Fabrication of Autonomous Fire Protection Robot with Notification

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Abstract. The security of the home, laboratory, office, industry, and building is essential to human life. We are building a smart security system based on a multi-sensor sensor that contains a fire extinguisher robot in our daily lives. The destructive cause of electricity burning is a very high source. This is because the security system cannot detect an unusual and dangerous situation and inform them. Otherwise, the user may have difficulty identifying a minor cause of electrical burns. A user may take longer to extinguish a fire than to find a water source to put out a fire when you want to put out a fire. Difficulty with fire detection of small burnt area and hard to reach user space Sometimes hard fire extinguished for example spaces are difficult to detect. Therefore, the design of the "Autonomous Fire Protection Robot with notification" with an intelligent architectural fire extinguisher controlled by a small PIC18F4550 controller and supported by an independent CYTRON SK40C board and one additional circuit.This robot will transfer to the fire source when the fire sensor receives fire and will send a message to any GSM network phone via a modem connected to a configurable device. The robot was also programmed to stop before the robot hit the flames. This robot can also extinguish a fire of 45 degrees on the upper side and 45 degrees on the lower side. This robot involved the finger-cutting function of a fire extinguisher.

1. Introduction

In recent times, machinery and robot layout come to be crucial in assisting people. This fire protection robot turned into designed to assist human beings in any unfavorable burnt scenario in which this robot can extinguish burnt regions straight away the use of a self-sustaining device. This independent gadget can be designed the use of programming in PIC18F4550 and other extra circuits. In real lifestyles, the detrimental burnt area often happens without our awareness. therefore, this sort of robot would require a high call for within the marketplace due to its usefulness to people as well as the environment transmit hearth data to the cell phones the use of GSM modern. The objective of the assignment may be to design an SMS digital fire safety robot toolkit which can update the conventional hearth safety robot. The toolkit sends the hearth and sends SMS to the proprietor of the house, The gadget is made green by way of SIMs in order that the SMS can be acquired by using the number of devices forums in a locality using strategies of time department a couple of get admission to. The GSM modem receives the SMS. In return, the modem transmits the saved message through the wi-fi hyperlink. The micro-controller validates the SMS after which perform a particular venture at the tool.
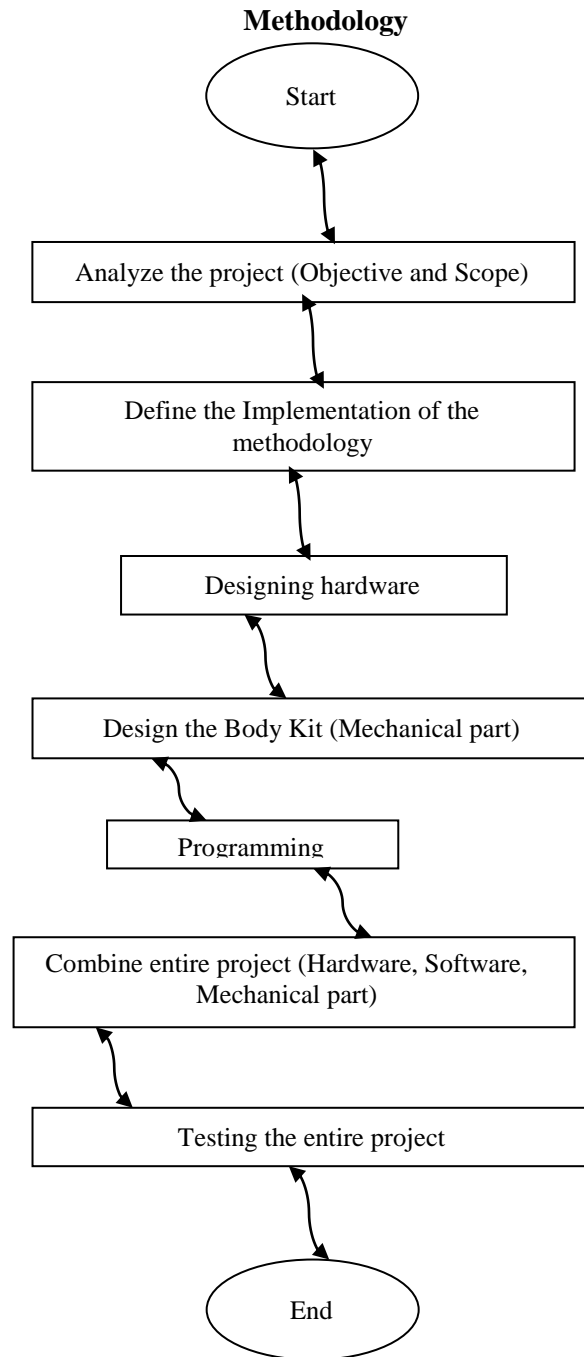
The target for this project is:
1. To examine a robot that could seek, stumble on and extinguish burnt areas right now and develop a software that use the PIC18F4550 to govern the movement of the robot. Besides, discover ways to join micro-controller and GSM modem.
2. To layout the robot that consists of the flame sensor to locate the fireplace after which ship notification with the aid of quick message service (SMS).
3. To analyze how the robotic performance to hit upon the angle of burnt location in the front of the robot and locate the brunt area in 0m – 2m in radius.

The mission scopes for this venture are
1. The robotic detects brunt location in 0m – 2min radius.
2. Robots come across fireplace events and uses extinguishing to combat the fire supply and the modem linked to the programmable tool.
3. The robot can turn 360° after which the robotic can extinguish a fireplace at an angle of 30° from the fireplace extinguisher nozzle.
4. The robot can extinguish the fire from petrol, gasses, and electric appliances.

The safety of domestic, laboratory, office, factory, and building are essential to human existence. We develop a protection device that carries a hearth safety robot the use of the sensor. The security gadget can hit upon unusual and dangerous situations and notify us. First, we layout a hearth safety robotic with an extinguisher for the sensible building. Except, human beings had difficulties detecting the small burnt caused by electric home equipment. The late time person takes to extinguish the fireplace. Users may take a late time to extinguish fireplace like locating the water supply to

extinguish the fireplace whilst need to extinguish the fireplace. The fire problems to hit upon the small burnt location and location that is hard to be reached with the aid of the person. On occasion tough fire extinguishers for example spaces is tough to peer. Except is fee the loss suffered within the event of a fire is slow to behave.

Methodology

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        ┌──────────────┐
        │    Start     │
        └──────┬───────┘
               │
    ┌──────────────────────────────────────┐
    │  Analyze the project (Objective and   │
    │                 Scope)                │
    └──────────────┬───────────────────────┘
               │
    ┌──────────────────────────────────────┐
    │   Define the Implementation of the    │
    │             methodology               │
    └──────────────┬───────────────────────┘
               │
        ┌──────────────────────┐
        │  Designing hardware   │
        └──────────┬───────────┘
               │
    ┌──────────────────────────────────────┐
    │  Design the Body Kit (Mechanical part)│
    └──────────────┬───────────────────────┘
               │
        ┌──────────────────────┐
        │    Programming        │
        └──────────┬───────────┘
               │
    ┌──────────────────────────────────────┐
    │ Combine entire project (Hardware,     │
    │     Software, Mechanical part)        │
    └──────────────┬───────────────────────┘
               │
    ┌──────────────────────────────────────┐
    │      Testing the entire project       │
    └──────────────┬───────────────────────┘
               │
        ┌──────────────┐
        │     End      │
        └──────────────┘
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2. Material and Equipments

1. Cytron sk40c Board
2. PICI8F4550 Micro-controller
3. Square plate
4. DC Motor
5. Clipper
6. Actuator
7. Fire extinguisher
8. Stopper
9. Hose
10. Nozzle
11. Stabilizer
12. Flame Sensor

3. Experimental Procedure

The actual experimentation procedure is done as follows,

1. The raw material is prepared for the base framework using power hacksaw machine as per the requirements.
2. Angle material is using to make the base framework. After hacksaw cutting the material edges is griding process using bench grinding machine
3. The base frame material is arranging to require shape and dimension using try square. The try square using for checking the parallel and perpendicular of material arrangement.
4. After arrangement the material is joining using arc welding technology as per the shape and dimension. After joining the material, the base framework is finished.
5. The motor and the sensors are mounted on the base frame. Before that drill the base material to fit the bolt nut for motor mounting work.
6. The rotary disk material is doing the turning and drilling process by lathe machine as the required dimension the drilling process is suitable for motor shaft.
7. After finishing the rotary disk it's fitting in the motor shaft.
8. The extinguisher material to cut the required size using the power hacksaw machine. After the cutting process facing the edge by lathe machine using single point cutting tool.
9. The drilling operation doing in the cylinder tank for the in let nozzle fitting work and valve fitting work.
10. The body kit is used to protect the electronic circuit from the any obstacles especially liquid where it may cause the electronic circuit malfunction for the robot.
11. After finishing the mechanical part, the hardware part comes into operation the Cytron SK40c Board and PICI8F4550 microcontroller is connected and fitted inside its designated slot.
12. The micro-controller validates the SMS and then perform specific task on the device.
13. The flame sensors which are connected to the PICI8F4550 microcontroller is fitted near the left and right side of the freewheel
14. This robot contains two wheels at rear side and one free wheel at front side. The free wheel used to stabilize the robot and to rotate the 360°.
15. The outlet nozzle is arranging for the joining the tank head.
16. The cylinder tank is mounting on the rotary disk by arc welding process. The fire indicator I also fitting on the rotary disk.
17. The stopper is welding below the exiting is her tank. The two-pin switch in fitting on the base frame.
18. Then GSM module is inserted and programmed the function to be carried out using MP-LAB or MP-LAB X which is a code editing and debugging for microchip tool
19. To tasking robot to finding and extinguish the destructive burnt area, the steering method is the important thing that must be emphasis.
20. The fire indicator system wiring work is doing in the product as per the required design. This system mounting in the rotary disk.
21. After finishing all kin do f joining work. Doing the alignment test using digital surface gages.
22. After the performance evaluation test doing the working area to check performance do the batter.

4. Conclusion

The Autonomous fire protection robot is made by mild steel material used as the base frame, cylinder tank, cylinder tank head, inlet pipe, outlet pipe, rotary disk etc. maximum the arc welding technology is using to make this system. Some of the work using manufacturing technology likes facing ruing, drilling operation. The designed Autonomous fire protection robotusingSOLIDWORKStechnologytosuitableshapeanddimension.Before designing the system study the journals and articles area of fire safety. Hence, the Autonomous fire protection robot was fabricated with manufacturing technology and SOLID WORKS technology. As the it is highly performance to compare other system for industrial safety

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