

# Design of Automated Guided Vehicles for Handling Material and Fire Fighting

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**Abstract-** Today in most of the field the human power is replaced by the robot in order to reduce the human error and delay. In most of Commercial centers the robots are used for material handling purpose only, when the huge fire expose the fire fighters are require to turn off the fire in such a case there is possibility of damage and loss of valuable human life. To overcome this drawback this paper aims to design the robot for multiple applications of handling material and fire fighting. The robot is controlled by Arduino micro controller with Smart sensors such as smoke sensors, IR sensors and color sensors.

**Keywords-** Material handling, Fire fighting, Arduino, Smart sensors.

## 1.INTRODUCTION

Fire fighting is the process of avoiding unwanted fire in building, vehicles, woodlands, etc. Fire sources produce huge damage to the entity. In Korea on the year of 1925 the fire administration was established for the first time and today fire service stations are established all over the world. In fire fighting mechanism, the fire fighter use water guns and chemical to turn off the fire, but in all circumstances human cannot task completely, to act in such a case fire fighting robots are required. The implementation of fire fighting robot is rapidly increase in many countries. The fire detecting mechanism is placed on the walls/ ceiling in the home and industries, but it is not efficient to find fire act. The robot is design as reprogrammable and to performed multi task operations like to shift the material from one position and placed in the respective position as per the command.

## 2.LITERATURE SURVEY

AdmahNurHadi et-al (2017) proposed a research work of wheeled robot which provides a model of arduino microprocessor equipped with gas sensor MQ2, LED, and Buzzer alarm. This provides an alert to the worker who is working in the industry .It detects the presence of flammable gases and leakage of hazardous gases on the pipeline that appropriately measures its performance. This can be done using the line follower principle which can able to detect the start and exit point.The proposed method can able to record all the sensed values of various gaseous sensors and that can be stored in SD Memory Card that can be export to excel sheet.

Godhvisonal et-al (2017) proposed a framework of design and implementation of RGB line follower robot that can differentiate among three colors.It is also capable of following congested curves and it continuous receive data from various sensor nodes. It also detects the obstacles and collision present in the sensor.The framework move towards the lane with the movement speed of 0.082M/s which improves the system overall performance.

Ya-Yao Lee (2015) proposed a design of controller which based on the line follower robot that works on fuzzy logic. Here the detection sensor is the array of infrared light sensor and distance detection is done by using ultrasonic ranging finder. The line follower control and distance keeping control are directly combined to drive the servo motor. The performance is examined by using S-type orbit. The overall results show two controls which are easily combined and implemented. It is flexible and reduces the traffic congestion.

### 3. PROPOSED SYSTEM

The robot follow the mapped line to reach the destination with help of IR sensors. The smoke sensors are fixed on the ceiling of the room to detect the fire when the smoke is expose. The color sensor is placed in the robot to identify the current location of robot.

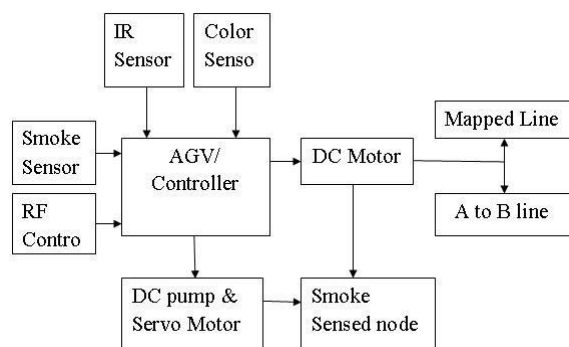


Fig-1: Proposed System Block diagram

The robot lift the material from point-A and drop at point-B. The DC motor is use to drive the wheels of robot and for lifting purpose. The servo motor help to spray the water from tank to turn off the fire. And RF controller help to get back the robot to the initial position.

#### 3.1. ARDUNIO MEGA

The Arduino mega 2560 is a micro controller which depends on ATmega2560. It has 54 input/output pins among that 15 pins can use as PWM output and 16 analog inputs. It has crystal oscillator in the frequency of 16 MHz, USB connection, power jack, ICSP header and reset button to start the new operation. It consists of everything in order to support micro controller.



Fig-2: Arduinio Mega

#### 3.2. IR SENSOR

IR sensor is an electronic gadget which is utilized to distinguish the IR radiation while falling on the gadget. There are a few applications including IR sensors like nearness, complexity and deterrent counter. The sensor comprises of two sections, the producer and the beneficiary circuit. On

the off chance that there is any middle of the road between these producer and collector circuits the tally gets expanded and there isn't a transitional between these circuits the check gets diminished.



Fig-3: IR Sensor

### 3.3.SMOKE SENSOR

A gas finder is a gadget that recognizes the nearness of gases in a zone, regularly as a feature of a security framework. This sort of gear is utilized to identify a gas spillage or different emanations and it can be interfaced with a control framework so a procedure can be naturally closed down. A gas identifier can sound a caution to administrators in the territory where the hole is happening, giving them the chance to clear out. This kind of gadget is vital in light of the fact that there are numerous gases that can be unsafe to natural life, for example, people or creatures.



Fig-4: Smoke Sensor

### 3.3. RF TRANSMITTER AND RECEIVER

The Tx is an ASK transmitter module .The outcome is astounding execution in an easy to utilize. The Tx is planned particularly for remote-control, remote mouse beneficiary module that gets On off keyed adjustment flag and demodulated to computerized motion for the following decoder arrange. The outcome is superb execution in an easy to utilize , with a low outside part check. The Rx is outlined particularly for remote control and remote security beneficiary working at 315/434Mhzand auto caution framework working at 315/433.92 MHz

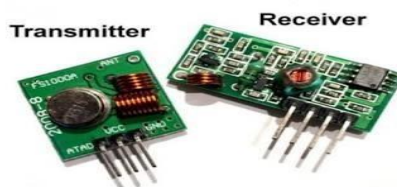


Fig-5: RF Transmitter & Receiver

### 3.4 SERVO MOTOR

Servomotor is a rotating actuator or straight actuator that takes into consideration exact control of rakish or direct position, speed and increasing speed. It comprises of a reasonable engine coupled to a sensor for position criticism.

It likewise requires a moderately refined controller, frequently a devoted module composed particularly for use with servomotors.



Fig-6: Servo Motor

They are not a particular class of engine in spite of the fact that the term servomotor is regularly used to allude to an engine reasonable for use in a shut circle control framework. Servomotors are utilized as a part of utilizations, for example, robots, CNC hardware or mechanized assembling.

#### 4.WORKIN

The robot will be placed at initial point- A. The material are lifted by fork lifter from point-A and unload at point-B. The DC motor-1 is connected with lead screw arrangement, which rotate in clockwise direction to lift down the fork lifter to the bottom end. The DC motor-3 is connected with steering rake which rotate in anti-clockwise direction with delay to get the straight position. The DC motor-2 is used to run the wheel of robot. The robot will get into the lifting position, the object lift from the table with help of fork lifter. The mobility of robot is based on line follower, the direction is guided by two IR-sensors which is placed at two end with the distance as per the map was fixed. The feedback from the both IR-sensors will be taken into the consideration for following the mapped line to reach the destination point-B, where to unload the material. The smoke sensors are placed at sealing of room which is exactly opposite to the mapped node in order to trace the fire location correctly. The RF Transmitter is connected with smoke sensor which sends the digital signal to the RF receiver of robot when the fire is detect. By placing different color at each node the current location of robot can easily identified with help of color sensor from that node the robot will reach the firing location. The servo motor is help to pump the water from the tank off the fire. Once the fire is vanished, the robot is handle by the RF controller to get back the robot to home position.

#### 5.MERITS & DEMERITS

The major advantage of fire fighting robot are given below:

- It performed multiple tasks
- It requires less investment
- Easy design

#### 6.CONCLUSION

This work proposes a better material handling and fire fighting cost-effective automatic guided vehicle for small areas fire accident using RFID Module. Compared with current technique, the proposed scheme can accurately detect the fire occurred area and automatically reaches the area and spray the water without any man power. This has the safety compliance for the humans and also the fire service employees.

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