MiG-V (Unmanned Ground Vehicle)

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ABSTRACT—Inthis paper, we identify the machine which can move to a place where the human can't reach at ease. This is going to be mainly used in the defense sector. It can be operated using Gesture Control, Voice Control, and Command Function. In the present day scenario, most of the defense giants are focusing on the development of equipment or system with less human intervention or operating with the least manpower. Keeping this in mind we came up with an idea to develop a prototype that demonstrates the actual machine like UGV (Unmanned Ground Vehicle).We have used low-cost components and open source software to complete and perform its operation in this project. We have made the project on an MDF board as a chaises on which the Drivers, Motor, Bluetooth (HC05), Camera, Arduino UNO Kit, Capacitor, Cells, PCB, LED, Voltage Regulator, Resistance, and Wheels are connected.Moreover, accelerometer sensors are used to reach obstacle detection and to gain the control signal feedback. The result obtained in this prototype shows the potency of the project to reach the identification of obstacles and control mechanisms.

Keyword— UGV, HC05, PCB, MDF, Gesture Control, Camera.

I. INTRODUCTION

In the present day scenario, terrorism and insurgency are faced all around the globe. To overcome such insurgencies, the defense organization are working on such kinds of models, and systems are introduced to operate from the control stations and reduce the human participation in the conflicted zones.

The main objective of this project is to execute an actual model or prototype of an unmanned ground vehicle that will be operated on teleoperation mode to perform its operation and replace the human intervention in a hazardous situation. It has four wheels (plastic + rubber), and the back side wheels have two DC geared motor (1000rpm, 2kgcm, shaft 6mm), which works for the movement of the vehicle. Atmega328 is used to receive instructions and perform its operation as per the received instruction from the operator. It has a motor driver module (L293D Module) which is used to operate the Motors as per the provided instruction by the operator from the control station. The Bluetooth HC05 is used for the connectivity with the operating device (Android phone) and the system.

A 9-volt battery is assembled with the help of 6 cells (each containing 1.5 volts) which supplies the power to the systems and camera (V380) to perform the operations. The LED is used to indicate the

A 360 $^\circ$ rotational camera (V380) which can be rotated as per the needs of visuals or images is used to provide image data of its surrounding containing the movements that come under its frame and indicates it to the operator for its suspiciousness to take actions or not. The camera will allow us to store the video and images which can be used for future reference by using an image processing tool to update its operating capability to increase the accuracy of the system and self decision-making capability. Machine learning can be helpful for such updates for future reference.

II. PROBLEM STATEMENT

When the vehicle is being deployed over to the ground or battlefield it will start the visualization and tracking of its surrounding or nearby obstacles and send it to its operator for the decision making. It is so challenging to save human lives on the battlefield or ground when there is a war going on, so this system will help to collect the real-time visuals and analyze the danger. The

operator can control the system using his/her android phone connected to the Bluetooth of the system and it can be helpful to track down the snipers to overcome the dangers to the grounded personnel's life. Its teleoperation method will also help to overcome the danger of life lost.

III.EXISTING PROBLEM

The existing system which is deployed in such kind of situation is a bit expensive and has some limitations like a complication of its operating mode, deployment over the patchy ground, tracking of the system, the systems which are used to track and surveillance over to the battlefield/ground or border area are expensive as well as complicated to operate and required some extra manpower for its operation.To overcome such expensive complications, the solution is made within the prototype of this UGV.

IV.DRAWBACKS OF EXISTING SYSTEMS

In the existing system, they are large so that the enemy can easily target and destroy them. They are expensive systems and cannot be affordable by an individual.

V.PROPOSED SYSTEM

In this system , tracking and surveillance of the surrounding where the system is deployed with a 360° rotational camera (V380) to capture the real-time visuals and also can store them in the system so that the operator can analyze them and make the decision accordingly. The Bluetooth (HC-05) will help it to be connected with the operator's devices to perform the operations and make the system run as per the instructed commands. The operator can command it using gesture control, voice control, and defined functional operation.

VI. ADVANTAGES OF PROPOSED SYSTEM

Consistency of performance, 24/7 continuous working, Reduce amount of operation error, Improved Quality of product, easy deployment, Relocation from one place to another, Seamless working capabilities, and uninterrupted live visuals are such a kind of advantages that most of the existing system lacks.

VII. HARDWARE DESCRIPTION

1.PCB (Printed Circuit Board): It comes in some different types, the PCB which we used is a general purpose (0 PCB), and it's used for immediate

Prototyping Design. The Copper layer is laminated for simple soldering and to forestall corrosion.

2. Bluetooth (HC-05): For setting up wireless serial communication, Bluetooth HC-05 is most demanding and famous due to its extremely high features and low cost. It has the frequency 2.4GHz ISM band the sensitivity of this Bluetooth model is =< 84dBm. Asynchronous speed is 2.1Mbps(Max) / 160kbps. The synchronous speed is 1Mbps. Power supply 5 volts.

3. Arduino UNO Kit (ATmega328): It is a low-cost version of the Arduino. CH340 USB is assembled with it to serial convertor chip. It requires 5 volts, 0.2Amp of power supply to perform its operation. The microcontroller which is assembled with this Arduino kit is ATmega328 SMD. It has 14 digital I/O pins.

4.Motors (DC Gear Motor): This motor is a dual shaft BO motor. It gives good torque and rpm at low operating voltages. The light weight of this motor makes it suitable for in-circuit placement. It can be used with 69mm diameter wheels plastic gear motor.

5. MDF (Medium Density Fiber Board): It is a wood product with a composite and is traditionally formed by breaking the softwood into wood fibers. After the deliberation, wax and synthetic resin binder are mixed to form panels by applying high temperature and pressure.

6. Motors Drivers (L293D Module): It is a 16-pin IC stepper motor driver controller that comes in mainly black color with the plastic and durable hard alloy material. The channel capability in of 600mA. It required a 9volt of power supply. It helps in the movement of the wheels which are connected with the 100rpm DC motor.

7. Wheels: It is a robotic wheelused in the project that has a diameter of 7cm and a width of 2cm. It is made with high quality and durable plastic material it can be easily get fitted into a shaft of a DC gear motor. The screw which is mounted with the wheel is for the gear motor for different robotic and robot wars.

8. Batteries: There are 6alkaline cell batteries used in our project to fulfill the power supply as per the need of the project, each of the cells consists of 1.5 volts, and a total of 9volts of power can be obtained from this method. The alkaline batteries cell are very needful and cost-effective.

9. LED: It is one of the types of diode which emit light when an electric current passes through the microchip that illuminates a tiny light source that is the output. Which we call an LED and the visible light is the output.

10. Capacitor: It is an electronic component that is used to store electrical energy and consist of two

conductors which are nearby and are insulator from each other. The electrostatic energy which is stored is released whenever possible due to the electric field.

11. Voltage Regulator: The voltage regulator is a kind of electronic component which help to regulate the voltage supply or power supply in the project to reduce the danger of circuit breakdown and prevent the components from the short-circuit. It can regulate the power supply as per the need or demand of the project.

12. Resistors: It is a two terminal active electrical component that implements the electrical resistance as a circuit element. It is used to limit or regulate the flow of the electrical current in an electronic circuit. It is also can be used to provide some specific voltage for an actual device (transistor).

VIII. WORKING

This project is made in the interest of the defense sector. Our project concentrate on the safety of our military force. This machine is teleoperated and the system works upon the given command by the operator as per the requirement. The code for the movement of the machine is written in C language. The 9V of the battery is connected to the machine to give the power supply to the project. When we turn on the power supply the LED which is assembled in the project will emit light when the electric current will passed through it. When the power supply is given to the machine the voltage regulator will give the supply as per the requirement, it will give 9V of supply to the DC gear motor for the movement of the wheel and 5V to the Bluetooth (HC-05) and Ardunio UNO (ATmega328). The commands which are given by the operator will be received by the output pins of the Arduino Uno 8, 9, 10, and 11, and this output will be sent to the motor driver. The motor driver will help in the movement of wheels which is connected with a 100rpm DC motor.

The operation of the camera (V380) can be performed by using the android application V380. By connecting the application with the camera, the operator can rotate the camera angle as per the need or requirement . It can be rotated at 360 ^{o}angle vertically as well as horizontally. The visuals which are visible to the camera will be stored in the storage of the android device and the stored data can be used for future references.

IX. ALGORITHM FOR UNMANNED GROUND VEHICLE

A. First we give power supply to the project.
B. Then we connect the Bluetooth (HC-05) of the project with the Bluetooth ofthe android phone.
C. Then we can give the command through gesture control, voice control, and command control.
D. For gesture control, we rotate/move our android phone in the direction we want the machine/system to move.
E. For voice control, we give the defined voice command through to the system with our voice, if we say forward the then machine will move forward, if we say back then the machine will move backward, if we say left then the machine will move left if we say right then the machine will move right and if we say stop the machine will stop.
F. For the command control, we give the pre-defined command through our terminal, if we give 'a' as a command then the machine will move forward, if we give 'b'as a command then the machine will move backward, if we give 'c' as a command then the machine will move left, if we give'd' as a command then the machine will move right and if we give 'e' as a command then the machine will stop.
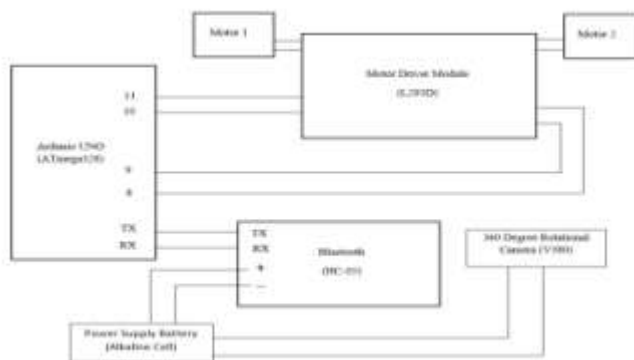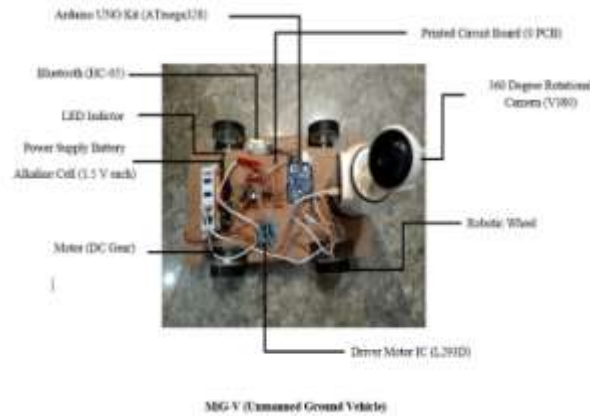
X. SYSTEM FLOW CHART

Fig. : 4 Block Diagram of MkG-V (Unmanned Ground Vehicle)

XI. HARDWARE IMPLEMENTATION

UtG-V (Unmanned Ground Vehicle)

XII. CONCLUSION

The main motive was to provide a prototype that is cost effective as well small in size with some advanced features as we all know such kind of innovative ideas required a bulk of economical assets as well scientific mind. It gives background support to the privacy and security to such kind of situation when there is a conflict or battle on the go. It also gives some benefits to the friendly side of the operators to detect and visualize the surrounding where the system is located.

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