Autonomous Fire Fighting Robot with Zigbee

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Abstract:
Disaster response, especially fire-fighting and rescue, is highly risky for firefighters engaged in action. As a result, many robots intended for fire-fighting have been proposed. However, it is difficult for them to directly access fire sources because their mobility is limited. Specifically, existing robots are large and heavy. Therefore, we propose a novel hose type robot, which can automatically detect the fire in the area and automatically turn on the pump. The ultrasonic sensor is used to navigate through the area and also detect the movement of human in that area and send the buzzer alert to the security system. so the firefighter can easily identify the person location. With the help of robot, we can easily fight under difficult condition.

Keywords: Fire Detection, Person Identification, Object Detection and Navigation.

I. INTRODUCTION

During disaster response, fire-fighting and lifesaving tasks take place in a harsh and risky environment for the firefighters engaged in the task. During a fire extinguishing activity, it is desirable to discharge water directly on the fire source by firefighters stationed away from the fire. However, it is difficult to directly access the fire source. Particularly, in a large-scale fire, it is difficult for a firefighter to extinguish the fire inside a building where it has spread. In such a case, the objective is none other than preventing the fire from spreading outside of the building. Various conventional robot systems have been proposed for fire extinguishing purposes. Many of them are terrestrial mobile robots or search robots, which are equipped with fire hoses. It is difficult to directly access the interior of a building that is on fire because the robots are often designed to move on a flat surface and identify the person and detect them with distance.

II.EXISTING SYSTEM:

With the continuous development of national economy and improvement of the standard of living, there are more and more practical operating situations which are not suitable for people's manual operations in the vehicle, such as disaster handling, the demolition of dilapidated buildings, dirt-cleaning, chemical waste management and some other dangerous or poor environment occasions. Using the remote controlled equipment to perform various works in the adverse environment, e.g., fire rescue, has become an urgent problem. A new remote controlled emergency handling and fire-fighting robot which can be used in practical situations has been developed on the basis of a small multi-function crawler hydraulic excavator. It can greatly enhance the operating security and it is significant in the aspects of avoiding casualties and reducing property losses.

III.PROPOSED SYSTEM:

The purpose of the robot is to directly access the fire source on behalf of firefighters and perform the fire extinguishing task

quickly and safely. In this the robot automatically detects the fire and turn on the pump when the fire is started. With the help of fire sensor, the PIC microcontroller detect the fire and using Ultrasonic sensor the obstacle detect the robot automatically recreate the path with them self. And using PIR (passive infra-red) sensor the human is detected by the robot and send the alert to the control unit which is show the location of person which make easy to identify by the rescuers.
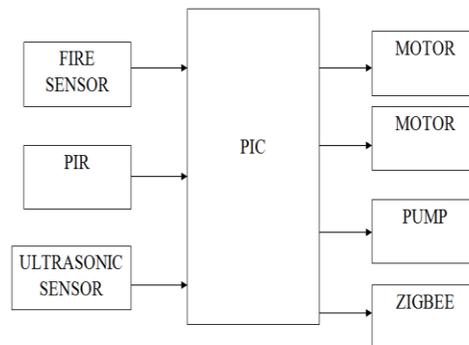
VI.BLOCK DIAGRAM:
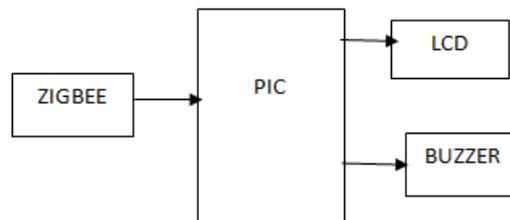

Figure.1. Robot Architecture

Figure.2. Control Unit Architecture

V. HARDWARE REQUIREMENT:

A.PIC:
It is a family of microcontrollers made by microchip technology, derived from the PIC1650 originally developed by General Instruments Microelectronics Division.

B. ZIGBEE:

ZigBee communication is specially built for control and sensor networks on IEEE 802.15.4 standard for wireless personal area networks (WPANs), and it is the product from ZigBee alliance. This communication standard defines physical and Media Access Control (MAC) layers to handle many devices at low-data rates.

C.PIR:

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors.

D.FIRE SENSOR:

A fire alarm system has a number of devices working together to detect and warn people through visual and audio appliances when smoke, fire, carbon monoxide or other emergencies are presence.

E. ULTRA SONIC SENSOR:

Ultrasonic Sensors measure the distance to the target by measuring the time between the emission and reception.

F. PUMP:

A mechanical device using suction or pressure to raise or move liquids, compress gases, or force air into inflatable objects such as tires.

G.LCD:

An LCD is a display of information on a screen, which uses liquid crystals that become visible when electricity is passed through them. LCD is an abbreviation for 'liquid crystal display.

H. BUZZER:

A buzzer is an electrical device that is used to make a buzzing sound for example, to attract someone's attention.

I.MOTOR:

An **electric motor** is an electrical machine that converts electrical energy into mechanical energy. Most electric motors operate through the interaction between the motor's magnetic field and winding currents to generate force in the form of rotation.

VI.SOFTWARE REQUIREMENT:

A.MP lab:

MPLAB is a proprietary freeware integrated development environment for the development of embedded applications on PIC and dsPIC microcontrollers, and is developed by Microchip Technology.

B. Embedded IDE:

An Integrated Development Environment (IDE) is software that assists programmers in developing software.

VII.ALGORITHM:

- The robot is placed on the standstill position. once accident is happened the transmitter sends the signal to the robot.
- The robot then moves towards the fire. Once the flame.

- A sensor in the robot detects the fire and extinguish the fire.
- If the robot is obstructed by an object .it avoids the object and move towards its path by using object sensor.
- Otherwise it moves towards its predefined path.
- After the robot extinguishes the fire its return back to its position.
- By using mutual induction, the battery of the robot is charged automatically.

VIII.ADVANTAGE:

- Small in size.
- Easy to implement.
- Better efficiency to detect the person.
- Autonomous operation is possible.

IX.FUTURE SCOPE:

The practical application domains where robotic technology is most likely to be used are
- Civil defence
- Domestic services like cleaning and arranging
- Government
- Security/surveillance
- patrol, observation.

X.CONCLUSION:

From the proposed system the intelligent buildings are fully survellienced by automated fire fighting robots with the help of pic microcontroller. The flame sensor senses the fires and transmit the signals to the robots. The robot starts to move and sense the fire and extinguish the fire with the help of pump or fire extinguisher. it also avoids the obstacle in the path of the robot. It also has wireless charging circuit for charging the batteries.

XI.REFERENCES

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