



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 Issue: III Month of publication: March 2017

DOI: <http://doi.org/10.22214/ijraset.2017.3200>

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Laptop Operated Fire Fighting Robot

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Abstract: detecting fire and extinguishing it is a harmful job that puts life of a fire fighter at hazard. There are many fire accidents which fire fighter had to lose their lives in the line of duty every year throughout the world. Robots are implemented in various areas like industries, manufacturing, medicines etc. Hence, robotics can be used to help fire fighters to perform this task of fire fighting and thus reduce the gamble of their lives. Fire fighter is a robot designed to use in such tremendous conditions. It can be operated as well as controlled by remote user from distant place and has the ability to extinguish fire after locating the source of fire. It is equipped with a monitoring system and operates through a wireless communication system. In this project we can see or observe the position of the robot from distant place by using wireless ip camera. The robot is controlled autonomously using the visual basic software. This concept helps to generate interest as well as embarkation in field of robotics while working towards a practical and obtainable solution to save lives and mitigate the risk of property damage.

Keywords: visual basic software, controller, rf module, wireless ip camera.

I. INTRODUCTION

The aim of our project is to develop a fire fighting robot using RF technology for remote operation. The robotic vehicle is loaded with water tanker and a pump which is controlled over wireless communication to throw water. AT89c51 microcontroller is used for the desired operation. At the transmitting end using PC, commands are sending to the receiver to control the movement of robot either to move forward, backward and left or right, etc. At the receiving end four motors are interfaced to the microcontroller for the movement of vehicle. The RF transmitter act as a RF remote control that has the advantage of adequate range (up to 200 meters) with proper antenna, while the receiver decodes before feeding it to the microcontroller to drive DC motors through motor driver IC for necessary work. A water tank 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 a AT89c51 microcontroller. A motor driver IC is interface to the microcontroller through which the controller drives the motors. These project is enhanced by interfacing it with a wireless camera so that the person controlling it and can view operation of the robot remotely on a screen.

II. LITERATURE REVIEW

A. *Swarnalata Bollavarapaul¹, Neil K. Samuel², Maneesh Shankar³, Nihaar Shah⁴- An Analytical Study of Various Methods used to Build an Autonomous Fire-Extinguishing Robot.*

Expanding human population and increasing industrialization, has led to a multifarious increase in the number fire accidents. The physical limitations of humans to deal with these kinds of destructive fires combined with the perverse conditions, makes fire extinguishing an hardworking task. The use of self-operating robots can reduce the errors and the limitations that are faced by human fire fighters. This paper is an effort to understand the various treat that are possible to build such a robot. We compare and contrast the various design and construction steps that are involved in the process of building a fire fighting robot.

B. *MdIftekharul Mobin¹, Md Abid-Ar-Rafi², MdNeamul Islam³, and MdRifat Hasan⁴ - An Intelligent Fire Detection and Mitigation System Safe from Fire (SFF)*

Safe from Fire (SFF) is an intelligent self-controlled smart fire extinguisher system made with multiple sensors, actuators and operated by micro-controller unit (MCU). It takes input signals from various sensors placed in various position of the observing area, and combines integrated fuzzy logic to identify fire breakout locations and severity. Data fusion algorithm facilitates the system to discard illusive fire situations such as: cigarette smoke, welding

Etc. During the fire risks SFF notified the fire service and others by text messages and telephone calls. Along with ringing fire alarm it declare the fire affected locations and severity. To prevent fire from smudging it breaks electric circuits of the affected area, releases the extinguishing gas pointing to the particular fire places.

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This paper presents how this system is built, components, and connection diagram and implementation logic. Overall performance is evaluated through experimental tests by creating real time fire hazard prototype view to investigate reliability. It is observed that SFF system demonstrated its efficiency most of the cases perfectly.

C. LakshayArora, Prof. AmolJoglekar- Cell Phone Controlled Robot with Fire Detection Sensors.

In this proposed Research Paper the mobile phone controls a robot by making a call to the mobile phone that would be built to the robot. At the starting period of the call activation period, if any button is pressed on the phone in hand, a tone corresponding to the button pressed is heard at the other end of the call that would be placed on the the robot. This tone is called dual-tone multiple-frequency (DTMF) tone. The robot perceives this DTMF tone with the help of the phone heap in the robot. The received code is processed by the microcontroller and then the robot performs actions accordingly.

D. Kuo L. Su, Ting L. Chien, Jr H. Guo - Design a minimum Cost Security Robot inure in Family

We design a low cost based security robot system to detect abnormal and dangerous situation and notify us. The traject interface may be Internet or GSM(Global System for Mobile). The structure of the security robot contains six parts. There are security system, avoid obstacle and driver system, software development system, auto recharging system, far supervise system and others. First, we structure a mobile robot using aluminum flame. Then, we develop a multisensor- based sensor system for the safety of robot, and we also present the remote mobile Security system(RMS)for the security robot system. Finally, we make some experimental scenario to supervise the security robot through the personal computer, and we can get bestl results for the low cost security robot.

E. William Dubel Hector Gongora Kevin Bechtold Daisy Diaz - An Autonomous Firefighting Robot

Firefighting is an important but dangerous trade. A firefighter must be able to get to a fire quickly and safely extinguish the fire, preventing further damage and reduce accidental death. Technology has finally overcome the gap between firefighting and machines allowing for a more efficient and effective method of firefighting. Robots designed to find a fire, before it fret out of control, could one day work with firefighters greatly reducing the risk of injury to victims. The *IEEE SOUTHEASTCON 2003* Hardware Competition tests the minds of college students all over the nation with the challenge of extinguishing a fire situated in a simulated house autonomously. To anyone unfamiliar with robotics, for a robot to be autonomous means the robot must operate on its own independent of any human mediation. The competition requires a robot to activate upon the sound of an audible tone (the fire alarm), locate and extinguish the fire. (The fire is simulated by an array of red LEDs hidden somewhere inside the house.) This paper describes such a robot, covering the components and logic required to successfully locate and extinguish the simulated fire.

III. BLOCK DIAGRAM

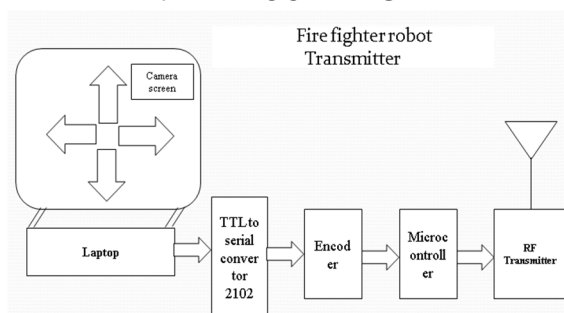


Fig no.1Block diagram of PC controlled RF transmitter

A. Basically this Fire Fighter consists of,

- 1) Wireless transmitter[using PC & RF transmitter]
- 2) Wireless receiver[RF receiver]
- 3) Microcontroller unit
- 4) DC motors & motor driver IC
- 5) Water pump for water splashing.

We will developed an VB based application on PC where we can create an GUI(graphic user interface) which will generate specific

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code if we press specific TAB in that application we will create following TABS or BUTTONS as forward, reverse, left, right, water pump on, water pump off.

The user/operator will press a particular tab from an visual basic based application on PC then this VB application will generate specific code from its serial port. This code is given to RF transmitter. This transmitter will transmit that code wirelessly up to 100mtrs.

Once RF receiver gets that code then this code is then given to microcontroller then as per code received and program written in controller it will give signals to motors to move robot forward, reverse, left, right or to stop, also it will turn ON or OFF the water pump.

Driver circuit is required because we cannot drive motors directly on microcontroller output. Hence by using motor driver circuit we operate motors in our system.

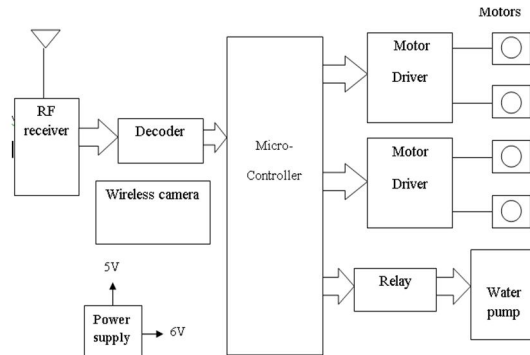


Fig no.2 Block diagram of Receiver

IV. FLOWCHART

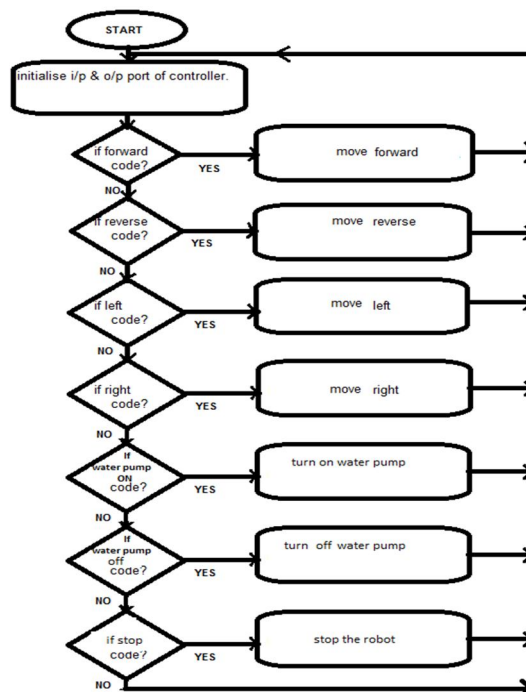


Fig no. 3 Working Flowchart

The working of “Laptop Operated Fire Fighting Robot ” is as follows:

Initially we have to start the VB’s GUI to operate the robot and also initialise I/O port of controller. As per the fire seen on laptop screen by using the wireless IP camera, we move the robot to that particular direction. If we found the fire in front of the robot then

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we send the code serially to robot via MAX232 then the robot will move in forward direction. once the robot reach at that place then again the code will send from the laptop to the controller of robot to turn ON the water pump to throw the water on fire. After extinguishing the fire code will send to controller to OFF the water pump.

There are the different code for the different direction such as backward, left, right.

V. VISUAL BASIC

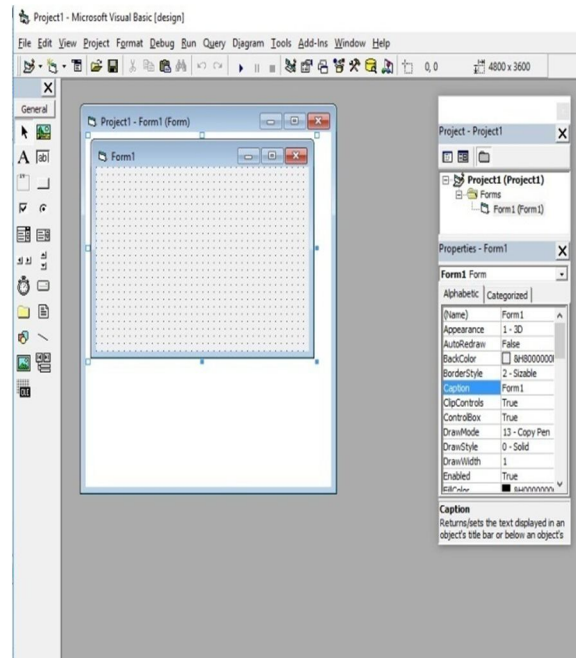


Fig no.4 VB6 Programming environment

VISUAL BASIC is a high level programming language that invent from the earlier DOS version called BASIC. BASIC means Beginners' All-purpose Symbolic Instruction Code. The code looks legion like English Language. Now, there are many versions of Visual Basic available in the market, the latest being Visual Basic 2015 that is bundled with other programming languages such as C#. However, the most popular one and still widely used by many VB programmers is no other than Visual Basic 6. .

VISUAL BASIC is a VISUAL Programming Language because programming is done in a graphical living. In VB6, you just need to drag and drop any graphical object anywhere on the form and click on the object to enter the code window and start programming.

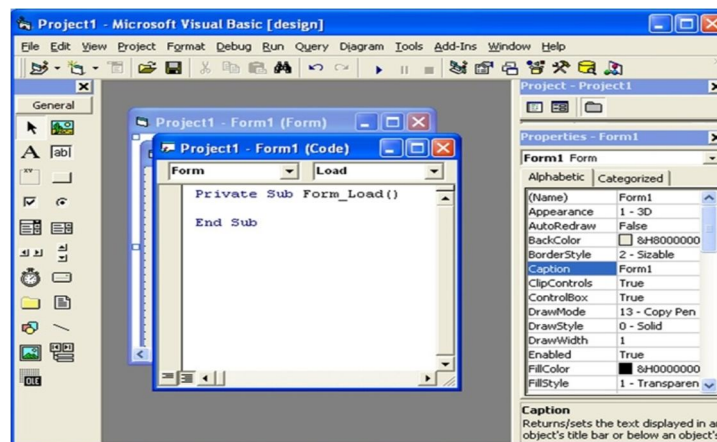


Fig no.5 source code window

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First of all, launch Microsoft Visual Basic 6 compiler that you have installed earlier. In the New Project Dialog, choose Standard EXE to enter Visual Basic 6 integrated development environment. In the VB6 IDE, a laxity form with the name Form1 will be presented to you. Now, double click on Form1 to bring up the source code window for Form1 as shown in Figure 2.1. The top of the source code window composed of a list of objects and their associated events or procedures. In the source code window, the object displayed is Form1 and the associated procedure is Load.

VI. OBJECTIVE

- A. Construction of PC operated intelligent fire extinguisher vehicle system.-We will developed an VB based application on PC where we can create an GUI(graphic user interface) by using this we can control the robot.
- B. which will generate specific code if we press specific TAB in that application we will create following TABS or BUTTONS as forward, reverse, left, right, water pump on, water pump off.
- C. Water Flow by using wireless RF technology.-By using the VB GUI we can control the water flow from the remote position.
- D. Design the low cost autonomous vehicle.-By using microcontrollers, DC motors, water pump and RF transmitter and receiver systems result in a low-cost vehicle that will extinguish the fire by throwing the water on fire.

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