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MACHINE VISION BASED FIRE FLAME DETECTION USING MULTI FEATURES

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Abstract - *Fire detection has many advantages over traditional methods, such as fast response, non-contact. But most of current methods for fire detection have high rates of false alarms. In point of general fires, the flames usually display reddish colors. And as an important physical feature of fire, the flame turbulent has a chaotic nature with abundant size and shape variation. If we consider the flame is made up of lots of spots, as a result of the turbulent movement, the spots velocity vector will be different from each other. A novel fire flame detection method based on color and dynamic features is presented. The method is proposed as followed, first, candidate fire regions are determined by flame sensor and sends a signal to the Arduino controller which activates the motor driver circuit which pumps the water. In addition to fire detection ,Whenever there is an obstacle IR sensor senses it and the robot generates fire.*

Key Words: **Arduino controller, IR sensor, flame sensor**

1.INTRODUCTION

A robot is an automatic mechanical device often resembling a human or animal. Modern robots are usually an electro-mechanical machine guided by a computer program or electronic circuitry. Military robots are autonomous robots or remote-controlled devices designed for military applications. MIDARS, a four-wheeled robot outfitted with several cameras, radar, and possibly a firearm, that automatically performs random or pre-programmed patrols around a military base or other government installation. It alerts a human overseer when it detects movement in unauthorized areas, or other programmed conditions. The operator can then instruct the robot to ignore the event, or take over remote control to deal with an intruder, or to get better camera views of an emergency. The robot would also regularly scan radio frequency identification tags placed on stored inventory as it passed and report any missing items.

The applications involved in the robot surveillance, fire, shooting, Bluetooth app and stop the firing. Surveillance robot is to recognize and detect motion automatically around a robot's environment. The robot design has been partitioned into control, and planning subsystems. Robotic surveillance appliance is built on a moving platform designed for surveillance and security tasks. This robot can be operated in “remote eyes” or “automatic trip” modes.

2.Project Objective:

The project is designed to develop a fire fighting robot using Bluetooth technology for remote operation. The robotic vehicle is loaded with water tanker and a pump which is controlled over wireless communication to throw water. PIC microcontroller is used for the desired operation

3.Existing Technique:

Till now the firefighting robot has been used in times for the military applications and up to now the fire has been projected on to the target. These sensors will experience self-heating that causes the measurement result is always higher than actual temperature. It can detect up to 100 degrees only. It can be used for experimental purpose only.

4.Proposed Technique:

Apart from the existing technique, we are proposing an additional advantage by destructing the fire using IR sensor. Operating in real time, infrared detectors pick up movement making them useful in a variety of circumstances, including their use by many fire departments allowing fire fighters, to see through smoke. infrared detectors are commonly used in the construction of skyscrapers and large structures to detect leaks in pipes.

5.Working:

At the transmitting end using Mobile Phone, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc. At the receiving end three motors are interfaced to the microcontroller where two of them are used for the movement of the vehicle and the remaining one to position the arm of the robot. The Bluetooth Transceiver acts as a remote control that has the advantage of adequate range, while microcontroller to drive DC motors via motor driver IC for necessary work. A water tank along with water pump is mounted on the robot body and its operation is carried out from the microcontroller output through appropriate signal from the transmitting end. The whole operation is controlled by an PIC microcontroller. A motor driver IC is interfaced to the microcontroller through which the controller drives the motors.

With the development in the field of robotics, human intrusion has become less and robots are being widely used for safety purpose. In our day to day life fire accident has become common and sometimes lead to hazards that make it hard for the fireman to protect human life. In such cases the firefighting robot is used to guard human live's, wealth and surroundings from the fire accidents. This firefighting robot is a advanced project

6.NEED FOR THE FIRE FIGHTING ROBOT:

A firefighting robot is capable of detecting fire, if a house catches fire while someone in the house is either sleeping or not present in the house. by means of this robot, people and properties can be safe from the fire accidents. The main intention of this project is to design a fire fighting robot using Android application for remote operation. The firefighting robot has a water tanker to pump water and spray it on fire; it is controlled through wireless communication. For the desired operation, 8051 microcontrollers is used.

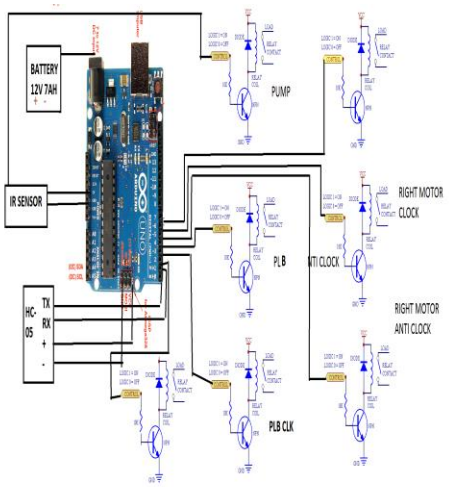

Fig. 6.1Circuit Diagram of Fire Fighting Robot

7.Specifications of Hardware:

Table -1:

HARDWARE			
Relay	0.5"	Bottom	0.5"
Transistor	0.5"	Right	0.5"
Microcontroller	Font	Cambria / 10 pt	
Bluetooth	Heading	13 Point	
Motors	Spacing	Single line spacing	

8.Components Used:

8.1 IR Sensor:

An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measure only infrared radiation, rather than emitting it that is called as a passive IR sensor.

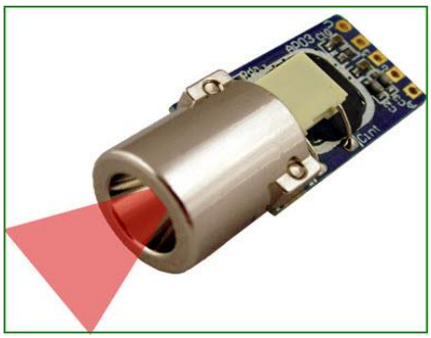

Fig. 8.1.1 IR Sensor

8.2 Relay:

A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contractor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays.

Fig. 8.2.1 IR Sensor

8.3 Bluetooth HC-05:

HC serial Bluetooth products consist of Bluetooth serial interface module and Bluetooth adapter.Bluetooth serial module is used for converting serial port to Bluetooth. These moduls have two modes: master and slaver device. The device named after even number is defined to be master or slaver when out of factory and can't be changed to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device by AT commands.

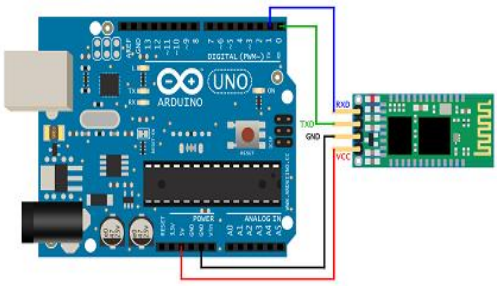

Fig. 8.3.1 Bluetooth Interfacing with Arduino

9.RESULT:

The fire fighting robot has obtained the desired results like ,turning of the robot in left right, front ,back, canon clockwise and canon anticlockwise, PLB clockwise and PLB anticlockwise with the help of the program that is dumped in the micro controller ATMEGA 328P. Now the application of the machine is seen that is generating the fire and also pumping of water. By changing the state of the Bluetooth we can control the output of the robot. when the Bluetooth state is 1,then it moves in the forward direction and when it changed to 2 it moves in the backward direction. If the Bluetooth state is 3 and 4,it moves right and left respectively. When the sensor detects the flames it operates the pump with the help of a microcontroller or the pump can be operated manually by changing the state of the Bluetooth to 5.The Bluetooth state 6 and 7 are used for the rotation of the canon in anticlockwise and clockwise directions respectively which is used to adjust the direction of generation of the flame. By changing the Bluetooth state to 8 and 9 PLB movement is controlled forward and backward respectively.PLB is used for releasing the flammable gas which is used to generate the flame.

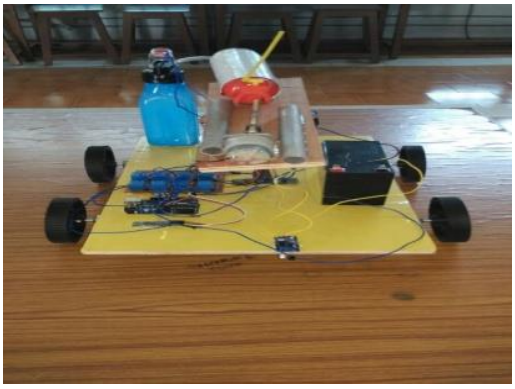

Fig.9.1 Forward and backward movement of robot

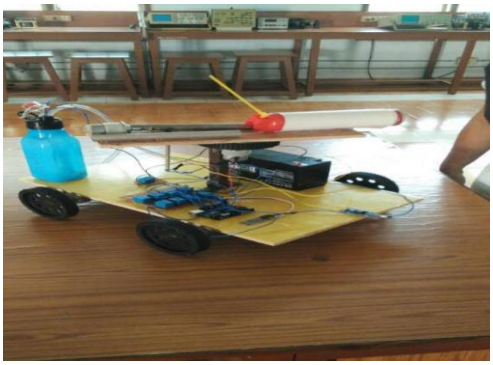

Fig.9.2 Canon clockwise and anticlockwise movement

10.CONCLUSION:

The Surveillances the most prominent role in the operation of the Multi Tasking Weapon Robot, as these Robot Work under Tough Conditions in Which the Process Should be Monitored Every Time in a desired Manner. Basically these Robots are unmanned, so the condition should be first monitored or visualized by the operator So that he could use a suitable application when and where it is necessary. So to control of any Robots like Multi-Tasking for flying Robots Surveillances Plays a Vital Role in operating the Robot or Viewing the task that Is been done by the Robot's.

11.FUTURE SCOPE:

The project has been motivated by the desire to design a system that can detect fires and take appropriate action, without any human intervention. The development of sensor networks and the maturity of robotics suggests that we can use mobile agents for tasks that involve perception of an external stimulus and reacting to the stimulus, even when the reaction involves a significant amount of mechanical actions. This provides us the opportunity to pass on to robots tasks that traditionally humans had to do but were inherently life- threatening.Fire-fighting is an obvious candidate for such automation. Given the number of lives lost regularly in fire- fighting, the system we envision is crying for adoption. Our experience suggests that designing a fire-fighting system with sensors and robots is within the reach of the current sensor network and mobile agent technologies. Furthermore, we believe that the techniques developed in this work will carry over to other areas involving sensing and reacting to stimulus, where we desire to replace the human with an automated mobile agent. Of course, this project has only scratched the surface. As in the design simplifications and the implementation constraints in suggest, our project is very much a proof-of-concept. In particular, a practical autonomous fire-fighting system must include a collection of robots, communicating and cooperating in the mission; furthermore, such a system requires facilities for going through obstacles in the presence of fire, and ability to receive instructions on-the-fly during an

operation. All such concerns were outside the scope of this project.

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