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Unmanned Warfare Vehicle

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ABSTRACT: The vehicle that is equipped with wireless video monitoring system can be controlled through RF based remote controlled technology based on the concept of video analyzing. The wireless video camera & a toy gun arranged over the vehicle are designed to rotate freely for hunting the enemies by capturing the live video of surrounding area and it is also controlled through the same remote. The system designed here can be used for many applications; it can be used as a hunting robot at boarders to destroy the enemies crossing the border; as warfare vehicle in war fields; to guard the highly secured zones.

The system designed as unmanned vehicle is equipped with wireless video camera & toy gun are controlled through remote. With the help of a wireless video analyzing system, the operator can chase the rivals from a secured place. The vehicle can be controlled in all directions; similarly the gun & video camera can be positioned towards the target through same remote. The gun moving mechanism can be positioned towards enemy direction. When the system is utilized at boarders, the system can be controlled from the bunker through remote designed with RF modules. The video camera arranged over the vehicle chassis, moves along with the Gun. The gun is positioned based on the live video monitored through a TV set. The wireless video monitoring system contains separate communication channel, which forms a link between video camera & video receiver. In this concept the operator is safe because he is in bunker. The microcontroller used in this project is programmed to control the motors independently. Three DC motors with reduction gear mechanism are used to drive the complete mechanical transmission section depending up on the control signals generated & transmitted from the remote. The vehicle moves in all directions and camera is also controlled independently.

I. INTRODUCTION

Unmanned warfare is a relatively new approach in the conduct of warfare, where the boundaries are not well charted and limited largely by our imaginations. Unmanned warfare will not only help overcome manpower and resource constraints but will also enhance operational capabilities, since it can now move into areas where mankind has previously feared to tread. With unmanned warfare, the competitive advantage can be swung such that human numerical superiority is no longer an overwhelming advantage or a pre-requisite for victory.

1.1 Aim of the project

The purpose of this project is to know about the enemies, where they are and what they are talking and without intimating about us, we can shoot the enemies by using the weapons, which are already attached to the vehicle

1.2 Methodology

Basic working of "unmanned warfare vehicle" depends on 4 major parts. They are 2 microcontrollers, RF transmitter & receiver and the wireless video camera. The wireless video camera and weapon arranged over the vehicle are designed to rotate freely for hunting the enemies by capturing the live video of surrounding area

1.3 Need for unmanned

The impetus to go unmanned include optimizing the deployment of manpower, enhancing operational capabilities and being able to venture into territory once out-of-bounds to mankind (e.g. deep ocean, space, etc). In particular, unmanned systems should be used to replace humans where the work is dangerous, dirty or dull.

1.4 Types of unmanned vehicles

Unmanned Ground Vehicles (UGV) are robotic platforms that are used as an extension of human capability. This type of robot is generally capable of operating outdoors and over a wide variety of terrain, functioning in place of humans.

UGVs have counterparts in aerial warfare (unmanned aerial vehicle) and naval warfare

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(remotely operated underwater vehicles). Unmanned robotics is actively being developed for both civilian and military use to perform dull, dirty, and dangerous activities.

There are two general classes of unmanned ground vehicles:

- Tele-operated ones and
- Autonomous ones.

An unmanned ground combat vehicle (UGCV) is an autonomous, all terrain unmanned ground vehicle designed for combat.

Tele-operated UGV

A Tele-operated UGV is a vehicle that is controlled by a human operator at a remote location via a communications link. All cognitive processes are provided by the operator based upon sensory feedback from either line-of-sight visual observation or remote sensory input such as video cameras. A basic example of the principles of tele-operation would be a toy remote control car. Each of the vehicles is unmanned and controlled at a distance via a wired or wireless connection while the user provides all control based upon observed performance of the vehicle.

Autonomous UGV

An autonomous UGV is essentially an autonomous robot but is specifically a vehicle that operates on the surface of the ground.

A fully autonomous robot in the real world has the ability to: Gain information about the environment ; Work for extended durations without human intervention; Travel from point A to point B, without human navigation assistance; Avoid situations that are harmful to people, property or itself, unless those are part of its design specifications; Repair itself without outside assistance; Detect objects of interest such as people and vehicles.

A robot may also be able to learn autonomously. Autonomous learning includes the ability to: Learn or gain new capabilities without outside assistance; Adjust strategies based on the surroundings; Adapt to surroundings without outside assistance. Autonomous robots still require regular maintenance, as with all machines.

II. BLOCK DIAGRAM

2.1 Block Diagram of Vehicle Control Station

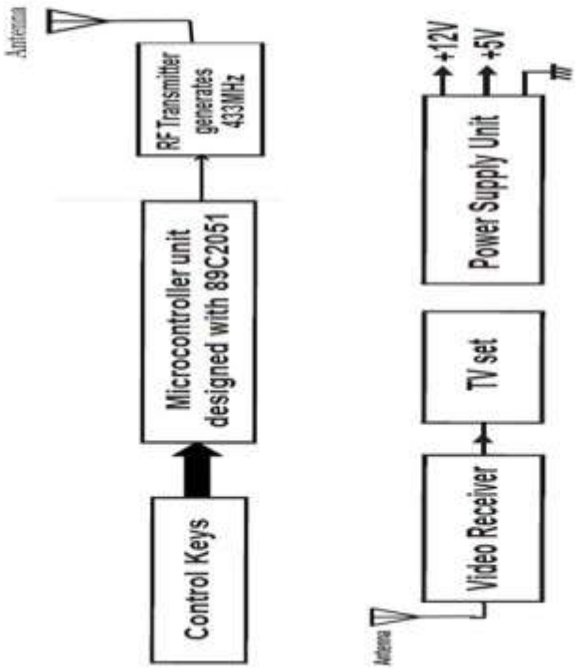

Fig.2.1 Block Diagram of Vehicle Control Station

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2.2 Block Diagram of Warfare Vehicle

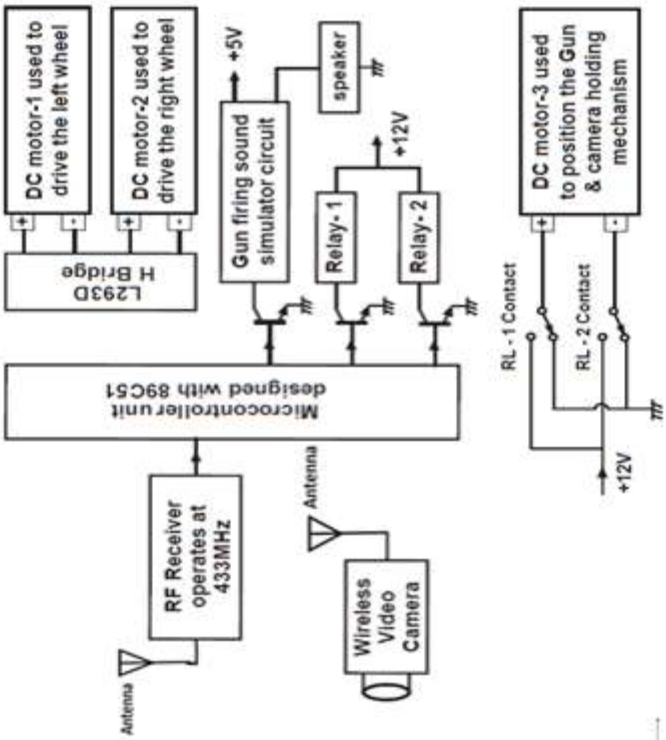

Fig.2.2 Block Diagram of Warfare Vehicle

III. HARDWARE SCHEMATIC

3.1 Hardware Schematic of Vehicle Control Station

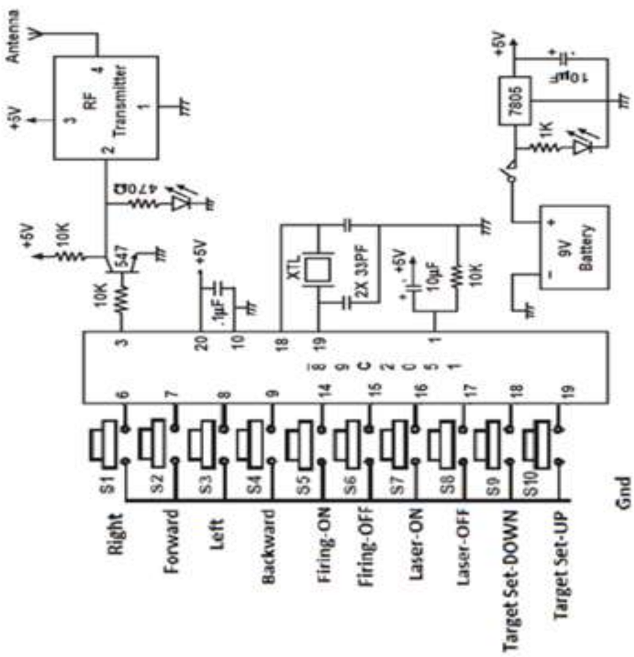

Fig.3.1 Hardware Schematic of Vehicle Control Station

3.2 Hardware Schematic of Warfare Vehicle

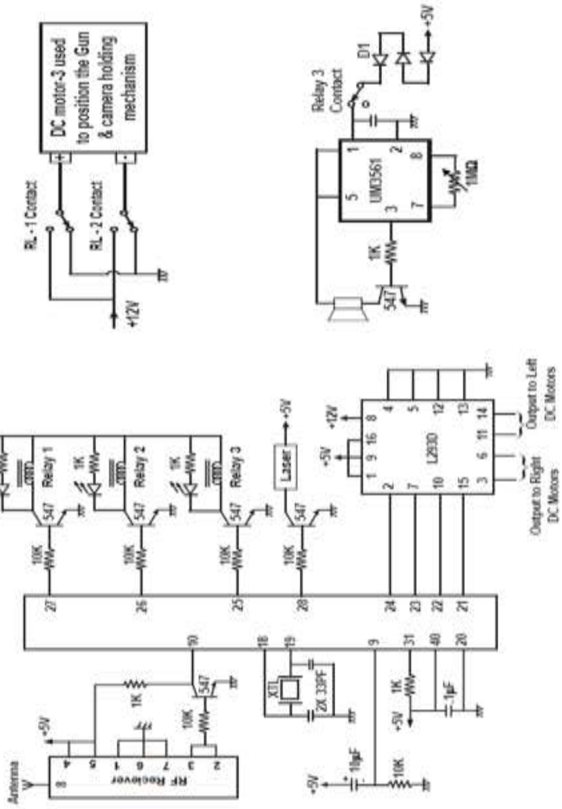

Fig.3.2 Hardware Schematic of Warfare Vehicle

Hardware Schematic of Warfare Vehicle (Cont...)

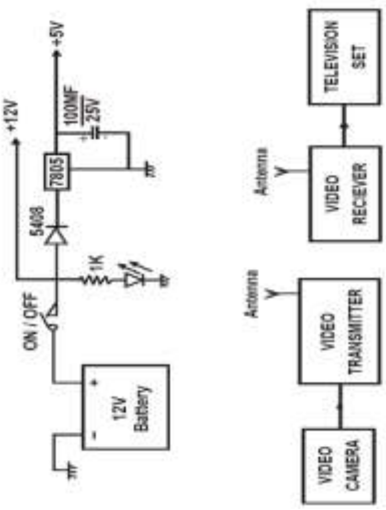

Fig.3.3 Hardware Schematic of Warfare Vehicle

3.3 Description of Hardware Schematic

The vehicle control station is designed with ten control keys, micro-controller and the RF transmitter and battery to provide power supply to all these components. Out of these ten keys four keys are used to control the warfare vehicle's direction i.e., to operate the in forward, backward, right and left directions. Two keys are to switch

ON and switch OFF the gun sound simulation IC that simulates that the bullets are fired from the gun. Two keys are to adjust the gun direction upwards and downwards. And two more keys are to switch ON and switch OFF the laser light through which the point of firing will be known.

Depending on the key pressed, the controller generates a unique code which is fed to the RF transmitter for modulation, here the modulation technique used in RF transmitter is Frequency Shift Keying (FSK).Then the modulated signal is fed to the Antenna, here the antenna converts the RF modulated signal in to EM Signal and radiate it in to the free space.

The receiving antenna intercepts the EM signals, which is transmitted and convert it in to RF modulated signal and fed it to the demodulator. The demodulator demodulates the modulated signal and produces the binary data in output. This binary data is given to RXD pin of micro controller (89c51).here the micro controller is programmed in such a way that, which always monitors the data in SBUF register, suppose if the data matches to the predefined data. It activates the corresponding output pins. Then corresponding operation is performed by vehicle.

IV. HARDWARE COMPONENTS

4.1 Control Keys

Here, the control keys are nothing but the 12mm push button switches. In our project this control keys is used to control the operations on warfare vehicle. This is a standard 12mm square momentary button. What we really like is the large button head and good tactile feel (it 'clicks' really well). This button is great for user input on a PCB or a good big reset button on a breadboard.

4.2 MICROCONTROLLER (89C2051)

The AT89C2051 is a low-voltage, high-performance CMOS 8-bit microcomputer with 2K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel’s high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C2051 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.

The AT89C2051 provides the following standard features: 2K bytes of Flash, 128 bytes of RAM, 15 I/O lines, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, a precision analog comparator, on-chip oscillator and clock circuitry. In addition, the AT89C2051 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The power-down mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

4.3 CRYSTAL OSCILLATOR

A crystal oscillator is an electronic circuit that uses the mechanical resonance of a vibrating crystal of piezoelectric material to create an electrical signal with a very precise frequency. This frequency is commonly used to keep track of time (as in quartz wristwatches), to provide a stable clock signal for digital integrated circuits, and to stabilize frequencies for radio transmitters and receivers. The most common type of piezoelectric resonator used is the quartz crystal, so oscillator circuits designed around them were called "crystal oscillators".

Quartz crystals are manufactured for frequencies from a few tens of kilohertz to tens of megahertz. More than two billion (2×109) crystals are manufactured annually. Most are small devices for consumer devices such as wristwatches, clocks, radios, computers, and cell phones. Quartz crystals are also found inside test and measurement equipment, such as counters, signal generators, and oscilloscopes.

4.4 RF TRANSMITTER

A direct conversion transmitter system to produce a transmission signal is generally comprised of a low oscillator (LO), a phase locked loop (PLL), a quadarature generator, a modulator, a power amplifier (PA), and one or more filters. The low oscillator, coupled to the PLL, produces a signal with a frequency that is substantially equal to the frequency of a desired RF transmission signal. The quadarature generator is coupled to the low oscillator and the modulator.

The PA is coupled to the quadarature generator, and receives the transmission signal and amplifies it. The amplified signal may go through a filter to reduce noise or spurious outputs outside of the transmission band. High quality RF transmitters typically include band pass filters; such as surface acoustic wave (SAW) filters provide excellent performance.

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A typical system may employ a band pass filter following the power amplifier to reduce undesired noise present at the antenna in different portion of RF spectrum to meet various standards regulations and specifications.

4.5 RF RECEIVER:

Receivers for communication systems generally are designed such that they are tuned to receive one of a multiplicity of signals having widely varying bandwidths and which may fall within a particular frequency range.

The RF receiver receives an RF signal, converts the RF signal to an IF signal, and then converts the IF signal to a base band signal, which it then provides to the base band processor. As is also known, RF transceivers typically include sensitive components susceptible to noise and interference with one another and with external sources.

The RF receiver is coupled to the antenna and includes a low noise amplifier, one or more intermediate frequency stages, a filtering stage, and a data recovery stage. The low noise amplifier receives an inbound RF signal via the antenna and amplifies it.

There is one or more intermediate frequency stages to mix the amplified RF signal with one or more local oscillations to convert the amplified RF signal into a base band signal or an intermediate frequency (IF) signal.

4.6 WIRELESS VIDEO CAMERA WITH TRANSMITTER

The output of the video camera is fed to the transmitter, here a low power compact transmitter is used and it is arranged inside a small camera for transmitting the video signals in amplitude modulation. The video signal coming out of video camera is nothing but pure composite video signal and this signal is fed to this AM transmitter. Normally in TV Transmission, the picture signal is Amplitude modulated and Sound Signal is Frequency Modulated.

This is the general description of the video & audio transmitter supposed to be constructed externally, and the output of the video camera should be fed to this three stage transmitter. But here this circuit is not constructed, because the camera which is available in the market is built in with the transmitter, inside the camera is not studied. Since it is a miniature type board camera, when the camera is opened it may spoil.

4.7 TV BROADCASTING SYSTEM

Generally TV broadcasting is known as 'telecasting', it is similar to sound broadcasting or radio broadcasting. In radio broadcasting sound waves are converted in to electrical signals by a microphone and these signals are transmitted through space as modulated radio carrier waves. On reception at distant end, the electrical signals are separated from the carrier waves by an ordinary receiver and converted in to audible sound waves by loud speaker. In television, light signals from the object are converted in to electrical signals by a video camera and transmitted through radio carrier waves. The television receiver separates the television signals from carrier waves and converts them in to light signals which form a picture of the televised object on the screen of the picture tube. However, in the television system sound signals are also to be transmitted along with the video signals. Separate carrier waves are used for the transmission of picture signals and sound signals, and are radiated by the same transmitting antenna. At the receiving end with the help of single receiving antenna both the carrier waves are received and later both the signals are separated. For the proper display of picture and reproduction of sound, several controlling signals also must be transmitted.

The following is the block diagram of TV set that shows how the signals are separated.

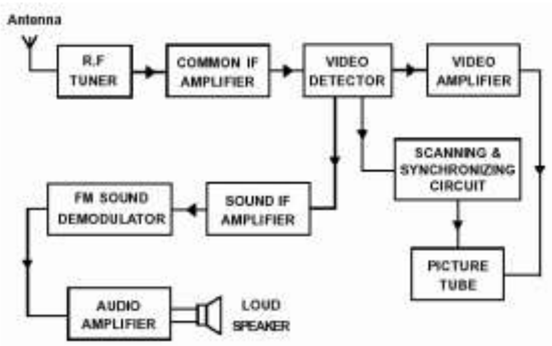

Fig.4.1 Block Diagram of TV receiver

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In above block diagram, the receiving antenna intercepts radiated RF signals and the turner selects desired channels frequency band and converts it to common IF band of frequencies.The receiver employs two or three stages of IF amplifiers. The output from the last IF stage is de-modulated to recover the video signal. This signal that carries picture information is amplified and coupled to the picture tube, which converts the electrical signal back into picture elements of the same degree of black and white. The picture tube is very similar to the cathode-ray tube used in an oscilloscope. The glass envelope contains and electron-gun structure that produces a beam of electrons aimed at the fluorescent screen. When the electron beam strikes the screen light is emitted. A pair of deflecting coils mounted on the neck of picture tube in the same way as the beam of camera tube scans the target plate deflects the beam. The amplitudes of currents in the horizontal and vertical deflecting coils are so adjusted that the entire screen called raster, gets illuminated because of the fast rate of scanning.

The video signal is fed to the grid or cathode of picture tube. When the varying signal voltage makes the control grid less negative, the beam current is increased, making the spot of light on the screen brighter. More negative grid voltage reduces brightness. If the grid voltage is negative enough to cut-off the electron beam current at the picture tube, there will be no light. This state corresponds to black. Thus the video signal illuminates the fluorescent screen from white to black through various shades of gray depending on its amplitude at any instant. This corresponds to brightness changes encountered by the electron beam of the camera tube while scanning picture details element by element. The rate at which the spot of light moves is so fast, so that the eye is unable to follow it and so a complete picture is seen because of storage capability of the human eye.

The path of sound signals is common with the picture signal from antenna to video detector section of the receiver. Here the two signals are separated and fed to their respective channels. The frequency modulated audio signal is demodulated after at least one stage of amplification. The audio output from the FM detector is given due amplification before feeding it to the loudspeaker.

4.8 MICRO CONTROLLER (89C51)

The AT89C51 is a low-power, high-performance CMOS 8-bit microcomputer with 4K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C51 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.
The AT89C51 provides the following standard features: 4K bytes of Flash, 128 bytes of RAM, 32 I/O lines, two 16-bit timer/counters, a five vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator and clock circuitry. In addition, the AT89C51 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port and interrupt system to continue functioning. The Power-down Mode saves the RAM contents but freezes the oscillator disabling all other chip functions until the next hardware reset.

4.9 H BRIDGE

Whenever a robotics hobbyist talk about making a robot, the first thing comes to his mind is making the robot move on the ground. And there are always two options in front of the designer whether to use a DC motor or a stepper motor. When it comes to speed, weight, size, and cost... DC motors are always preferred over stepper motors. There are many things, which we can do with DC motor when interfaced with a micro controller. For example we can control the speed of motor, we can control the direction of rotation, we can also do encoding of the rotation made by DC motor i.e. keeping track of how many turns are made by the motors etc. So we can see DC motors are better than stepper motors.

Usually H-bridge is preferred way of interfacing a DC motor. These days many IC manufacturers have H-bridge motor drivers available in the market like L293D is most used H-Bridge driver IC. H-bridge can also be made with the help of transistors and MOSFET's etc. rather of being cheap, they only increase the size of the design board, which is sometimes not required so using a small 16 pin IC is preferred for this purpose. L293D is having two 'H' Bridges inside, so that we can drive two DC motors simultaneously.

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4.9.1 Basic Theory:

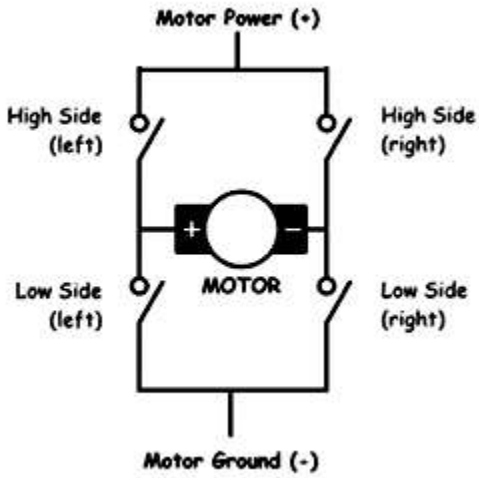

Fig.4.11 internal view of H-bridge

Let's start with the name, H-bridge. Sometimes called a "full bridge" the H-bridge is so named because it has four switching elements at the "corners" of the H and the motor forms the cross bar. The basic bridge is shown in the figure above. The key fact to note is that there are, in theory, four switching elements within the bridge. These four elements are often called, high side left, high side right, low side right, and low side left (when traversing in clockwise order).

The switches are turned on in pairs, either high left and lower right, or lower left and high right, but never both switches on the same "side" of the bridge. If both switches on one side of a bridge are turned on it creates a short circuit between the battery plus and battery minus terminals. If the bridge is sufficiently powerful it will absorb that load and your batteries will simply drain quickly. Usually however the switches in question melt.

To power the motor, turn on two switches that are diagonally opposed. The current flows and the motor begin to turn in a "positive" direction. Switch off these two switches and switch on other two switches diagonally in other direction then the motor starts rotating in opposite direction. Actually it is quite simple, the tricky part comes in when we decide what to use for switches. Anything that can carry a current will work, from four SPST switches, one DPDT switch, relays, transistors, to enhancement mode power MOSFET's.

Table.4.1 Truth table of H-Bridge

Higher side left	Higher side right	Lower side left	Lower side right	Quadrant description
On	Off	Off	On	Forward running
Off	On	On	Off	Backward running
On	On	Off	Off	Braking
Off	Off	On	On	Braking

In the above table the last two rows describes condition about short circuit the motor that causes the motors generator effect to work against it. The turning motor generates a voltage, which tries to force the motor to turn the opposite direction. This causes the motor to rapidly stop spinning and is called "braking" on a lot of H-bridge designs. Of course there is also the state where all the transistors are turned off. In this case the motor coasts freely if it was spinning and does nothing if it was doing nothing.

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4.9.2 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 directions. Since the device is having four half 'H' Bridges, thereby if required four motors can be driven through this single device, moreover the task is to run all four motors in one direction only. 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.

In this IC there are two different power supplies (Vcc1 and Vcc2). Vcc1 is for logic input circuit while Vcc2 is supply for the output circuit. This means that we should apply about 5V to Vcc1 and whatever voltage required by the motor (up to 36V max for this IC) to Vcc2. Each Half H-Bridge has an individual Ground. So we must ground the terminal corresponding to the Half H-Bridge, depending up on the circuit design, if required all four terminals of bridges can be connected to the ground.

Each Half H-Bridge has an Input (A) and output (Y). Also there are enable pins to turn on the Half H-Bridges. Once a Half H-bridge is enabled, then the truth table is as follows:

INPUT A	OUTPUT Y
L	L
H	H

So we just give a High level when we want to turn the Half H-Bridge on and Low level when we want to turn it off. When the Half H-Bridge is on, the voltage at the output is equal to Vcc2.

If we want to make a Full H-Bridge, we must connect the motor (or the load) between the outputs of two Half H-Bridges and the inputs will be the two inputs of the Half H-Bridges.

Suppose we have connected Half H-Bridges 1 and 2 to form a Full H-Bridge. Now the truth table is as follows:

INPUT 1A	INPUT 2A	OUTPUT 1Y	OUTPUT 2Y	Description
L	L	L	L	Braking (both terminals of motor are Gnd)
L	H	L	H	Forward Running
H	L	H	L	Backward Running
H	H	H	H	Braking (both terminals of motor at Vcc2)

4.10 RELAY

A Relay is a device that opens or closes an auxiliary circuit under some pre-determined condition in the Main circuit. The object of a Relay is generally to act as a sort of electric magnifier, that is to say, it enables a comparatively week current to bring in to operation on a much stronger current. It also provides complete electrical isolation between the controlling circuit and the controlled circuit.

4.11 THREE SIREN SOUND GENERATOR

Oscillating circuit:

There are two options for generating oscillator frequency. Either can be selected by changing the mask.

(1) Only one external resister is required to complete the oscillator circuit

(2) Oscillator resistor is built-in.

Sound Selection:

The SEL2 incorporates resistor for internal pull low, and SEL1 is a tri-state control pin.2 pads, SEL1 and SEL2, should be selected for the sound effect mode.

Sound Effect ROM:

The sound effect ROM is organized as 256 words by 8 bits. The sound effect program and the option are mask programmable and programmed in the N+ layer.

4.12 DC MOTORS

Motors are the devices that provide the actual speed and torque in a drive system. This family includes AC motor types (single and multiphase motors, universal, servo motors, induction, synchronous, and gear motor) and DC motors (brushless, servo motor, and gear motor) as well as linear, stepper and air motors, and motor contactors and starters.

Permanent magnet DC motor responds to both voltage and current. The steady state voltage across a motor determines the motor's running speed, and the current through its armature windings determines the torque. Apply a voltage and the motor will start running in one direction; reverse the polarity and the direction will be reversed. If you

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apply a load to the motor shaft, it will draw more current, if the power supply does not able to provide enough current, the voltage will drop and the speed of the motor will be reduced. However, if the power supply can maintain voltage while supplying the current, the motor will run at the same speed. In general, you can control the speed by applying the appropriate voltage, while torque is controlled by current. In most cases, DC motors are powered up by using fixed DC power supply, therefore; it is more efficient to use a chopping circuit.
Consider what happens when a voltage applied to a motor's windings is rapidly turned ON and OFF in such a way that the frequency of the pulses produced remains constant, but the width of the ON pulse is varied. This is known as Pulse Width Modulation (PWM). Current only flows through the motor during the ON portion of the PWM waveform. If the frequency of the PWM input is high enough, the mechanical inertia of the motor cannot react to the ripple wave; instead, the motor behaves as if the current were the DC average of the ripple wave. Therefore, by changing the width of pulse, we can control the motor speed.

V. FLOW CHART

5.1 FLOW CHART OF VEHICLE CONTROL STATION

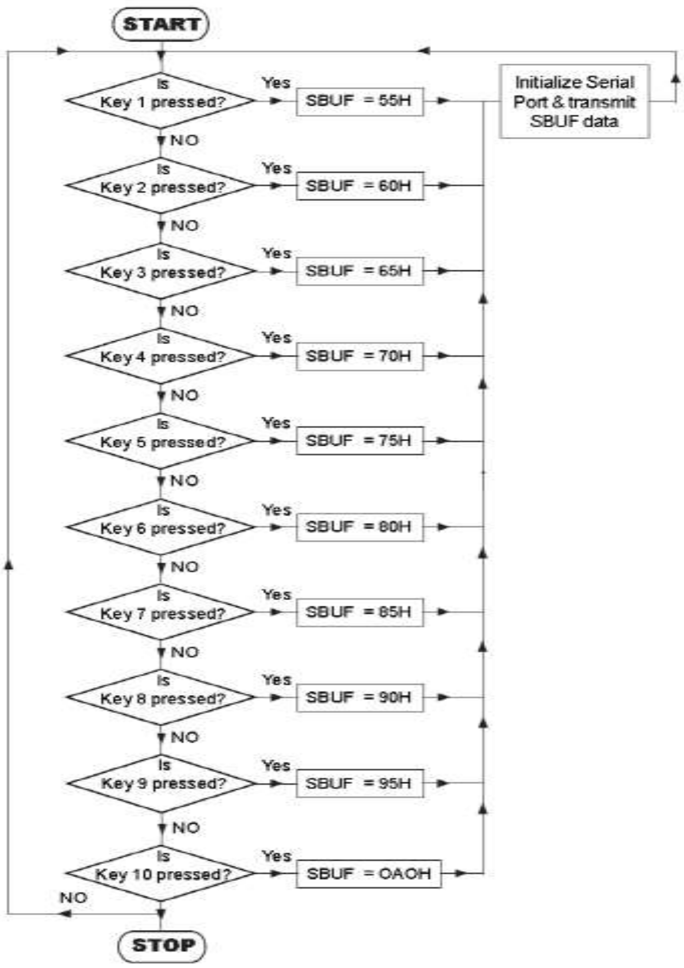

Fig.5.1 Flow Chart of Vehicle Control Station

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5.2 FLOW CHART OF WARFARE VEHICLE

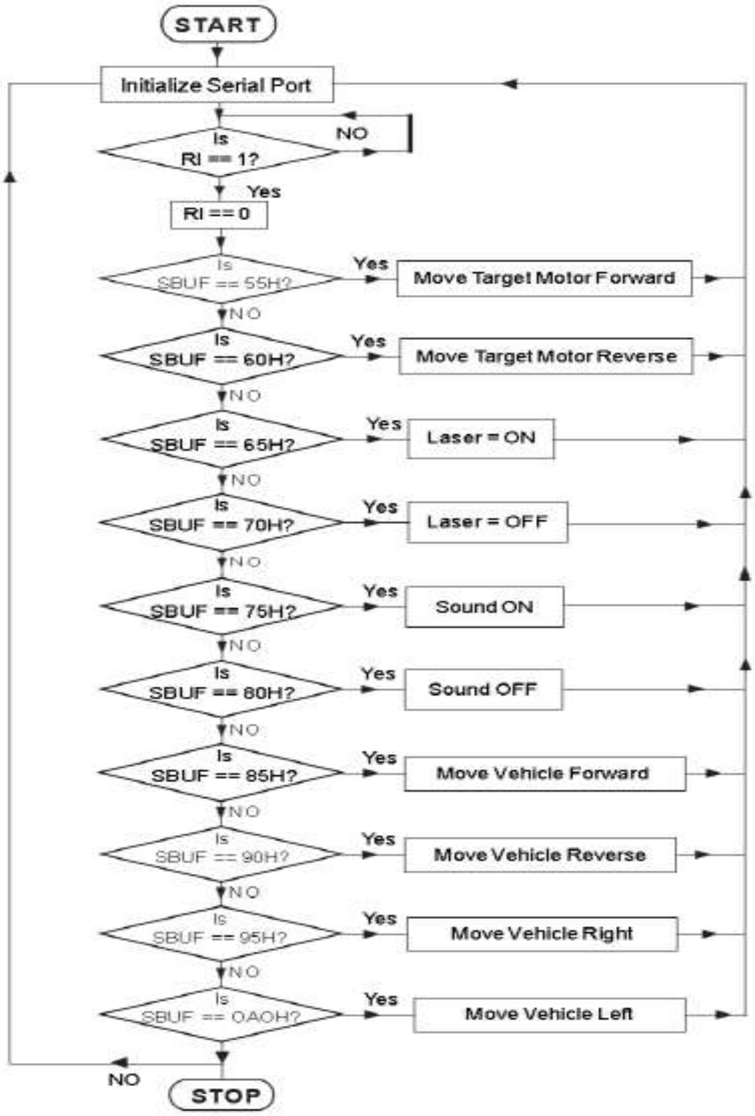

Fig.5.2 Flow Chart of Warfare Vehicle

VI. PROGRAMME CODE

6.1 TRANSMISSION PART

```
org     0000h
ljmprt
rt:
MOV     SCON,#40H
MOV     TMOD,#20H
MOV     TH1,#0FAH
SETB    TR1
CLR     TI
MOV     P1,#0FFH
main:
        JB      P1.7,NXT;
        MOV     A,#05H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#55H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT:
JB      P1.6,NXT1;
        MOV     A,#10H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#60H
        MOV     SBUF,A
```

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```
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT1:
JB      P1.5,NXT2;
        MOV     A,#15H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#65H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT2:
JB      P1.4,NXT3;
        MOV     A,#20H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#70H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT3:
JB      P1.3,NXT4 ;UD
        MOV     A,#25H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#75H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT4:
JB      P1.2,NXT5 ;UD
        MOV     A,#30H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#80H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT5:
JB      P3.2,NXT6  ;FRW
        MOV     A,#35H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#85H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT6:
JB      P3.3,NXT7  ;LFT
        MOV     A,#40H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#90H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT7:
JB      P3.4,NXT8  ;BCK
        MOV     A,#50H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#0A0H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        LJMP    MAIN
NXT8:
JB      P3.5,NXT9  ;RT
        MOV     A,#45H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
        MOV     A,#95H
        MOV     SBUF,A
        JNB     TI,$
        CLR     TI
NXT9:
LJMP    MAIN
DELAY:MOV R4,#0FFH
LOOP: MOV R5,#0FFH
        DJNZ R5,$
        DJNZ R4,LOOP
        RET
End
```

6.2 RECEIVER PART

```
org     0000h
ljmprt;>
rt:             MOV     SP,#60H
                MOV     P2,#00H
                MOV     SCON,#50H
                MOV     TMOD,#20H
                MOV     TH1,#0FAH
                SETB    TR1
                CLR     RI
                LCALL   dddelayS
```

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```
main:
RCV:        JNB   RI,MAIN
            CLR   RI
            MOV   A,SBUF
            CJNE        A,#05H,NXT
    ;TARGET SET
            JNB   RI,$
            CLR   RI
            MOV   A,SBUF
            CJNE  A,#55H,MAIN
ROT1:
    SETB  P2.5
            CLR   P2.6
            JNB   P1.1,STOPX
            LCALL  DELAY
            LCALL  DELAY
            LCALL  DELAY
            CLR   P2.5
            CLR   P2.6
            LJMP  MAIN
NXT :
CJNEA,#10H,NXT1;
TARGET SET
            JNB   RI,$
            CLR   RI
            MOV   A,SBUF
            CJNE  A,#60H,MAIN
ROT2:
             CLR   P2.5
            SETB  P2.6
             JNB   P1.0,STOPX
            LCALL  DELAY
            LCALL  DELAY
            LCALL  DELAY
STOPX:      CLR   P2.5
            CLR   P2.6
XX:         LJMP  MAIN

NXT1:       CJNE        A,#15H,NXT2
;LASER OFF
            JNB   RI,$
            CLR   RI
            MOV   A,SBUF
            CJNE  A,#65H,XX
HRZ1:
CLR   P2.7
            LCALL  DELAY
            LJMP  MAIN
NXT2:
CJNE  A,#20H,NXT3      ;LASER ON
            JNB   RI,$
            CLR   RI
            MOV   A,SBUF
            CJNE  A,#70H,XX
HRZ2:
SETB  P2.7
            LCALL  DELAY
            LJMP  MAIN
NXT3:
 CJNE  A,#25H,NXT4
            JNB   RI,$
            CLR   RI
            MOV   A,SBUF
            CJNE  A,#75H,XX
UD1:
CLR   P2.4
    ;SOUND OFF
    ;       LCALL  DELAY
            LJMP  MAIN
NXT4:
CJNE  A,#30H,NXT5
            JNB   RI,$
            CLR   RI
            MOV   A,SBUF
            CJNE  A,#80H,NT9
UD2:
SETB  P2.4                  ;SOUNDON
            LCALL  DELAY
            LJMP  MAIN
STOP:
MOV   P2,#00H
NT9:        LJMP  MAIN
NXT5:
CJNE  A,#35H,NXT6
            JNB   RI,$
            CLR   RI
            MOV   A,SBUF
            CJNE  A,#85H,NT9
FRW:
SETB  P2.3
            CLR   P2.2
            SETB  P2.1
            CLR   P2.0
            LCALL  DELAY
            LCALL  DELAY
            CLR   P2.3
            CLR   P2.2
            CLR   P2.1
            CLR   P2.0
            LJMP  MAIN
NXT6:
CJNE  A,#40H,NXT7
            JNB   RI,$
            CLR   RI
            MOV   A,SBUF
            CJNE  A,#90H,NT9
LFT:
SETB  P2.3
            CLR   P2.2
            CLR   P2.1
```

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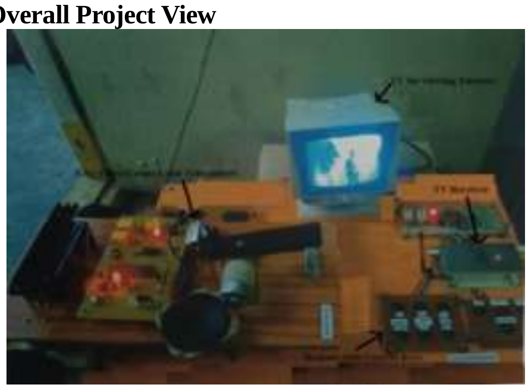
```
                    SETB   P2.0
                    LCALL  DELAY
                    LCALL  DELAY
                    CLR    P2.3
                    CLR    P2.2
                    CLR    P2.1
                    CLR    P2.0
                    LJMP   MAIN
NXT7:
CJNE   A,#45H,NXT8
                    JNB    RI,$
                    CLR    RI
                    MOV    A,SBUF
                    CJNE   A,#95H,NXT9
RGT:
CLR    P2.3
                    SETB   P2.2
                    SETB   P2.1
                    CLR    P2.0
                    LCALL  DELAY
                    LCALL  DELAY
                    CLR    P2.3
                    CLR    P2.2
                    CLR    P2.1
                    CLR    P2.0
                    LJMP   MAIN
NXT8:
CJNE   A,#50H,NXT9
                    JNB    RI,$
                    CLR    RI
                    MOV    A,SBUF
                    CJNE   A,#0A0H,NXT9


BCK:
CLR    P2.3
                    SETB   P2.2
                    CLR    P2.1
                    SETB   P2.0
                    LCALL  DELAY
                    LCALL  DELAY
                    CLR    P2.3
                    CLR    P2.2
                    CLR    P2.1
                    CLR    P2.0
NXT9:
LJMP   MAIN
DELAY:MOV R4,#0FFH
LOOP: MOV R5,#0FFH
    DJNZ R5,$
    DJNZ R4,LOOP
    RET

dddelayS: MOV R4,#60
  Zz21S:  MOV R5,#60
  Zz11S:  MOV R6,#60
          DJNZ R6,$
          DJNZ R5,Zz11S
         DJNZ R4,Zz21S
     RET
End
```

VII. PRACTICAL RESULTS

Warfare Vehicle View

Overall Project View



VIII. CONCLUSION

The project work “Unmanned Warfare Vehicle” is designed and developed successfully. For the demonstration purpose, a prototype module is constructed; and the results are found to be satisfactory. Since it is a prototype module, a simple vehicle is constructed, which can be used for many applications. In this concept the warfare vehicle is controlled by a remote that will be operated by the operator. The camera placed over the vehicle will broadcast the video signals to the centralized monitoring station, where the security personals are monitoring the zone and the triggering of the gun can also be done through the remote by which the gun sound simulator IC produces the gun shot sensation.

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IX. FUTURE SCOPE

This project can be extended in such way that, by including four cameras at four sides of vehicle we can get four side views at a time, so that we can perform the actions very fastly.

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