

IMPLEMENTING OF RF CONTROLLED SURVEILLANCE SYSTEM BY USING LABVIEW

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Abstract— *The Spy robots are remotely inhibited vehicle, equipped by camera. Wireless Robot car is simple 2-Wheel robot, which is controlled using LABVIEW and PC's Parallel port with the help of LabVIEW Front Panel. In order to develop a code LABVIEW platform is used, it supports extensive interfacing to devices, Code Compiling, consists of large Libraries, performed Parallel Programming etc. Wireless communication established using 433 MHz RF-module. According to the key pressed in front panel, the signal is send wirelessly. The RF transmitter goes about as a RF remote control that has the benefit of satisfactory range (up to 200 meters) with legitimate antenna, while the recipient interprets before sustaining to drive DC motor by means of motor driver IC (L293D) for important work. CCD cameras are used to capture the information of robot surrounding. It can likely be utilized as a part of dim territory at night, the CCD camera is setup with LED that are linked by lighting circuit. The goal of spy robot is to search interesting stuff from where people are not able to reach. It can reach specific location through its wheel encoder and return to its home. It is a little robot intended for surveillance, observation and assessment purposes.*

IndexTerms — Arduino UNO, CCD Camera, LabVIEW, MakerHub LINX, RF module.

I. INTRODUCTION

It is typically an electro-mechanical gadget which is guided by PC, tablet, portable or electronic programming and furthermore ready to do tasks like surveillance operations. In this paper, only we control the robot by using the Front Panel of LABVIEW. This robot is not exactly massive one and intended to be simple transportation. Transmitting section consists of RF-transmitter, ARDUINO UNO and a LabVIEW platform. The transmitting gadget contains RF Transmitter and an Encoder. This transmitter part will transmit command to robot with the goal that it can do the required task like pushing ahead, backward, turning left, turning right and stop at the receiver part. The tasks will perform by utilizing four push keys that are put on the FRONT PANEL of LabVIEW. Remote controlled robots utilize RF circuits which have disadvantages of restricted working extent, frequency range and partial control. The venture is be upgraded by mounting a remote camera on the robot, so that the administrator can control the development remotely by watching it on a screen. CCD (Charge Coupled device) cameras are used to capture the information of robot surrounding. It can likewise be utilized as a part of dim region as night, the CCD camera setup with LED that linked by lighting circuit. The goal of spy robot is to search interesting stuff from where people are not able to reach. It can reach specific location through its wheel encoder and return to its home. Remote operated detective robot is a small robot designed for surveillance, inspection purposes, etc.

II. LITERATURE REVIEW

- [1] WIRELESS CONTROLLED ROBOT USING ARDUINO AND RF MODULE. In this they are explaining about the Arduino and RF module. And also they explained about the interface between them. From this paper we know about the hardware of both the module. Then it is implement by using LabVIEW.
- [2] CONTROLLER DESIGN FOR QUAD COPTER USING LabVIEW. In this paper they implement the control of the DC motor using LabVIEW and arduino. From this paper we are getting the knowledge of how to rig up the circuit and also how LabVIEW platform interfaced with Arduino.
- [3] IMPLEMENTATION AND DESIGN OF REMOTE OPERATED SPY ROBOT BY CONTROL SYSTEM. In this paper they are showing how to receive audio and video wirelessly to the remote area. We take some idea about installation of CCD camera in this paper.

III. OBJECTIVES AND MOTIVATIONS

Testing and Monitoring of Arduino UNO interface with LabVIEW by utilizing NI MAKERHUB LINX tool. Understanding the system correspondence of NI VISA tool. Built the ROBOT by utilizing peripherals and control them by using LabVIEW. Checking the ROBOT with various condition by utilizing RF module along with CCD Camera.

From the above writing overview we know how to interface with various equipment's and LabVIEW programming. So In this paper we are executing RF controlled robot with spy camera by utilizing LabVIEW programming.

IV. SYSTEM DESCRIPTION

The RF-controlled robot is controlled by utilizing four push keys at transmitter side on the LabVIEW programming. Here we just need to push the keys in FRONT PANEL to run the robot. The transmitting tool contains a RF Transmitter and Encoder. This transmitter part will transmit data to robot with the goal that it can do the required undertaking like forward, invert, turning left, right and stop at receiver end. According to the key pressed in front panel, the signal is send wirelessly and at the receiver end movement of the DC motor takes place. These tasks will be perform by utilizing four push keys that are put on the FRONT PANEL of LabVIEW.

A. Transmitter Section

Firstly, the program is dump to the Arduino UNO board through LabVIEW parallel port, then the microcontroller send data to the RF-encoder (HT12E). Encoder remove's noise from data and encrypt the data. Then RF-transmitter transmits the data through Telescopic antenna. As shown in Fig 4(a).

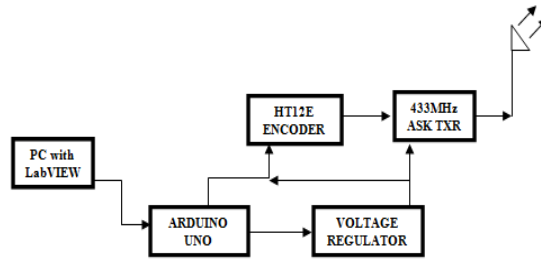


Fig4(a). Block diagram of Transmitter section.

Arduino UNO board

The Arduino UNO board contains microcontroller in view of ATmega328P. It has 14 advanced input or output pins, 6 analog channel, 16 MHz crystal oscillator, USB association, power jack, an ICSP header(IN CIRCUIT SERIAL PROGRAMMING) and a reset catch. The code write on the Arduino is executed by this controller. And it is directly connected to the I/O pins. The controller is programmed via the TX and RX pins connected to the USB to serial controller and contains bootloader code. It can also be programmed directly via the ICSP pins. The pinout is shown in the Fig.4(b).

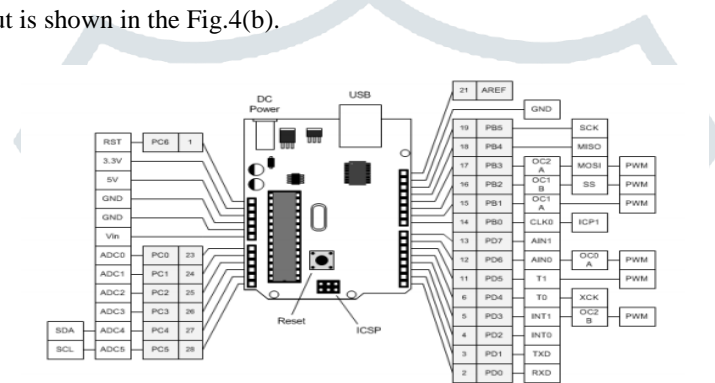


Fig.4(b) ARDUINO UNO

HT12E Encoder

HT12E is an encoder integrated circuit of 212 series of encoders. They are paired with 212 series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format. HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. The Pin configuration is shown in Fig.4(c).

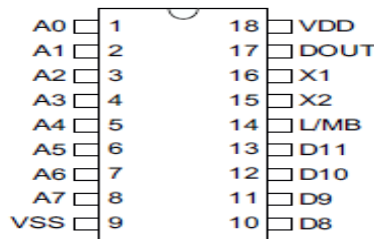


Fig.4(c) HT12E Encoder

RF-Transmitter

RF-transmitter, as name indicates works at Radio Frequency. The relating recurrence extend differs between 30 kHz and 300 GHz. The RF system, the advanced information is spoken to as varieties in the abundance of transporter wave. This class of adjustment is known as Amplitude Shift Keying (ASK). We are using 433 MHz ASK RF transmitters. The circuit diagram as shown in Fig.4 (d).

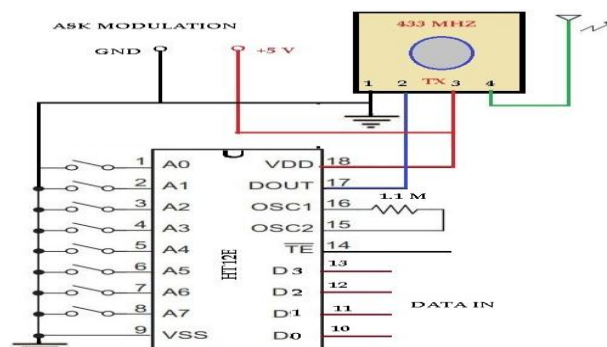


Fig.4 (d) RF Transmitter

Voltage Regulator

The Power supply is considered necessary for all of electronic equipment. If we have a 12V power supply and want to use it as a 5V power supply, then utilize this 12v to 5v dc-dc converter circuit to change 12 volt to 5 volt. It provides 5V, 1Amp at output. The circuit diagram of 12V to 5V converter as shown in Fig.4 (e).

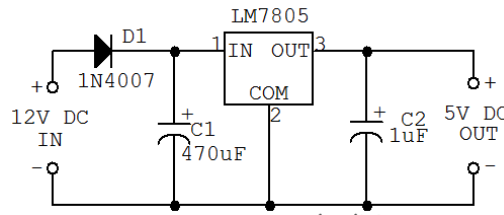


Fig.4(e) Circuit of voltage regulator

B. Receiver Section with CCD Camera

The receiver section consists of RF-receiver, 12v battery, 2 DC motor and motor driver circuit. The RF-receiver receives data which is transmitted, then decoded by using the RF-decoder (HT12D). It decodes the desired data without any loss. The data is then feed to the motor driver H-bridge circuit to distribute same voltage for motor to run. Also the CCD camera mounted to retrieved audio and video data to the remote area. As shown in Fig.4(f).

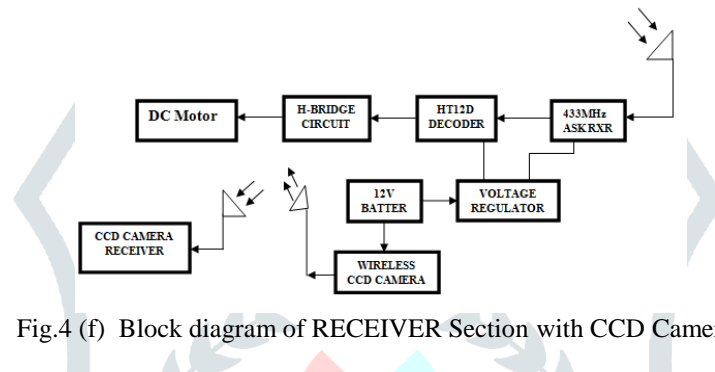


Fig.4 (f) Block diagram of RECEIVER Section with CCD Camera.

RF-Receiver

It is the receiver section, it has 8 pins. 2 is for VCC, 2 for GND, ANT pin and a DATA pin. The RF-receiver receives data and sends it to the decoder DIN pin. Then serial data is converted to parallel data by using decoder. The block diagram is shown in Fig.4 (g).

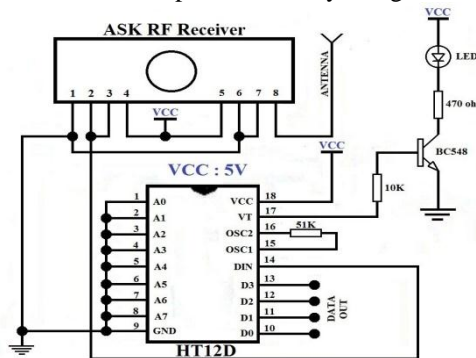


Fig.4(g) RF Receiver

Decoder HT12D

HT12D integrated circuit which belongs to 212 series decoders. HT12D converts the serial input from RF receiver into parallel outputs then feed to motor wheel to rotate. This decoder is mainly used in remote control system applications like burglar alarm, car door sensors, security purpose etc. It mainly provides interface for RF and infrared circuits. The pinout shown in Fig.4 (h).

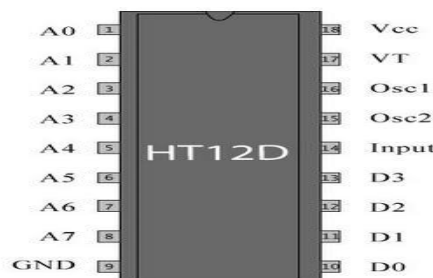


Fig.4 (h) HT12D Decoder

DC Motor

DC motor is a class of electrical operator that believes coordinate current, also electrical power into mechanical power. A straightforward DC motor has a stationary arrangement of magnets in the stator and an armature with at least one windings of protected wire

wrapped around a delicate iron center that focuses the attractive field. The commutator permits every armature curl to be empowered thusly and interfaces the pivoting loops with the outside power supply through brushes. The working is shown in Fig.4 (i).

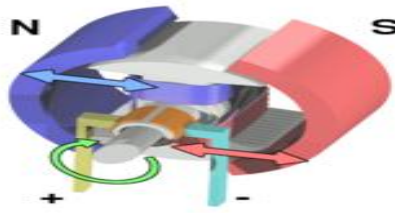


Fig.4 (i) DC Motor Working

L293D DC Motor Driver IC

L293D is a common Motor driver or Motor Driver IC which permits motor to drive on both clockwise and anticlockwise direction. It is a 16 pin IC which can control an arrangement of two DC engines at the same time toward any path. It takes a shot at the idea of H-bridge concept. H-bridge is a circuit which accepts the voltage to flow in both directions. The L293D is as shown in Fig.4 (j).

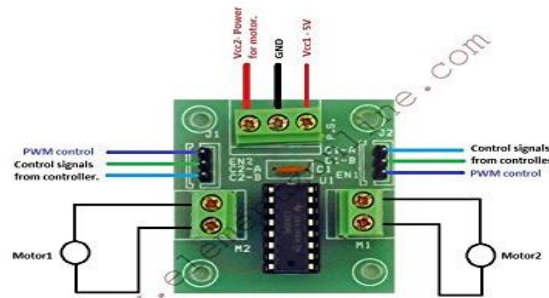


Fig.4 (j) L293D Driver

CCD CAMERA MODULE

The image sensor engaged by most of the digital cameras, it is a Charge Coupled Device (CCD). A few cameras use complementary metal oxide semiconductor (CMOS) technology. Together CCD and CMOS image sensor converts light into electrons. The CCD camera captures light and converts it into the digital information which is recorded by camera. For this reason, CCD camera is often considered the digital description of film.

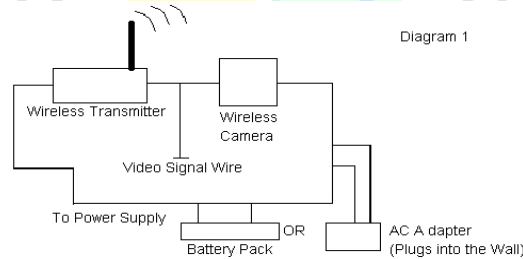


Fig.4(k) CCD Transmitter

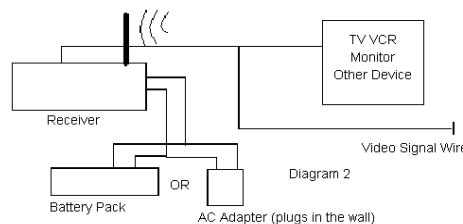


Fig.4(l) CCD Receiver

Charge Coupled Devices (CCDs) gives a extensive application in almost all digital image-acquisition systems. The wireless camera has both audio and video system. The range of transmitter is 100ft around the robot. The resolution for PAL is 628*582 and NTSC is 510*492. Camera apparatus of 1/3, 1/4 picture sensor. Minimum illumination of 3LUX. It also has +18db of sensitivity. Power for CCD camera is by +9V DC from battery. The power consumption <=400mW. No USB port in this camera so for saving process of the video needs capture card. The CCD transmitter block diagram is as shown in Fig.4(k). The receiver part consists of RF receiver TV/PC interface to display video. It has the specification of high receive sensitivity of +18dB, operating voltage of DC +9V, maximum current is 500mA. In receiver we using TV tuner to stream the video. The CCD receiver block diagram shown in Fig.4(l).

V. SOFTWARE

LabVIEW

LabVIEW remains as Laboratory Virtual Instrumentation Engineering Workbench. Its begun in 1983 by an organization National Instruments. which broadly remains as NI. OIt is a graphical platform intended for specialists and researcher. Lab view is predominantly designed for complex issues. It is a graphical programming language used to make programs called VI, which are in a pictorial frame called

a Block Diagram. Lab VIEW is accessible for all the real stages and is effectively convenient to all stages. It is simple and adaptable, since it is a graphical approach no need of composing projects of 100 lines like other program languages. Every VI has two windows- Front Panel and Block Diagram. Front Panel is user interface which has controls and indicators. Block Diagram is program code which demonstrates information goes on wires from controls through functions to indicators. The significant disadvantage for LabVIEW is its cost. In this way directly LabVIEW application are limited to just high scale applications in modern levels but to move on the robotic level. The benefit of LabVIEW in robotization makes it less demanding to configuration, as well as expands the exactness and speed of the system.

LINX

It is an open source extends by careful and intended to make it simple to create installed applications utilizing LabVIEW. LINX incorporates VIs for more than 30 of the most well-known embedded sensors and also equipped with hardware APIs for getting to peripherals like PWM, SPI, digitalI/O, analogI/O, I2C and UART.



Fig.5 (a) LINX open

Inputs

SerialPort Specifies the COM port of the remote LINX device. Baudrate override when specified, allows the user to override the default baud rate used for serial communication. By default LINX establishes communication using a baud rate of 9600 and then negotiates for the remote LINX device's maximum supported baudrate and re-establishes communication at that maximum rate. If a Baud Rate Override input is provided it will be maximum baud rate used. This is useful when using UART abstractions that are not able to change baudrates on fly.

Outputs

LINX Resource: Contains LINX connection resources.

Device Name: The name of the remote LINX device.

Error Out: It contains information of errors.

Digital write channel

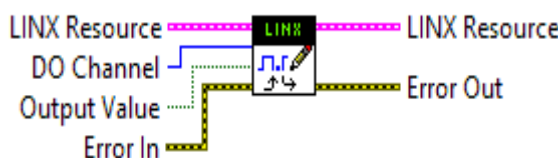


Fig.5(b) LINX digital write.

Inputs

- **LINX Resource**
- Contains LINX connection resources.
- **DO Channel** Specifies the digital output channel to write to.
- **Output Value** Specifies the digital value to write.
- **Error In** : The input give standard errorin function.

NI-VISA Overview

NI accomplishment the Virtual Instrument Software Architecture API, generally referred as NI-VISA. We use NI-VISA to communicate with most instrumentation buses like GPIB, Serial, USB and Ethernet. It gives a reliable and easy to use command set to communicate with multiplicity of instruments. VISA's advantage is that it uses numerous of the same operations to communicate with instruments regardless of the interface type. VISA is also designed as programs written using VISA function calls are very easily portable from one platform to other. VISA's main advantage is that it is an extremely easy language to learn.

A Typical VISA Application

- Start the Session by given Resource.
- Do any configuration on the given resource (setting baud rates, termination character, etc...).
- Carry out writes and reads data to device.
- Close of the assembly by Resource.
- Handle all errors that have occurred.

VI. ALGORITHM AND FLOWCHART

RF controlled robot using LabVIEW move according to key pressed in front panel. LabVIEW is the main tool we used in this paper, the FRONT END and BLOCK DIAGRAM are shown in the Fig.6(a) and Fig.6(b). This is the Graphical program language which is used in this paper.

In the front end the control keys are used, as forward, backward, left, right and stop to move in all direction.

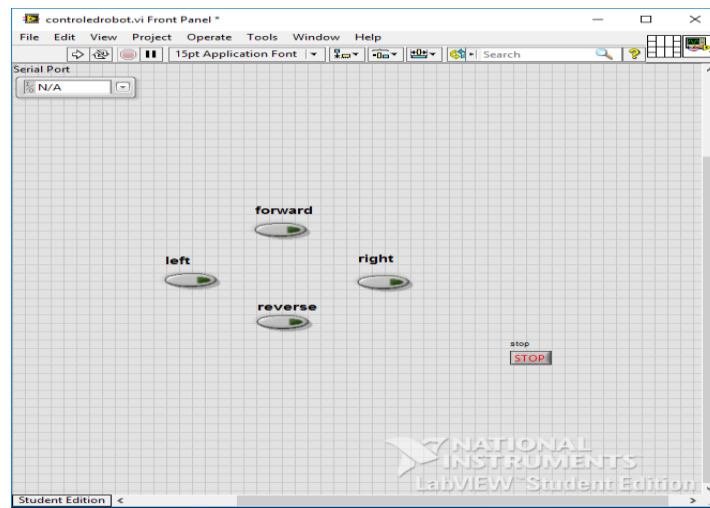


Fig.6(a) Front end of controlled robot

Block diagram is the internal structure of the front end. This is used to develop end to end connection. The controls and indicators are connected as per the programming to reach desired location.

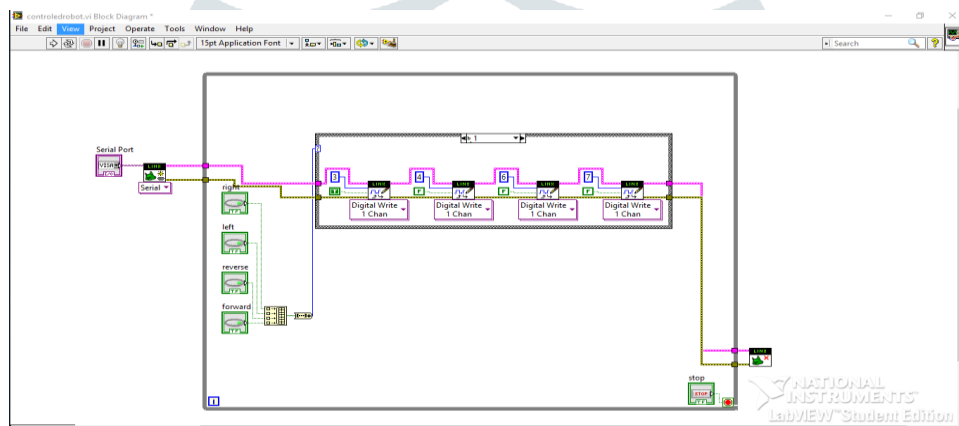


Fig.6(b) Block Diagram of controlled robot

When we pressed the LEFT key in the front panel, then the right motor rotates clockwise direction and left motor is in OFF condition. So that robot turn LEFT.

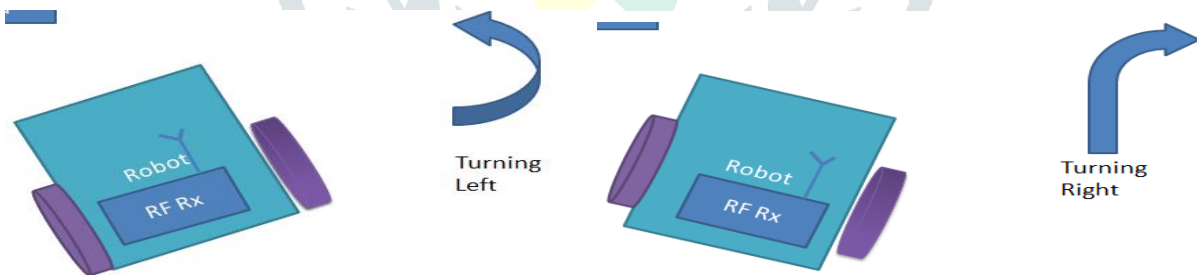


Fig.6 (c) shows LEFT and RIGHT turning of robot

When we pressed the RIGHT key in the front panel, then left motor rotates in clockwise direction and right motor is in OFF condition. So that robot turns RIGHT. As shown in Fig.6 (c).

The FORWARD movement takes place, when both the motor rotates in clockwise direction and anticlockwise direction to move BACKWARD. As shown in Fig.6 (d).

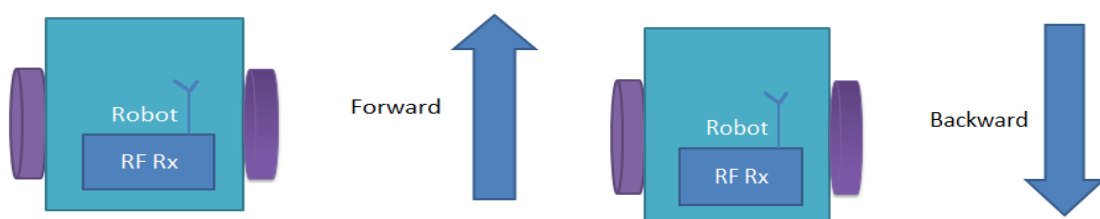


Fig.6 (d) shows FORWARD and BACKWARD movement

When more than one key pressed in the Front panel or no key pressed, the robot is in the STOP condition. As in Fig.6(e).

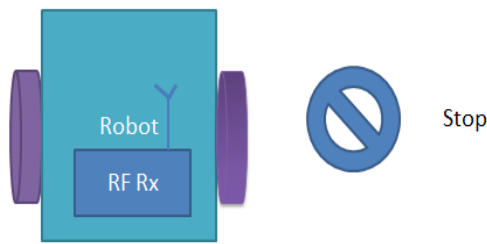


Fig.6(e) shows STOP of the robot

Flowchart

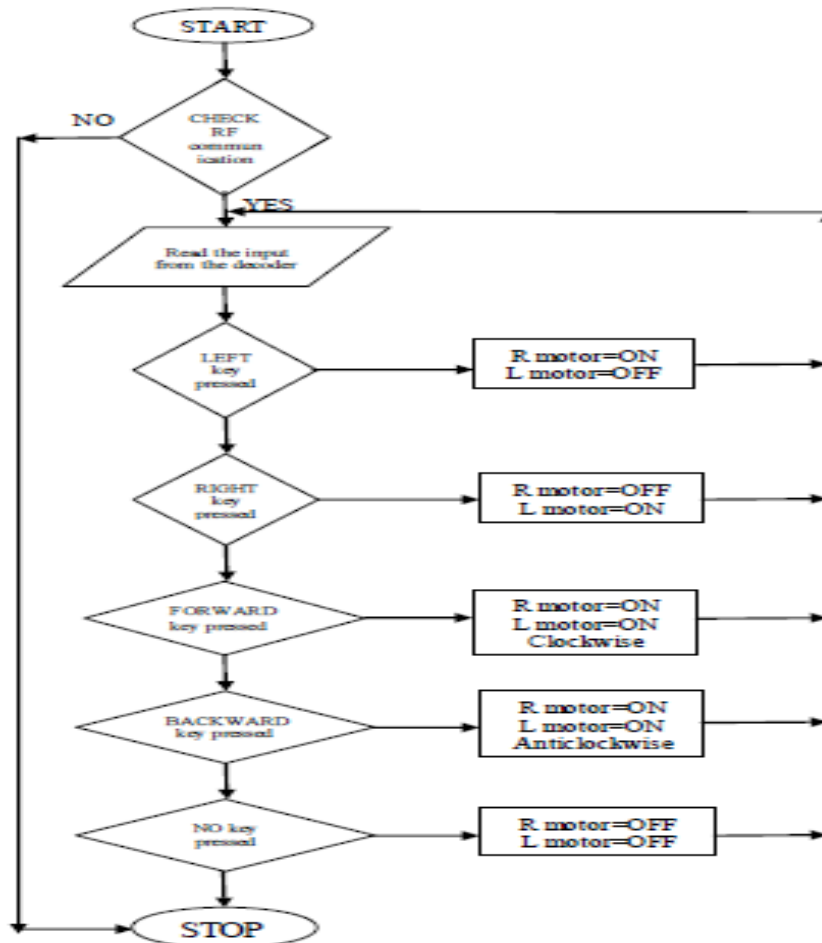


Fig.6(f) Operational flow chart

VII. RESULT

The system controlling is done by using LabVIEW software. behind the generation of VI, The program has successful dumped to Arduino by using MAKERHUB firmware. This control can be used to distantly enter and exit places. The front end is used as the main controller in this system. RF transmitter sends data then RF receiver get data and execute as per the command and operate the DC motor from the L293D motor driver circuit.

Night vision of the robot surrounding is obtained by using lightning circuit. LED is mounted on the robot for dark area as shown in Fig.7(a).

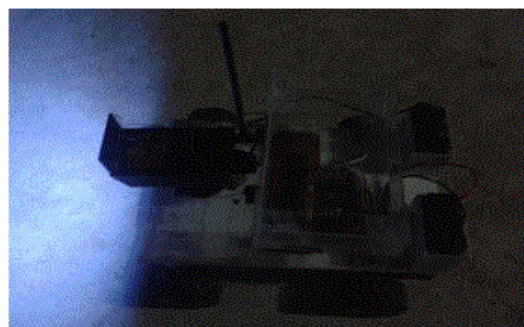


Fig.7 (a) Night vision at dark region

The CCD camera will mounted on the Robot. Commands are sent to the receiver to command the robot to move in all direction. In receiving end two motors are interfaced RF data lines through motor driver, here they are used for the movement of the vehicle. The robot with CCD camera is as shown in the Fig.7(b).

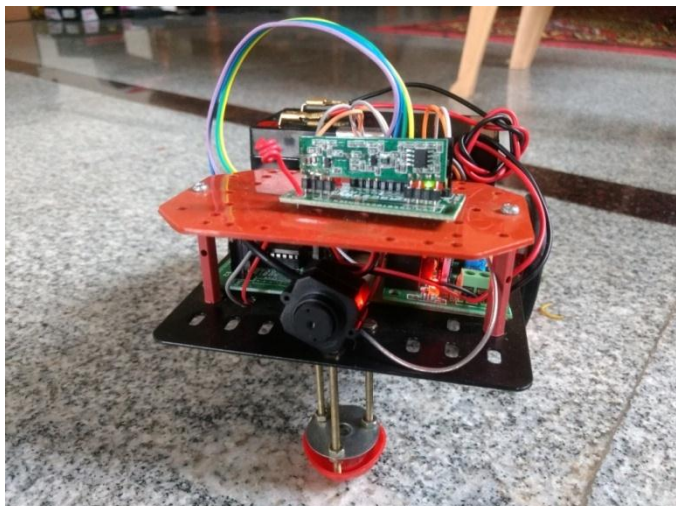


Fig.7(b) The robot with CCD camera



Fig.7(c) Captured video with laptop

The receiver part of the CCD camera is connected with the laptop for stream the video. This is shown in the Fig.7 (c).

The blend of multiple sensors on a single robot is the highlighted feature which makes it efficient and very cost effective. The project serves as a basic prototype for several other applications. Arduino is a hardware with high versatile and easy platform for this project.

VIII. CONCLUSION

This kind of robot can perform difficult and redundant works for humans. It can have an exceptionally hazardous employment and such unsafe jobs should be possible by utilizing little spy robot. Be that as it may, it is helpful to look at and look the spots where hazardous toxic substance gasses have. Spy robot can likewise be utilized as a part of looking individuals who are in building destroyed by the earthquake. Due to the remote camera is introduced in spy robots, it can be utilized remotely to enter and exit unsafe place that human can't. At the point when the robot controls by remote controller, the spy robot will move to craved goal and spy pictures around the robot. Helping LED is mounted on Spy robot, it can be used for rescue operations. The robot is not exactly enormous one and intended to be simple in transportation. For the entire framework, the required power is provided by batteries which associated with the voltage controller.

IX. APPLICATIONS

1. It can be used in military operation. i.e. sent ahead of infantry to investigate potential ambushes.
2. It can also used for Traffic monitoring system.
3. Can be used in Wheel Chair.
4. Machine monitoring and control :LabVIEW Real-Time module helps in preparing powerful machine monitoring and control applications
5. Research and Analysis: Scientist and Researchers use it for biomedical, aerospace industries etc.
6. Control Design: Real world data can be compared with theoretical data.

X. FUTURE SCOPE

This venture can be additionally stretched out to detect different sorts of sensor information, for example humidity, light intensity, air quality and so forth. Various sensors can be interfaced to an Arduino board keeping in mind the end goal to give straight forwardness to a robot to performing particular task. Future work could incorporate a totally upgraded power management system to actuate multiple sensors without adversely impacting the operation.

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