UDDHART-Unmanned Ground Vehicle

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Abstract— The robot is a military based vehicle.It is an unmanned ground vehicle that would be controlled by an application on any graphical user interface. The GUI would be having controls to move the vehicle from one place to another. A camera would be installed on the robot to give us live feeds at those instants. Whenever the robot or the user faces any threats then it can eliminate the threat by using a weapon that would be attached on the top of the vehicle. However, as it is practically impossible to install a weapon, we would be resorting to a laser that would act as an alternative to the weapon. The robot would be capable to travel over any rough terrains. It would be able to gather information and pass it on to the sources and also annihilate the targets whenever necessary.

Key words: UDDHART, Robot, Vehicle

I. INTRODUCTION

It's not uncommon that a news flashes on the screen regarding the martyrdom of a soldier or a defense personnel. A lot of humans lives has been and currently on stake on the border lines defending us. There has been a lot of cases where the militants hide in the civilian houses on the border areas to hide from the defense authorities .At such times, it is difficult to ascertain whether the person hiding is a militant or a civilian. Left with a handful of choices, the soldiers have to resort to blind firing with a hope to kill the target. Unfortunately it is the civilians who are victims of collateral damage.

Countries like USA, Russia and other developed countries have started using Artificial Intelligence since the last decade. Automated machines that function on the air, water and on land are being used nowadays to keep a check on hostile activities. Drones and other unmanned ground vehicles are being deployed on the line of fire. Hence there has been a decrease in fatality rates during operations.

Our government organization, the DRDO (Defence Research Development Organization) have also developed the unmanned ground vehicles to counter terrorist activities. They have developed 'Daksh' and snake robots suitable to and adjustable to various environments and conditions. We also use unmanned aerial vehicles to observe the activities on the ground from air.

Our robot would also be having the same functionalities as that of 'Daksh' but we would be having some extra advantages over the later. Our robot would be able to enter any secluded and largely enclosed areas without giving any prior knowledge or hints. One of the main factors of our robot would be the stealth factor. It would give us valuable information which would help us decide the further course of action.

Whenever the user controlling the robot faces any threat that would appear in front of the robot then it would have the liberty to eliminate the target, with the help of the weapon installed over it .However, we can replace the weapon with any asset depending on the situation and geography. This robot can also be deployed during curfew where it can be used to disperse off the protestors. We can use this to our advantage without putting human lives at stake. The vehicle would consist of a belt drive that would help travel on any rough terrain without less amount of labor. In our model, we would be using laser as an alternative to the weapon. It would be capable at 50-70m to point out target.

Hardware: Our robot consists of two microcontrollers: Arduino Mega and Arduino Uno. The Arduino mega 2560 is used to control the motion and functionalities of the robot, while the Arduino Uno is used to function the camera module. There are four wheels of 9.5Cm in diameter, the distance between two wheels are 13cm. In order to adjust and adapt to the rough terrain, the wheels on either sides are joined with belt -drives. The power supply to these wheels through motor shield is 12V power. The robot consists of a 12v battery to power its components. The robot can reach a maximum speed of**km/hr.. The Camera is an Ov7076 model, which has 2mpx clearance and able to rotate in 360 degree with its base. Camera has movable base that is 16cm and can move in various direction, i.e it has the ability to ascend-descend, move right -left and rotate in a circular fashion. The connection among the components are established with the help of jumper wires of male to female. Laser (alternative to weapon) is fitted along with the camera to point out the target. All the motions and controls are initiated by a mobile application. In order to establish a connection between themselves, the mobile device has to be connected to the Bluetooth module to...yes...but it is a mode by which we send data and signals.

II. LITERATURE SURVEY

To decrease the rate of fatality, a lot of countries are currently adapting to artificial intelligence to tackle serious situations. Instead of sending humans behind the line of fire, robots and drones are being used to attack the hostile forces. Countries like USA, Russia France are resorting to drones and UAVs for aerial attacks. However there is always an uncertainty about the presence of civilians in terrorist areas. Hence they always opt for blind firing, which costs them a lot of innocent civilian lives. Unmanned ground vehicles are being used by various organizations to counter the insurgencies taking place in various areas. Comparatively to a large UGV, a human sent behind the line of fire is always preferable because it proves to be much more effective and can deliver results. The only disadvantage is that they have to put their lives on the line.

To counter some major discrepancies that occur from larger UGV, small UGV's like Uddhart can be used to deliver some more successful results. One of the main factors that Uddhart can provide is the element of surprise. It can be sent to various places that may seem suspicious or dangerous to give some valuable information to decide the future course of decisions.

III. SYSTEM ARCHITECTURE

The vehicle would be able to detect the targets or give valuable information about the surroundings that may help decide the further course of actions. The camera attached over the UGV is dynamic and flexible in movements that would be able to assess the environment without any complexities. If at any moment the user feels any threat surrounding the robot, then it can use the asset to neutralize the target or can escape the situation with its stealth abilities.

System architecture is a formal description and representation of system that supports reasoning about the structures and behavior

The following architectural diagram shows the total layout of our design that would be reliable to be used during various missions. The camera attached on the top would give us instant feeds and would help decide the future course of decisions. It also consists of a weapon to wipe off the targets that may act as hindrance to a certain successful mission. As the diagram depicts, the camera and the asset is flexible enough to move in any direction to grasp the feeds of any unusual environment.

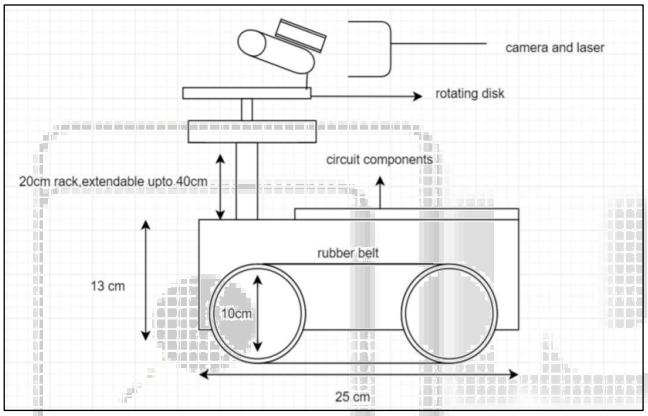

Fig. 1: System Architecture of Uddhart

Fig. 2: Arduino Mega 2560

This microcontroller is capable to handle multiple hardware functionalities as Mega has more pins than Arduino Uno. The arduino board can be coded according to the user's requirements with the help of Arduino IDE.

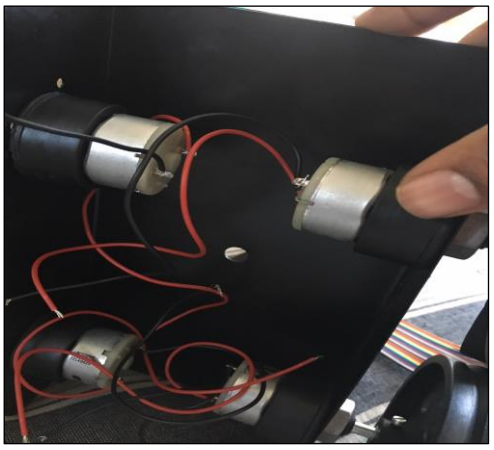

Fig. 3: DC Motors

These Motors are responsible to make the Vehicle mobile.

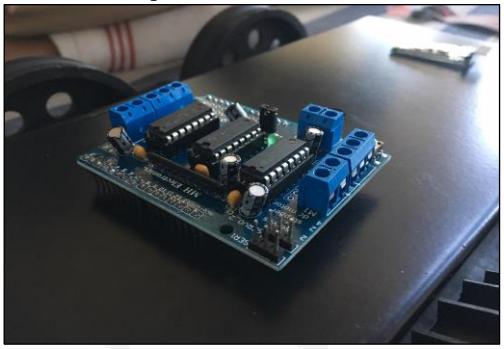

Fig. 4: Motor Shield

It consists of 3 IC's and 4 I/O Pins which is capable to load 12V supply from the power source. This component is responsible for the functioning of motor wheels. The instruction pins are connected to the Arduino Board.

Fig. 5: Bluetooth Module

It is one of the main component of our vehicle which helps in transmitting and receiving of signals from the GUI to Arduino board.

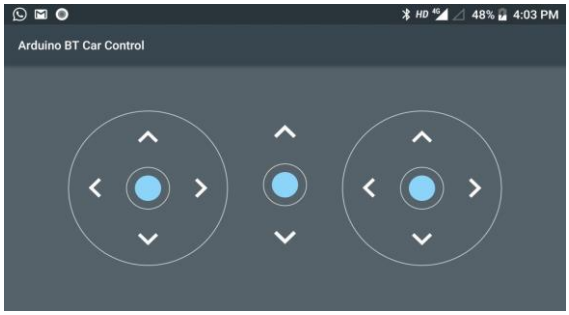

Fig. 6: Application GUI for controlling the UGV

IV. ON-FIELD MODEL DESIGN

The robot would consist of a steel belt-drive that would prevent the wear and tear of the tyres and also it would help to work in rough terrain areas. The height of the rack would be more as it would be able to cover more areas and cross obstacles. The robot would consist of motors that would work without making any fuss or clamour and improve its efficiency. The Bluetooth model would not be practically enough to transmit signals from control station to the machine. In order to achieve that a satellite frequency transmission would be used to communicate between the ends. Radio frequency concept would be used in order to function the vehicle. The camera would be of high quality with improved pixels and dimensions to give clear sights of the surroundings and targets. The GUI which would be handled by the user would consist of a cross-cursor that would aim at the target, whenever required. The asset would vary according to the missions. It could range from water hose, bullet guns to small mini guns that would result to extreme destruction. The appearance of the robot would be camouflaged to achieve the stealth factor in accordance with the surroundings and terrain. For powering the whole architecture of the vehicle, a battery would be used with higher capacity for longer endurance and continuity.

V. CONCLUSION

On the basis of various researches, the ways by which a small vehicle or robot can be used in military operations is proposed in this paper. The results of experiment show that, even though the vehicle is small, it can be proved effective in various operations that includes risks, uncertainty and lot of assumptions. It can also be concluded that the asset attached over the robot can be used for various functionalities and would be adjustable to various rough terrains.

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