Figure 3-3 : Bluetooth module HC-05 | 12 |
| Figure 3-4: Motor Driver | 12 |
| Figure 3-5: Mini pump | 13 |
| Figure 3-6: Gear Motor | 14 |
| Figure 3-7: Easier Pro Pinout | 15 |
| Figure 3-8: Arduino Nano | 16 |
| Figure 3-9: Opening Arduino IDE | 17 |
| Figure 3-10: Sketch of Arduino | 18 |
| Figure 3-11: Arduino Board Selection | 19 |
| Figure 3-12: Communication port selection | 20 |
| Figure 3-13: Experimental Setup | 20 |
| Figure 3-14: Scratch opening | 21 |
| Figure 3-15: Basic program of LED Blinking | 22 |
| Figure 3-16: Arduino uno & Arduino Nano | 23 |
| Figure 3-17: Main Dashboard of Thunkable app builder | 25 |
| Figure 3-18: Block programming in Thunkable | 25 |
| Figure 3-19: Live Test in Thunkable | 26 |
| Figure 3-20: Block Diagram of Fire Plot Identification System | 27 |
| Figure 3-21: Block Diagram of Fire Fighting Vehicle | 28 |
| Figure 3-22: Mother board | 32 |
| Figure 3-23: Vehicle Top View | 32 |
| Figure 3-24: Fire Sensor | 32 |
| Figure 3-25: Tank Feeder | 32 |

LIST OF TABLES

| Table 1-1: Distance Measurement with Following Angle | 13 |
|--|----|
| Table 1-2: Arduino Boards Comparison Chart | 24 |