

Forest Fire Prevention Using AI

Farheen Adil Talib

Department of Information Technology
Pillai HOC College of Engineering and Technology
Rasayni-410207, India

Pooja Mahavir Choudhary

Department of Information Technology
Pillai HOC College of Engineering and Technology
Rasayni-410207, India

Namit Santosh Singh

Department of Information Technology
Pillai HOC College of Engineering and Technology
Rasayni-410207, India

Anurag Ramkaran Verma

Department of Information Technology
Pillai HOC College of Engineering and Technology
Rasayni-410207, India

Abstract:- To enter an unknown or dangerous environment is too risky such as a forest fire. In order to save human life and not manually going in the environment we send rover and sending human is too expensive and will be very complex project with all the precaution and even to take the precaution we need to study the environment and know which elements is need to be taken care of and what exactly should be the precautions and what functions need to be added in the project and void casualty and study the environment. In this present work, a Raspberry Pi operating system based robot platform with remote monitoring and control algorithm through Internet of Things (IoT) has been developed which will save human live, reduces manual error and protect the country from enemies. The spy robot system comprises the Raspberry Pi (small single-board computer), night vision pi camera and sensors. The information regarding the detection of living objects by Ultrasonic sensor is sent to the users through the web server and pi camera capture the moving object which is posted inside the webpage simultaneously. The user in control room able to access the robot with wheel drive control buttons on the webpage. The movement of a robot is also controlled automatically through obstacle detecting sensors to avoiding the collision. This robot can be used as surveillance system using the robot and can be customized for various fields like industries, banks and shopping malls.

Keywords:- Forest Fire, Raspberry Pi, Iot, Obstacle Detection, Surveillance System, Camera.

I. INTRODUCTION

In today's world the robotics field is growing exponentially and some of the popular robotic products are used largely by the industries, defense, academic and research communities. The design and implementation cost of a robot is very less than hiring a human caregiver. The robots can be reprogrammed faster and more efficient. The robot has sufficient intelligence to cover the largest area to provide a secured space. The intelligent robots can perform preferred tasks in unstructured environments with or without human direction. This robot consists of 2 motors and 2 wheels and universal wheel. It has a micro controller and motor driving IC with programmable input output ports. It has a wired camera

to show the live telecast of its environment. It can be controlled using motion sensor to control this robot as an autonomous controlling robot. Here it has wireless connectivity with both in Bluetooth or Wi-Fi. The wireless control provides additional benefits including increased flexibility and reduced installation cost.

II. SYSTEM OVERVIEW

The Robot will be remote controlled by an Android device with Bluetooth capability. The intention is that the robot will be moving into a path where the data must be captured. The data will be continuously being captured and transmitted independently if the robot is stationary or in movement. The user should receive a visual feedback (live video stream) from the Robot. The captured data would be analysed and send to the device. The Robot will have some autonomous capability to avoid obstacles in order to protect itself in case of bad controlling by user. Basically, two gear motors are sufficient to produce the movement of spy robot and the motor driver module is used to supply enough current to drive two gear motors which protects the Raspberry-pi module from the damage. Robot has a ultrasonic sensor which is used to sense the obstacles coming in front of the robot path. The temperature sensor (DHT-11) is used for the sensing of the temperature. If any high readings of the temperature are recorded, then the user can turn on the video camera to see the presence of any fire that has occurred. Therefore, deploying any firefighters for the fire to be taken care of, hereby reducing the risk of fatality as well as the time and efficient use of the water or the chemicals that are used to put down the fire.

III. SYSTEM DESIGN

Robot has two working modes for the controlling of robot. They are:

A. User control modes

User control mode is controlling the system with wireless connectivity. The wireless connectivity is established by the Bluetooth. Bluetooth connection can be established and robot is controlled by a smart phone with Android OS.

B. Autonomous control mode

Autonomous control mode is established by compiling the preloaded program. Autonomous mode doesn't need instructions at instant to move a robot.

IV. HARDWARE DESIGN

A. Arduino Uno

Arduino is an open-source computer hardware and software company, project and user community that designs and manufactures microcontroller-based kits for building digital devices and interactive objects that can sense and control objects in the physical world. Arduino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

B. Raspberry Pi 3 model B

Raspberry Pi 3 Model B was released in February 2016 is a 1.2 GHz 64-bit quad core ARM Cortex-A53 processor, on-board 802.11n Wi-Fi, Bluetooth and USB boot capabilities.

C. Sensing devices

In sensing section, the sensors such as ultrasonic sensor will sense the distance of an object present in its path. Humidity sensor senses the humidity around the robot. The sensed values are stored in the robot first and then it is transmitted. The distance from the robot and the object is received and shown in the Android device display.

D. Camera visuals

Visuals around the robot are captured by the Pi cam is converted to signals and is sent to the receiver through wireless medium and visuals can be seen in the display. In the display the person who is sensing can know about the surroundings of the robot continuously.

V. DESIGN FLOW

A single processor responsible for all tasks, that in this case was a Raspberry Pi and a dual processor, having the requirements "split" between them (Arduino and RPi):

A. Processor 1: RPi-2

- Responsible for data capture
- Web communication
- Streaming Video

B. Processor 2: Arduino

- Motors Control (movement and camera positioning)
- Obstacles avoidance
- Remote Control communication

In terms of costing, using 2 processors is in fact less expensive than the single processor option. This is because the Arduino is a very cheap item and less expensive than the RPi

Hat option necessary to run de Servers with RPi. Another difference is the BT module. For Arduino a very cheap HC-06 BT 3.0 slave module can be used, costing half of the price of the BT dongle to be added to RPi. So, the dual processor was the chosen option.

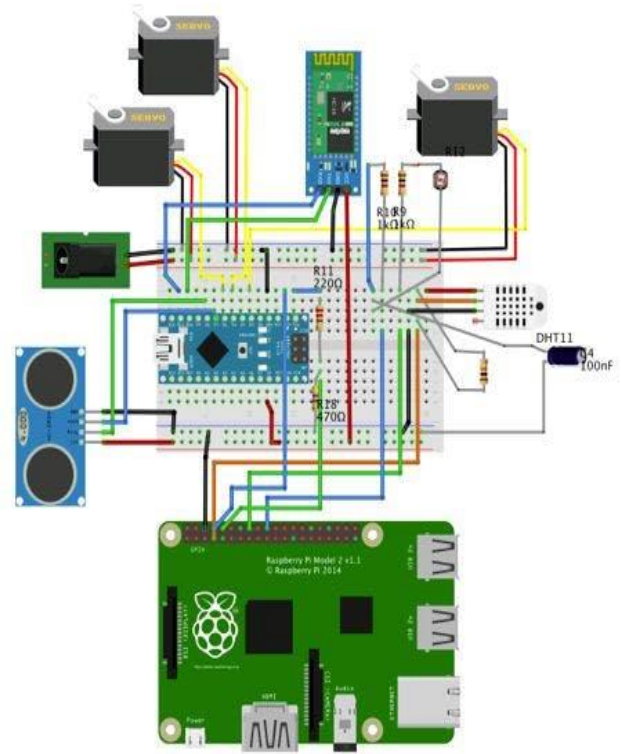


Fig. 1. The schematic diagram of the proposed system

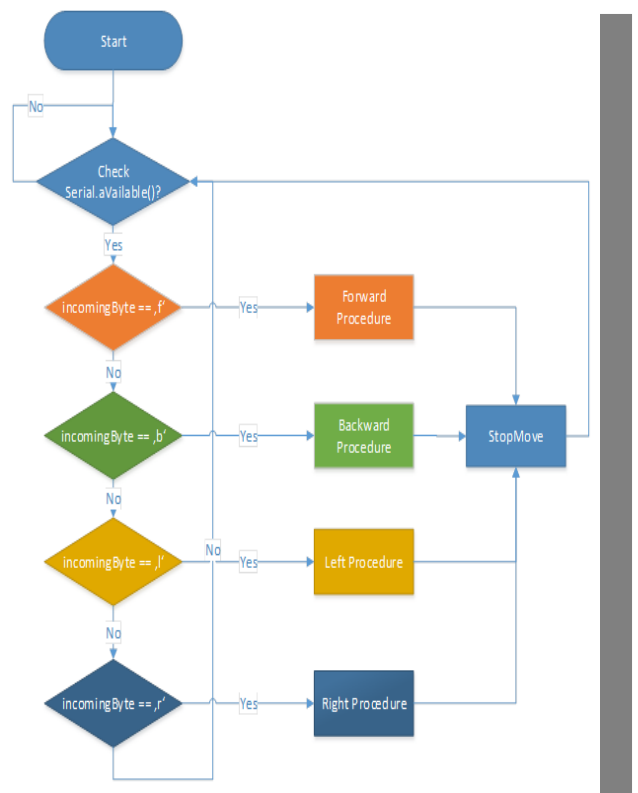


Fig. 2. Work flow of the system

VI. CONCLUSION

The Robot used for this secure purpose can operate effectively in order to collect various types of information that is required by users which in this case is "Forest fire". For instance, the temperature and humidity of the surrounding can be determined by the DHT11 sensor which sends a signal to the Arduino board when a change the temperature being is in the ambient of the Robot. In turn, the Arduino triggers the Bluetooth module and immediately sends it to the web application on the mobile phone. The brain of the spy robot is an Arduino board minicomputer. The Robot is operated by three modes. Firstly, only run the code and leave the Robot to navigate freely based on the sensor status. Secondly, control the moving to a specific direction by the Laptop Keyboard. Thirdly, monitor the information available on the web page, and control accordingly with various buttons.

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