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FIRE FIGHTING WIRELESS CONTROLLED ROBOT

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ABSTRACT

Fire is an unavoidable disaster that occurs suddenly or intentionally in place or mostly in household residences. This phenomenon led to loss of properties, risk lives and causes a big destruction in a certain place. From this project I explain the implementation and designing of fire detecting robot. There are two dc motors used for motions. There are three sensors used Temperature for detecting the increase in fire, Smoke(gas) for detection of smoke and IR for detection of obstacle.

I.INTRODUCTION

This report illustrates the design and implementation of our team's fire fighting robot for the Industrial Systems Design and Integration paper. The robot must run automatically, avoiding obstacles and at the same time find and track two flames (candle light) and extinguish them. To achieve the best performance with an effective implementation, we have taken a modular design strategy, where the robot is divided into a number of logical modules based on functionality.

Our design consists of four main modules:

Mastercontroller

Motorcontrol

Proximitycontrol

Firedetection

Each module is associated with appropriate sensors and a microcontroller, which is then interfaced to the master controller.

In the next two chapters, the specification of the project is identified. Then, each module's design and implementation discussed in their own sections.

Objective:

The need for a device that can detect and extinguish a fire on its own is long past due. Many house fires originate when someone is either sleeping or not home. With the invention of such a device, people and property can be saved at a much higher rate with relatively minimal damage caused by the fire. Our task as electrical engineers was to design and build a prototype system that could autonomously detect and extinguish a fire. Also aims at minimizing air pollution. In this Project we design a Fuzzy based Microcontroller controlled Robot. It is the Robot that can move through a model structure, find a "burning oil derrick" (lit candle) and then extinguish

it with help of a Blower. This is meant to simulate the real world operation of a Robot performing a fire extinguishing function in an oilfield. Fuzzy logic provided an appropriate solution to the otherwise complex task of mathematically deriving an exact model for the non-linear control system upon which conventional control techniques could then be applied. The fuzzy inference system was designed to act as a PID-like controller. We are using the Popular 8 bit Microcontroller the 8051 family Microcontroller. Program code to control the fire fighting robot is written in assembly language.

II. Hardware Requirements:

Circuitry wise, the main board is the least complex. Because the main board's purpose was to take in messages from the sub modules, and output correct fan and motor control messages, all that was required hardware wise was the use of connecters, and parts required to make a Arduino function. List one show the parts used for the main board:

Machinedsockets

10MHzoscillator

ARDUINO

ProgrammerSocket

Worth noting here is the use of a 10MHz oscillator, this allows the main chip to operate on a much higher speed fundamentally compared to the sub modules. This means that at a hardware level, the main chip would be able to communicate with all sub modules simultaneously without becoming the bottleneck of the entire system.

Software Requirements:

A Cross compiler for compiling and linking the code written for AT89C51.

Serial communication software for downloading code to AT89C51.

Operating system: Windows

Problem description:

The goals of this project are listed below:

It must runautomatically

It must avoid any obstaclespresent

It must track and find flames (candle lights) and extinguish them without making direct contact

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Description of Block Diagram:

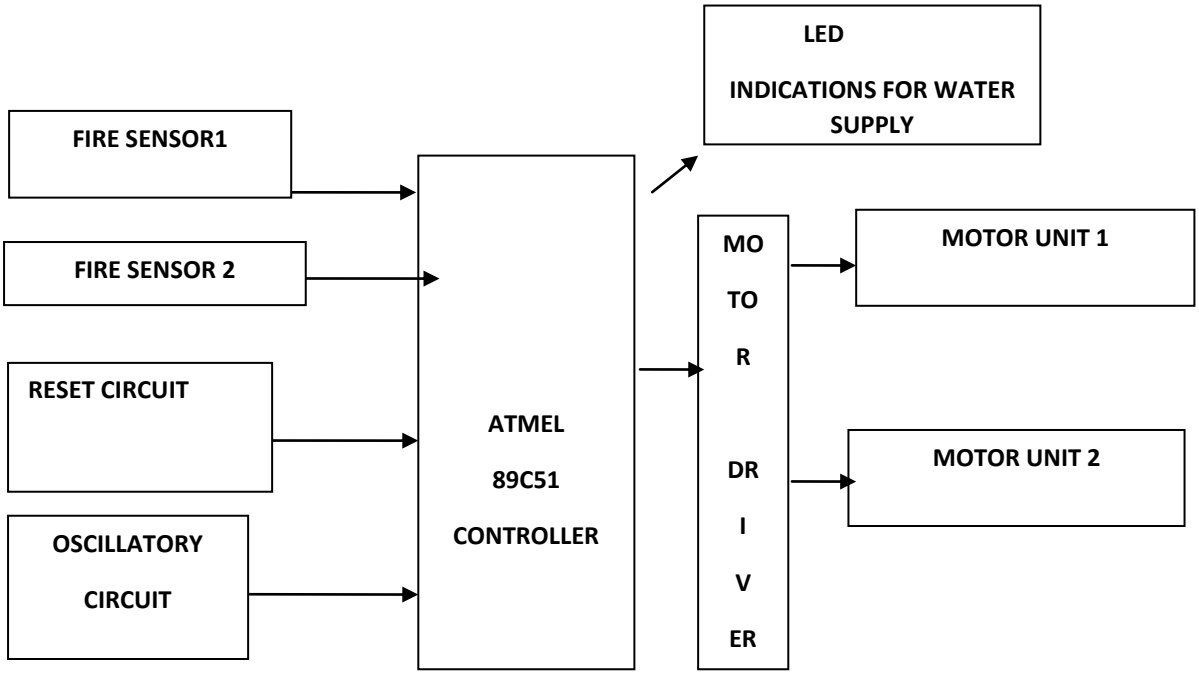

FIG:1 BLOCK DIAGRAM OF FIREFIGHTING ROBOT

Arduino:

Arduino interface boards provide the engineers, artists, designers, hobbyists and anyone who tinker with technology with a low-cost, easy-to-use technology to create their creative, interactive objects, useful projects etc., A whole new breed of projects can now be built that can be controlled from a computer.

FIG Arduino

Features of Arduino:

The **features of Arduino Uno ATmega328** includes the following.

- The operating voltage is 5V

- The recommended input voltage will range from 7v to 12V
- The input voltage ranges from 6v to 20V
- Digital input/output pins are 14
- Analog i/p pins are 6
- DC Current for each input/output pin is 40 mA
- DC Current for 3.3V Pin is 50 mA
- Flash Memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK Speed is 16 MHz

Application of Arduino:

The **applications of Arduino Uno** include the following.

- **Arduino Uno** is used in Do-it-Yourself projects prototyping.
- In developing projects based on code-based control
- Development of Automation System
- Designing of basic circuit designs.

III. CIRCUIT DESCRIPTION

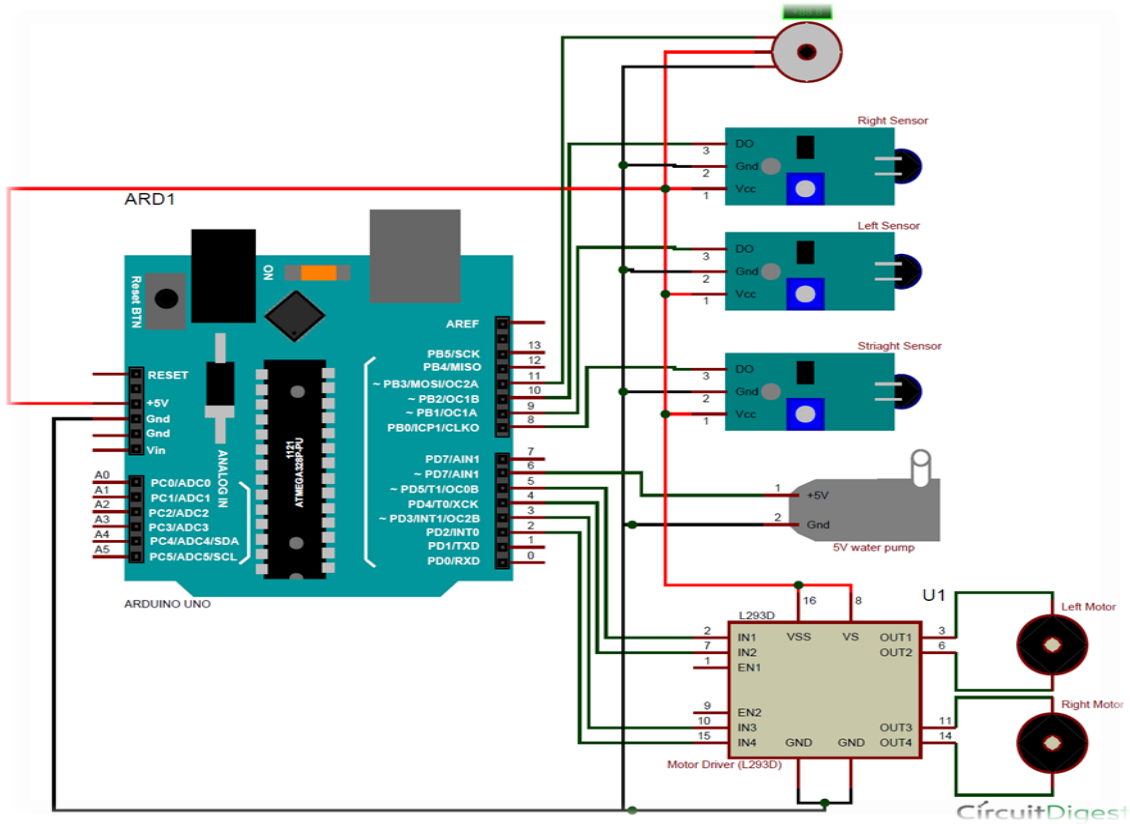

Fig: circuit diagram of fire fight robot

CIRCUIT DESCRIPTION:

L293D Dual H-Bridge Motor Driver

L293D is a dual H-Bridge motor driver, so with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if you have motor with fix direction of motion you can make use of all the four I/Os to connect up to four DC motors.
L293D has output current of 600mA and peak output current of 1.2A per channel. Moreover for protection of circuit from back EMF output diodes are included within the IC.

The output supply (VCC2) has a wide range from 4.5V to 36V, which has made L293D a best choice for DC motor driver.

IV.Result of firefighting robot:

Our chassis was designed to be a single layer circular sheet of aluminium with room to accommodate all of the necessary hardware on board. The elementsinclude:

- Four circuit boards plus powerboard
- Batteries (2 x 9V + 3 xAA)
- Gearboxes/Wheels
- ProximitySensors
- Fan +Motor
- Other accessories including relay and LED board fordebugging

A section of material was removed from either side of the chassis so that the wheels attached to the two Tamiya gearboxes were set inside the outer circumference. These gearboxes were then bolted to the chassis through pre-drilled holes. Rubber bands were applied to the Tamiya sports tyres attached, as we found the semi-slick treads – while looking the part – weren't providing enough grip on the slippery laboratorysurfaces.

Front and rear foam guide wheels were added to keep the robot balanced, while allowing slippage across the floor surface during turns. These also had greater aesthetic qualities than the ping-pong balls some of the other groups were using.

FIG: Fire flighting robot

V. CONCLUSION:

I develop this project named as "Fire Fighting Wireless Controlled Robot Using ARDUINO". This project presents a Fire Fighting robot using IR communication and it is designed and implemented with Atmel 329p or 8051 microcontroller (MCU). Experimental work has been carried out carefully. The result shows that higher efficiency is achieved. The proposed method is highly beneficial for the security purpose and industrial purpose. At future the robot will also capable of throwing water with controlled robotic arm and the object detection using cameras on it. It can be used as further extension of the project to achieve all the features.

Based on the findings above, the objectives of the project are successfully achieved. However, the firefighting robot has its own limitations.

1) How did the firefighting robot (F2R)developed?

The researchers developed the Firefighting Robot (F2R) by gathering all the material needed, through the planning and conceptualizing the robot. Then researcher developed the prototype, assembled and programmed it to its specific functions. The researcher done the experimentations through the trial

and error to measure its efficiency.

2) What is the efficiency level of the prototype F2R in detectingfire?

The efficiency of the fire sensor has an average mean of 0.19 mille seconds in detecting the fire without the presence of water in the mini pump, and 0.25 mille seconds average mean with the presence of water in the mini pump The mini pump

.relies on the detection of the fire sensor.

FUTURESCOPE:

Some expansions need to be done in the future work in order to be able to compete and win a good position in the fire fighting competition. Enhancements on the sensor used to detect the fire, that could be done by using certain type of infrared sensor that is not affected by camera lights because it gives tremendous results and it is able to detect the fire.

VI. ACKNOWLEDGEMENTS:

FIRE FIGHTING WIRELESS CONTROLLED ROBOTby the guidance of Dr. kamala Kumary, support extended by the team of Instrumentation laboratory, Andhra University. Sincere thanks to my fellow mates who collaborated in my achievement of the Project.

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