

Android Controlled And Voice Based Fire Fighting Robot System

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Abstract- Nowadays, fire accidents are common and sometimes it becomes very difficult for fireman to save human life. It is difficult to appoint a person to observe for accidental fire where robot can do that. Therefore in such cases firefighting robot used in picture. Robot will check fire remotely. These robots are mostly useful in industries where probability of accidental fire is large. The proposed vehicle is able to detect presence of fire and extinguishing it automatically by using gas sensor and temperature sensor. It contains gear and motor driver to handle the movement of robot. Relay circuit is used to control the pump and when it will detect fire then it will communicate with microcontroller (Arduino UNO R3) through bluetooth module. The proposed robot has a water jet spray which is able to perform of sprinkling water. The sprinkler can be rotate towards the required direction. At the time of rotation towards the source of fire it may happen that it will come across some obstacles, then it has obstacle avoiding capability. It will use GUI for arduino operation using android. It detects obstacles using ultrasonic sensors the range is 80 m. Communication between the mobile phone and robot will take place through Bluetooth, which will have GUI to control the movement of robot. When mobile gets connected to Bluetooth firstly it will set module name, baud rate. It is feasible to implement Bluetooth communication between smartphones and microcontroller.

Keywords- RFID Tag, Sensor, time, Traffic Detector.

I. INTRODUCTION

Nowadays mobile robots are very important in construction sites, warehouses and manufacturing plants. Mobile robots can be used in material handling applications which are growing day by day. For identify different items and for handling materials mobile robots can be used. Wireless navigation is also possible for movements of mobile robot, can be controlled through android. Fuzzy logic control mechanism is used to control robot. That model not required any mathematical model controlling.

II. LITERATURE SURVEY

In this movable robot consists of sensor like LM35 and Arduino Flame Sensors are used to detect the fire and

distances on its way towards fire. In this for the mobility of the Robot, two wheels made of Nylon and a caster ball is used. This is mostly a rear wheel drive type of vehicle. The water container has the capacity to contain at least 1L water. It is made of strong cardboard which has water resistant property.[1]

A fuzzy controller is used to control an obstacle avoidance of Vehicle. The aim is to guide the Vehicle along its path to avoid any static environments containing some static obstacles in front of it. Obstacle avoidance in real-time is a mandatory feature for Vehicle in an unknown environment.[2] In this the human can control the robot by using the Bluetooth module. The Bluetooth module is work with the android application. In this the Bluetooth model communicate an-droid application by using driving motor, arduino mega, voltage divider, tires, Bluetooth, motor driver.[3] In this there are three different types of system unit is use

1. Locomotion system
2. Fire detection system
3. Extinguishing system
4. Communication system

The Locomotion system is used for obstacle detection and four ultrasonic range finder to find the distance between obstacle and system. Fire detection system is used for the detection and the gas sensor is used. Extinguishing system is for successfully extinguish the fire.[4] In this paper Arduino (UNO R3), motor driver, gear motor, Relay driver, Bluetooth module, pump and sprinkler are used. To program Arduino Nano open source software Arduino IDE is required. The detection of fire as well as extinguishing was done with the help of Arduino in which the gas sensor, gear motor and its driver, relay driver etc. are interfaced. The "Android controlled firefighting robot" can easily be used in everyday life such as in homes, parking, chemical Labs, supermarkets, stores, shops etc. Important function of the robot is patrolling. Bluetooth range and water capacity is limitation of Robot.[5]

III. PROPOSED SYSTEM

Our project is designed to build an android app that can control operations of the robot. Fire Engineers can send commands to robot using Bluetooth module which is mounted on robot. Android phones has facility of Bluetooth, using that Bluetooth fireman can control the movement of the firefighting robot. For fire detection uses two sensors. One is temperature sensor and other is smoke detector. Fire dismissal system will be get activated when fire detection system detects fire .Sprinkler starts sprinkling water when robot detects fire . At the fireman end android application is used and at receiving end two DC motors are interfaced to micro-controller. There are two types of robot control algorithms in unknown environment by using FLC. Tracking Fuzzy Logic Controller (TFLC) Obstacles Avoiding Fuzzy Logic Controller (OAFLC)

Embedded C. We are going to build robot in Embedded C and for controlling that robot we are using Android environment.

3.3 Hardware Requirements:

1. Ultrasonic Sensor
2. Servo Motor
3. Temperature Sensor
4. Bluetooth module
5. Relay Driver
6. Gear Motor
7. DC motor
8. Arduino UNO
9. Smart Phon
10. Water Container
11. Pump
12. Power supply

3.1 Description of block diagram:

1. Ultrasonic sensor:- This sensor is used to detect the obstacle.
2. DC Motors- Are Used to make the movements of the robot
3. HC05 – To communicate the robot with Fireman’s Mobile Phone
4. Android device:-Android device is used for manual traffic signal control using Bluetooth modem.
5. Arduino Mega 2560:- Arduino is used to control overall operation of system.
6. Power supply:- Power supply is used to provide power to system.

3.4 Software Requirement:

1. Embedded C
2. Android Studio
3. Arduino IDE

3.5 Flow Diagram:

There are two types of robot navigation in unknown environment by using FLC. Tracking Fuzzy Logic Controller (TFLC) Obstacles Avoiding Fuzzy Logic Controller (OAFLC)

Following flow diagram can give the clear idea about the flow of TFLC and OAFLC (Figure 2).

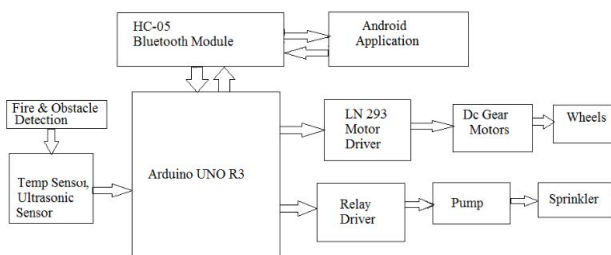


Figure 1: Architecture Diagram

3.2 Deployment Environment:

Arduino UNO R3 is an open source prototype. Software will operate in Arduino IDE. Computer code can be written and upload to the physical board. Arduino board is a board that can be functioned via Arduino IDE by sending a set of instructions to the microcontroller on it. For controlling motion of robot we are using GUI, for that purpose Android SDK is needed .For arduino programming we are going to use

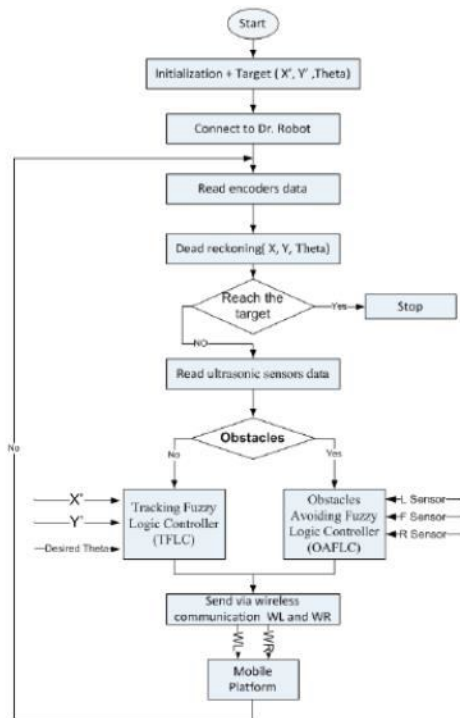


Figure 2: Flow Diagram

IV. SYSTEM DESCRIPTION

Android Controlled Firefighting Robot using ArduinoG-19TFLC is used to move robot in any direction according to the commands sent by the fireman. As soon as obstacle is detected control transfers to the OAFLC to avoid obstacles. To travel robot towards the target TLFC and OAFLC these two FLC methods are useful because it assures the collision free path. Output of these two techniques will be velocities of left and right DC motors. TFLC moves robot smoothly towards the target and for that purpose TFLC will require two inputs. One is distance between obstacle and robot, and another one is angle between robot and obstacle. OAFLC is normally used to control signals and to avoid obstacles which may come along the path towards the target. For avoiding those obstacles OAFLC will require distance and angle between robot and obstacle. Ultrasonic sensors can provide that distance. Following table shows the use of fuzzy logic algorithm.

2.1.2 Functional Requirements: Robot Automation Description and Priority Predictions will be done, on the basis of data collected by the sensors. These predictions will give idea to the user whether to turn the motor on through the android application and without human intervention. Hence sprinkler pump will be automated by fireman on the basis of predictions. Highest priority is given to automation. Response Sequences According to the obstacle detection, fireman will decide whether to turn robot to left or right. As obstacle will be detected robot will function

accordingly. If fire is detected then micro-controller will send command to sprinkler for turning it on. Then sprinkler will sprinkle water to extinguish fire without any interference.

V. RESULT AND ANALYSIS

The initial stage of the project is the part of Finding fire, temperature sensor LM35 the temperature sensor detects temperature at a certain distance. It does not receive data from areas outside of the determined area. It was decided to use two Reducing motors in order to realize the motion system. Both of these Reducing engines can move forward and backward. According to the obstacle state, if the motor is to be turned, one of the motors is given a reverse current by the processor and the axial rotation is provided and the obstacle less driving is provided. Thus, every obstacle was easily overcome in the environment where the system is located. When it detects obstacles, it intercepts a MZ80 sensor and sends the necessary data to the robot so that the robot can move without hitting the obstacles. In order to provide this communication in the project, communication is made with the android interface created using HC-05 Bluetooth module. If the robot system is navigating through the obstacle and fire is detected by the temperature sensor, microcontroller data is being sent. After the scan is finished, the pump motor is activated according to the incoming signal and the fire is extinguished with the help of water.

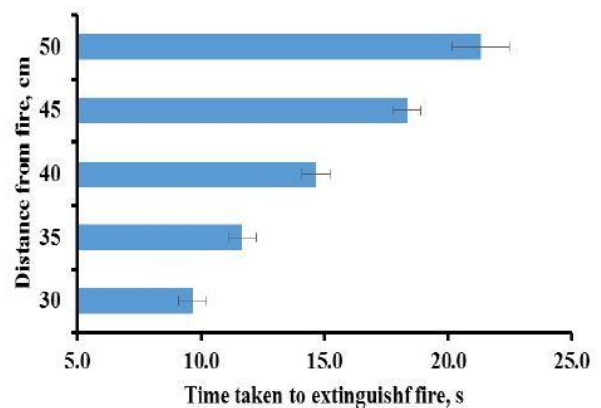


Figure 3: Time to Extinguish Fire Depends on Distance of Robot with Fire

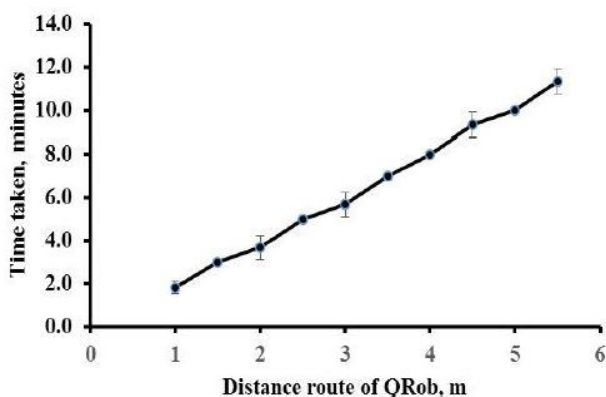


Figure 4: Time Taken Depends on Distance Route of Robot

VI. FUTURE SCOPE

1. We can use this system to collect the traffic data for traffic research.
2. If all traffic signal in city are synchronised smart city traffic management can be developed.
3. To provide traffic information to drivers using IOT.
4. Also, if emergency is an ambulance, then the nearby hospital will be notified by an alarm through registered phone.

It can be used in different industries for picking multiple objects where human intervention is not desired. On a large scale, it can be used to develop robots that have military applications. It can be used to target opponent without any human being crossing the territory. It also provides more development of applications depending upon android operating system. Such as, Application depending on sensors (accelerometer , gyroscope) etc

VII. CONCLUSION

Thus we developed a robot which will be used for fire fighting purpose. This proposes a great chance for automation and will be useful at places where human cannot reach or is dangerous. This robot will be helpful in automation industry also. Proposed approach of modular design strategy was a good solution in implementing the fire fighting robot to help people at the critical condition. The proposed robot can make movements in forward, backward, left, right and can stop also. It reduces the human efforts and also protect their property. Robot detects fire and extinguish the fire with the help of water sprinkler pump. For extinguishing that fire robot need to reach up to there and it starts movement towards the

target with the obstacle avoidance property. Thus robot can detects obstacle and also avoid them.

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