

# Fire Alarm Bluetooth Truck

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## Abstract

Fire accidents are very common in our surroundings and it is not practically possible to assign a fireman everywhere to determine whether any fire casualty is happening in the area. Fire Alarm Bluetooth Truck is an Arduino device which can easily solve this problem. These Arduino trucks detect fire in a particular range and because of their mobility, they immediately reach the place of the mishap. The trucks have a water tanker through which they take water and sprinkle on the fire to extinguish it. This machine gets commands from the mobile phone with the help of Bluetooth. These Arduino trucks are very easy to use and as they function with the help of Bluetooth, they can easily be used in day to day life.

**Keywords :** Bluetooth, fire alarm

## I. INTRODUCTION

As we all know that extinguishing and detecting a fire zone is a perilous task that risks the life of the firefighter but in place of this, if we assign robots for the task of recognizing and extinguishing the fire, then the loss of firefighter lives can be avoided, whereas it also evades other unsought of incidents. In this world of technology, robots are everywhere, whether it is household work, automation or industrial field, it is very viable to fabricate several kinds of robots for various tasks of day to day life. After long research and development, Bluetooth firefighter trucks are developed which lessen the risk of unwanted incidents, and the loss of firefighter lives can be avoided.

The Bluetooth firefighter truck comprises two main functions, detecting the fire and extinguishing it. Along with various sensors and a small fire extinguisher is attached for proper enforcement.

This Arduino device gets commands from Android

smartphone through Bluetooth. The device consists of two motors through which water is pumped from the water tanker to extinguish the fire. The whole design concept, its implementation, and result analysis of this model are discussed briefly in this paper.

## II. PREVIOUS WORK

A fire alarm system comprises numerous devices which are working collectively. When smoke, fire, carbon monoxide or some other kind of emergency occurs, it alerts people through audio and visual devices. These alarms get activated either manually from manual fire alarm activation devices like manual points or pull stations or automatically from heat detectors and smoke detectors. Fire alarms sounders in the form of motorized bells, wall-mountable sounders, horns, and speaker strobes blow an alarm. Then a voice evacuation message is given which is followed by a voice evacuation message which warns people inside the building to take particular measures

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against the fire. At certain different frequencies and tones, these fire alarm sounders can be set. According to the country and manufacturer of the equipment these frequencies range can be low, medium, and high. The firefighter truck has a turntable ladder which is especially used to extinguish the fire at the height. It is also used to enter inside to rescue people who are trapped inside the building at height. At more height, the large telescopic ladder is used where a normal ladder doesn't work. These trucks also have audible and visual warning communication devices. In the traditional firefighter truck, there was a problem in water pumping and storage. This problem has been solved in the modern one. It has a built-in water pumping system and many have their own reservoir.

### III. PROPOSED SYSTEM

Normal fire trucks do not have a fire detector. This system would have a fire detector that analyzes the extent of fire spread and gives alarm indicating the required authorities to take proper steps to protect the surroundings and curb the fire to a smaller location. This system is remote controlled and thus, does not require any human involvement in the fire stopping procedure thus, reducing the risk of loss of human life.

### IV. DEVICE COMPONENTS

#### A. Arduino Uno

Based on the ATmega328P, it is a microcontroller board comprised of 14 digital I/O pins, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), 6 analogue inputs, a power jack, an ICSP header, a USB connection, and a reset button.

#### B. Motor Shield

L293D uses a 16 pin DIP package, its internal integration is bipolar H- bridge circuit. This kind of bipolar pulse width method has many advantages, such as the current continuous, or micro-current vibration when the motor stops, which has a lubrication effect. It can eliminate the dead zone of static friction when positive and negative.

#### C. Bluetooth Module

HC-05 module Bluetooth SPP (Serial Port Protocol) module, designed for wireless serial connection setup. It has EDR (Enhanced Data Rate) of 3 Mbps Modulation

with complete 2.4 GHz radio transceiver and baseband.

It uses CSR Bluecore 04- External single-chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

#### D. Water Pump

- ↗ Water pump helps to pump water from the water tank.
- ↗ Using energy it draws water from the water pump to the pipes.
- ↗ According to the requirement, it increases the pressure of the water using energy.

#### E. Bo Motor 300 rpm

- ↗ Its voltage is DC 3V-6V.
- ↗ Current is 100MA-120MA.
- ↗ The reduction rate of this motor is 48:1.
- ↗ Its RPM (with tire) is 100-240.
- ↗ The car speed is 20-48 (M/minute)
- ↗ The weight of each motor is 29 g.
- ↗ The size of the motor is 70\*22\*18 mm.
- ↗ The noise of the motor is less than 65 decibels.

#### F. Bo Yellow Wheel

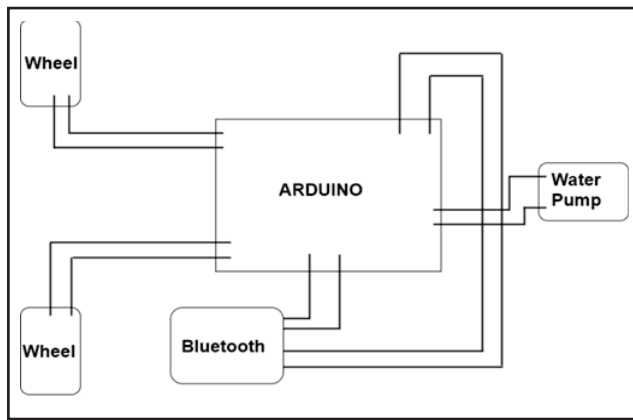
It is used for the movement of the truck from one place to another. The diameter of the wheel is 68 mm and width is 26mm. The dimension of the centre hole is 5.3\*3.66 mm Weight of the wheel is 50 g.

#### G. Jumpers

There are 10 pieces of each (total 30 pieces) jumper cable Dupont wire for Arduino which are of high quality and in good working condition. It is durable and reusable, easy to install and use. It is a popular choice for construction or repair. It can be used for the electronic project and Genuine Arduino product. Its length is 20 cm.

### V. DESCRIPTION OF A FIRE TRUCK

The Fire engines that we see today consist of a primitive model of the truck. It is handled by a Fire worker. The truck is driven and all the equipment is controlled by workers. The fire truck consists of various components which are shown as given in fig. 1.



**Fig. 1. Circuit Diagram**

### **A. Components Description**

**(1) Ladder :** A ladder is required in the fire truck to make the places accessible and rescue people trapped in apartments in the upper floors of the building.

**(2) Hoses :** The hose pipe is used to force water out of the tanker to be sprinkled at places under fire.

**(3) Storage Compartment :** This part of the fire truck is used to store various equipment required by firemen. It can be used to store their jackets, caps, first aid etc.

**(4) Elevating Cylinders :** These are mechanical supporting equipments or tools to elevate the ladders attached to the fire vehicle to higher levels for rescue operations in case of a fire.

**(5) Siren :** These are loud noise making devices attached to the vehicle so that the vehicles passing by can make way for the fire truck so that it can reach the site under fire damage as soon as possible.

**(6) Flashing Lights :** The flashing lights on the emergency vehicles are just to gain attention of the other passing vehicles so that they are aware that the vehicle is passing by and need to make way for it.

**(7) Pump Panel :** It is a panel which consists of all the controls of various fire extinguishing tools on a fire truck. The water pressure etc. are controlled from this panel.

## **VI. MODIFICATIONS**

The new idea brought about in the paper consists of the installment of the fire detecting tools and bluetooth devices on the fire truck. The idea is to reduce the

dependency of the fire truck on human resources and be able to function partially on its own to be able to identify and detect the fire and be able to diminish it. Though some human assistance will always be needed to control some or the other equipment, the reduction in human capabilities will lead to a faster action by various detecting tools that will help in diminishing the overall casualties and thus, increase the efficiency of the fire fighting department.

The sensors installed and the bluetooth control together with human aid help and assist in controlling the fire and the human workers may rescue the people trapped in the fire.

The set up consists of an Arduino board with sensors and bluetooth connectivity. The programming is done on the Arduino board accordingly so as to detect the heat signatures by the sensors and then throw out the water from the pump in the required area.

**(1) Arduino :** Arduino is a hardware and software company. For mounting digital services it produces single-board microcontrollers and its kits. The GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL) gives access to anyone for manufacturing of the Arduino boards and software distribution. DIY kits of Arduino boards are accessible commercially. These boards are furnished with digital and analogue I/O pins.

**(2) Bluetooth :** The Bluetooth connection is used to give instructions to the Arduino or the fire truck for certain tasks when it may not be able to function properly.

**(3) Sensors :** Sensors are installed on the fire truck to detect the heat signals and give information about the heat signals to the fire department so that once the fire is extinguished, rescue operations could be taken control by the firemen.

**(4) Water Pump :** The water pump is also connected and is behind the truck. It contains a large quantity of water to extinguish water. There is always excess water carried in the water tank for some emergency requirements if incase the put down fire by any means kindles it again.

We see that the whole system discussed here that enhances the existing fire trucks and increases their capabilities, reduces the risk to firemen, and the automatic fire detection system might be more efficient to detect fire using heat signatures. At the same time, while the fire truck is busy extinguishing the fire, the manpower may be used to look after other important issues and to rescue people.

## VII. CONCLUSION

In this world of technology, robots are everywhere and they can perform work more quickly and efficiently. The idea of Arduino trucks is not just an idea but a serious requirement of this era. Where human help takes hours to reach the place of a mishap, this technology will provide help in less amount of time, can avoid a lot of accidents, and also save more human lives. If these types of trucks are present in factories, shops or any place where there is a high risk of fires, a lot of mishappening can be reduced as the robot will get instantly into action by the time it detects fire.

Due to the sensors present in the truck, it can identify fire more instantly and precisely. However, in the future, a lot of new technology can be added to the manufacturing process and can make it more reliable for this task. In the coming years, it can also be modified according to the demand and the requirement of the task.

## VIII. ACKNOWLEDGEMENT

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## REFERENCES

- [1] P. J. Y. Piera and J. K. G. Salva, "A Wireless Sensor Network for Fire Detection and Alarm System," *2019 7th Int. Conf. on Inform. and Commun. Technol. (ICoICT)*, Kuala Lumpur, Malaysia, pp. 1-5. Doi: 10.1109/ICoICT.2019.8835265
- [2] *Fire alarm system*. (n.d.). [Online]. Available: [https://en.wikipedia.org/wiki/Fire\\_alarm\\_system](https://en.wikipedia.org/wiki/Fire_alarm_system)

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