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Surveillance Fire Fighting Robot

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ABSTRACT

Our project surveillance fire fighting robot is among the valuable system in a security based monitoring. This project design to develop Robot with night vision camera, smoke sensor, gas sensors, water tank, dc motor, pump motor, solar panel. The main need is to design and develop a portable and efficiently useful surveillance fire fighting robot for security. This project allows a user to monitor all activities and control a fire fighter equipment with water tank and remotely wirelessly for extinguishing fires. wireless camera used for monitoring purpose and user can watch live streaming display on the mobile application. Two DC motors were used to control the motor movement while the robot is on operation mode to extinguish the fire. It can be used in industry and for security purpose.

Keyword: Firefighting robot, Arduino IDE, Esp32 cam, Fire sensor, AT-mega328.

1. INTRODUCTION

The act of surveillance can be performed both indoor as well as in outdoor areas by humans or with the help of embedded systems such as robots and other automation devices. Robot ,any automatically operated machine that replaces human efforts. Robotics is the rising answer to ensure the safety of the surroundings and human lives. There are multiple ways robots are being used to improve security. They can operate in environments where humans cannot go. When the fire gets out of control, firefighters are called. But while rescuing people they often get injured because of extreme fire. By using a firefighting robot this kind of accident can be reduced. Fire fighting is an important job but it is very dangerous occupation. Due to that, Robots are designed to find a fire , before it rages out of control . It could be used to work with fire fighters to reduce the risk of injury to victims and firefighters too

1.1 AIM OF OUR PROJECT

The aim of our project develop a robot which continuously monitor all activities around disaster area. It is designed to sense any kind of fire by the help of sensors and extinguish it by spreading water continuously until the fire and smoke goes off and along with camera can wirelessly transmit real time video with vision capabilities.

2. METHODOLOGY

2.1 Project model

In this project we have used esp32cam module and Atmega328 which gets the power supply through battery which is connected to solar panel which recharge the battery, as esp32cam module has built-in camera and Wi-Fi module which can connected to mobile for live streaming and controlling the operations (like forward, backward, left, right and stop) the dc motor which is connected to driver IC, fire sensor and dc water motor is connected to esp32cam module and At-mega 328, as fire sensor will detect the fire and try to extinguish it completely by using dc water motor through spraying on it, Smoke detector which is connected to Atmega328 microcontroller detect the smoke in surveillance area and buzzer which is also connected to AT-mega 328 starts buzzing as soon as it get command from smoke or fire sensors.

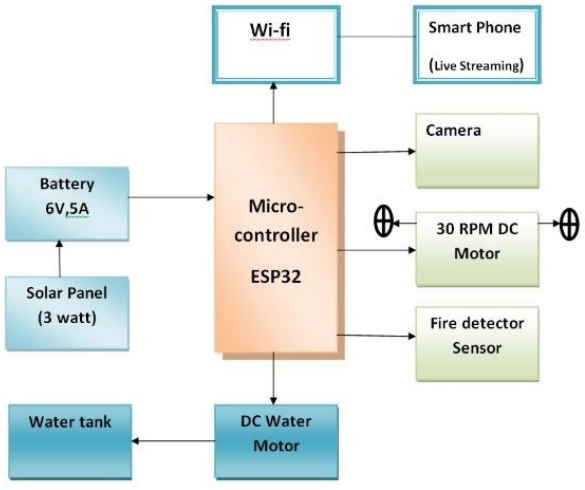

Fig 1: Block diagram

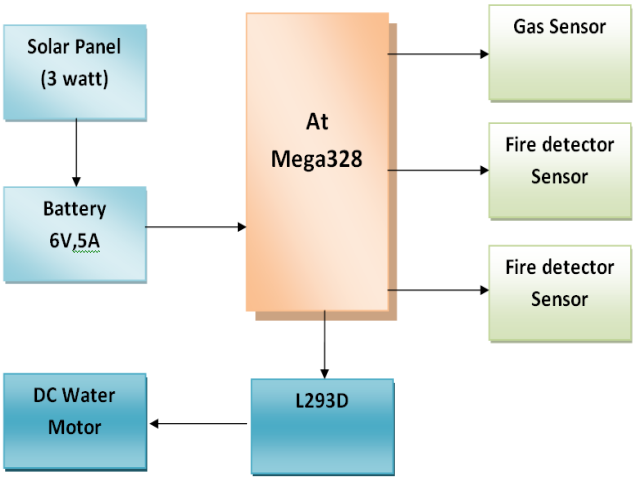

Fig 2: Block diagram

3.3 Flow chart

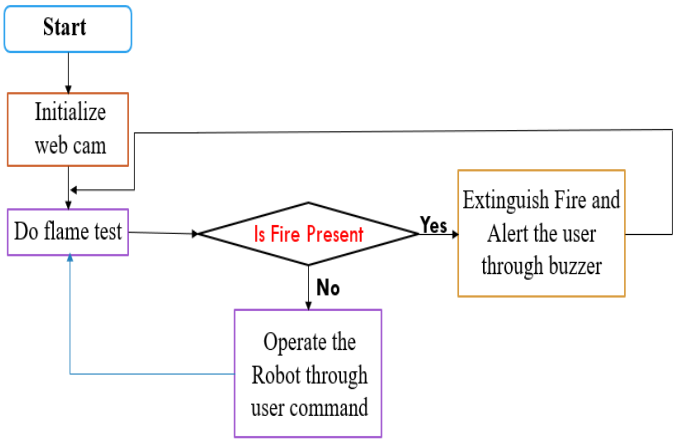

Fig 3. Flow chart

3. MODELING AND ANALYSIS

The hardware and software requirements for the implementation of this project is as shown below:

3.1 Hardware Components:

- Esp32 camera module
- Motor driver
- Solar panel
- Battery
- Fire Sensor
- Gas Sensor
- Dc Motor
- Dc pump
- L293D
- Buzzer
- Water Tank
- AT- meg328

3.2 Software Used:

- Arduino IDE
- Proteus
- ESP32-CAM Robot

3.4 Working

A surveillance fire fighting robot is a partially automated machine that works as per instructed by user and work and move to destination by detecting the fire in the way using the sensors , Streaming or capture images which can be then analyzed by the user. How do solar powered surveillance fire fighting robot work? Solar powered surveillance fire fighting robot uses solar panel to harness the sunlight and convert that sunlight into direct current (DC). A remote controlled surveillance robot is defined as any robot that is remotely controlled to capture images/video for specific purposes. Surveillance fire fighting robots that are controlled remotely have important roles in area of rescue and security.

This project Surveillance fire fighting robot with Vision Camera allows a user to control a fire fighter robot equipped with water tank to extinguishing fires catch area. For this purposes the system uses an RF remote for remote operation along with RF receive based microcontroller circuit for operating the robotic vehicle. The receiver circuit receives RF signals through RF based remote transfer user commands. The receiver circuit now decodes the data commands sent. It then forwards it to the microcontroller. Now the microcontroller processes these instructions and then instructions the robot to run the dc motor in desired directions. This allows the user to operate the robot and put off the fire by standing at a safe distance. This robot body also has a wireless enabled camera mounted over it. This vision camera helps to direct the robot body in whichever direction as needed. This is because whatever area that will be captured by this wireless camera can be viewed in mobile for reference. The robot operates within a 8 meter range of the remote. Thus this system helps to extinguish fire from a safe distance with the help of the water tank attached to the robot body.

4. PROTOTYPE MODEL

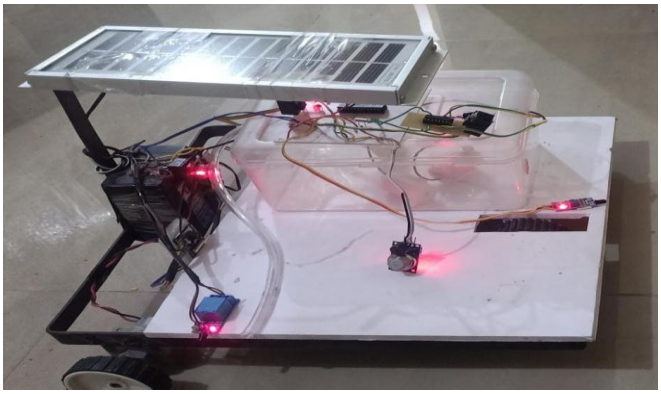

Fig 4: Model

5. RESULT

All the overview of the project, a Surveillance Fire fighting Robot has been successfully capable of detecting flames and extinguishes it and live streaming can be done using android application successfully. This robot move forward, move left & right by user instructions given through mobile application. The motors work together to control the movement of the robot. If any of the flame sensors or smoke sensor are triggered, then buzzer will start to buzz .The motor will start to rotate & move the robot to the danger point upon receiving a signal about the danger environment & start to pump the water with the help of motor. This process will be continued until the fire or smoke has been extinguished completely. Whole process is streamed live on mobile screen. Proper snapshots of the results were attached. Thus, a Surveillance fire fighting robot has been built to achieve the objectives of this project successfully.

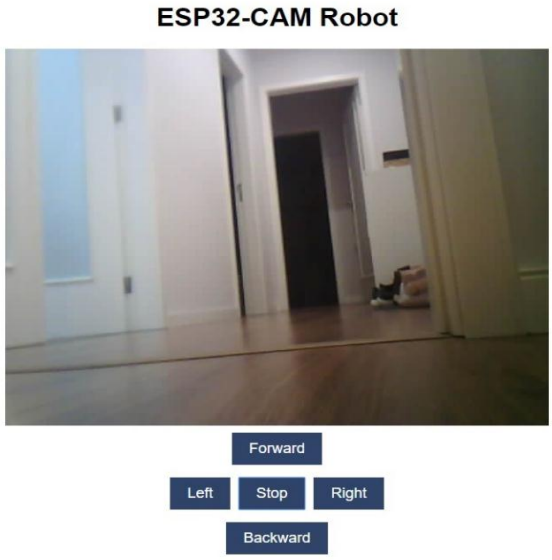

Fig 5: Result on mobile app

6. CONCLUSION

We have successfully implemented the working of the wireless video surveillance fire fighting robot controlled using android mobile device. The robot is successfully controlled using the android application through the wireless technology. Even the real time video feel is successfully achieved using the Wi-Fi technology on our designed android application. This Fire Fighting Robot is effective enough to fight against fire on a small scale. As a conclusion, the project entitled "Surveillance Fire Fighting Robot" has achieved its aim and objective successfully.

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