**FIRE FIGHTING ROBOT**

#### **Introduction**

#### In our day-to-day life, fire accidents have become common and sometimes may lead to hazards that make it hard for firemen to protect human life. Fire fighters are susceptible to burns, smoke inhalation and crush injuries from collapsing structures and can suffer from heat exhaustion, as well as long term job-related illness such as asthma and lung damage.

With the development in the field of robotics, robots are being widely used for safety purpose. A fire fighting robot can be used to guard human lives, wealth and surroundings from fire accidents.

**Why did we decide to make it?**

We decide to build this project because by means of this fire fighting robot, people and properties can be saved from fire accidents. The idea of this work is to develop an autonomous robot that can navigate through mock home with a candle placed randomly inside the room which would simulate a house on fire. The robot will go near the candle and put it off in minimum time possible.

**Materials and Methods**

Components used:

* Hardware:

#### Arduino Uno Board

#### Arduino Uno - R3.jpg

#### The Arduino UNO is a widely used open-source microcontroller board based on the Atmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9 volt battery.

#### Servo Motor

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#### A **servomotor** is a Rotary Actuater or Linear Actuater that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors.

#### Flame sensors

#### Image result for flame sensor

#### A flame sensor detects the presence of fire or flames. In extremely hazardous environments, flame sensors work to minimize the risks associated with fire.

#### L293D Single Slide Board

#### Image result for l293d single slide board

#### Breadboard

#### Image result for breadboard

#### A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate.

#### Robot Chassis

#### Related image

A chassis is the internal framework of an artificial object, which supports the object in its construction and use. An example of a chassis is a [vehicle frame](https://en.wikipedia.org/wiki/Vehicle_frame), the underpart of a [motor vehicle](https://en.wikipedia.org/wiki/Motor_vehicle), on which the body is mounted; if the [running gear](https://en.wikipedia.org/wiki/Running_gear) such as wheels and transmission, and sometimes even the driver's seat, are included, then the assembly is described as a [rolling chassis](https://en.wikipedia.org/wiki/Rolling_chassis).

#### Water Pump

#### Image result for water pump mini

#### The firefighting robot has a water tanker to pump water and spray it on fire so a water pump is used for that purpose.

#### Motor Driver

#### Image result for motor driver

#### A motor driver is a little current amplifier. The function of motordrivers is to take a low-current control signal and then turn it into a higher-current signal. This higher current signal is used to drive the motors.

* Software:

1. Arduino IDE

#### The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuine hardware to upload programs and communicate with them.

1. Fritzing

#### Fritzing is an open-source hardware initiative that makes electronics accessible as a creative material for anyone. It is a software tool and a community website for Processing and Arduino, fostering a creative ecosystem that allows users to document their prototypes, share them with others, teach electronics in a classroom, and layout and manufacture professional pcbs

#### Materials required for Cad Model:

#### MDF Sheet

#### Caster Wheel

#### Nuts

#### Motor Limps

#### Methods

#### Step1: Mechanical Modelling

#### Cad Model

#### C:\Users\Plashkunj\Downloads\Fire fighting 3d.PNG

#### Procedure:

#### Take the transparent MDF Sheet of specified design.

#### Insert the electronic components.

#### Fix the wheel casing.

#### Make the connections as specified in Circuit Designing.

#### Step 2: Circuit Designing

#### The Connections are as follows:

#### A Battery of 12 V is used as a power Supply.

#### The D1 pin of Arduino is connected to Buzzer.

#### The D7 pin of Arduino is connected to Data pin of Servo Motor.

#### The D9, D10, D11 pin of Arduino is connected to 3 Flame sensors.

#### The Two motors is connected to Motor Driver (L298N).

#### Step 3: Software

1. Write the code in Arduino IDE.

2. Connect Arduino with your computer.

3. Select the port.

4. Clear Arduino by uploading vacant file.

5. Upload the code into Arduino.

#### **SchematicC:\Users\NIRMAL~1\AppData\Local\Temp\Rar$DIa0.980\Fire Fighting Robot (Labelled).jpg**

#### **Future Scope**

#### This system “fire fighting robot” is capable of being used in everyday life if more professionals are selected instead of the elements used in the project.

#### This can be easily used in closed parking lots, supermarkets, stores, shops. By the fire extinguishers which can be added to the robot, the fire can be firstly intervened and most of the fire can be extinguished without any growth.

#### Among the changes that can be made are the provision of safety of the robot by using non-combustible materials, the increase of the number of sensors for obstacle detection and the increase of the quality of the batteries used for the longer life of the robot's energy

#### In our work, fire extinguishing was done with the help of water pumps only. However, there are many alternatives in this regard. There are many applications such as fire extinguisher gel tightening with the help of servo motors.