Review Paper on Design of Unmanned Ground Battle Tank for Border Security

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Abstract— Unmanned Ground Vehicles (UGV) have tremendous potential in military and civilian applications, specifically in areas like reconnaissance, surveillance, target acquisition and monitoring etc. This paper is a survey of various systems and areas of research in Unmanned Battle Tank vehicle development. An autonomous UGV is essentially an autonomous UGV that operates without the need for a human controller. During the recent years, the researchers have been striving to achieve higher degree of autonomous mode in ground vehicle to enhance operational performance by infusing microcontroller and software approach. An unmanned ground vehicle (UGV) is a military robot used to augment the soldier's capability. This type of robot is generally capable of operating outdoors and over a wide variety of terrain, functioning in place of humans. This project presents the development of an unmanned ground vehicle with the facility of measurement of humidity, temperature and illumination, video and audio clips to get the information of the environment through which UGV navigates.

Keywords: Unmanned Security, Ground Battle Tank, Microcontroller, Autonomous Protection

I. INTRODUCTION

Usually, the vehicle will have a set of sensors to perceive the environment, and will either autonomously make decisions about its behaviour or pass the information to a human operator at a different location who will control the vehicle through tele-operation. An autonomous robot may also undergo a process called machine learning for accomplishing its tasks or adapting to changing surroundings. During the recent years, the researchers have been striving to achieve higher degree of autonomous mode in ground vehicle to enhance operational performance by infusing microcontroller and software approach. However, it is seldom seen in literature, any practitioner reporting the successful implementation of these models in wild life monitoring. These relatively near-team applications will drive the sophistication and cost of autonomous vehicle technology into the real where more mundane but more widespread applications such as automated public transportation will be possible. However, significant technology advances will be necessary before even the simplest and most crucial applications can be practically addressed. An unmanned ground vehicle (UGV) is a military robot used to augment the soldier's 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 (remotely operated underwater vehicles). Unmanned robotics is actively being developed for both civilian and military use to perform dull, dirty, and dangerous activities.

II. METHODOLOGY

This section defines the scope of the planning technology area. It describes the mid- and far-term state of the art, and identifies the impact, if any, on Army operations or logistics. Planning for Army UGV systems encompasses software for path planning, which interacts with both perception and navigation, and mission planning. Path Planning is the process of generating a motion trajectory from a specified starting position to a goal position while avoiding obstacles in the environment. The input to a path-planning algorithm is a geometric map of the environment where positive and negative obstacles have been identified, and the starting and goal points are given. The output of the path-planning algorithm is a set of waypoints that specify the trajectory the vehicle must follow. For a completely known environment, path planning need only be performed once before the motion begins. However, the environment is often only partially known, and as obstacles are discovered they must be entered into the map and the path must be replanned. The Army requirements determination system has evolved over the last several years with the increased influence of joint operations, the publishing of a Joint Vision (Joint Vision 2020) by the CJCS and establishment of the Joint Forces Command (JFCOM), responsible for developing joint concepts and recommending joint requirements. The TRADOC commander is responsible for developing and publishing the Army Capstone Concept (TRADOC Pam 525-5), which becomes the guide for all other concept development activities. Integrating and supporting concepts are developed by TRADOC centers and schools and are published in a series of TRADOC pamphlets. The Future Operational Capabilities (FOC) document published in TRADOC Pamphlet 525-66 is a statement of the required operational capability needed by the Army and is intended to help the Army Science and Technology activities as well as industry research and development initiatives.

III. GENERAL BLOCK DIAGRAM

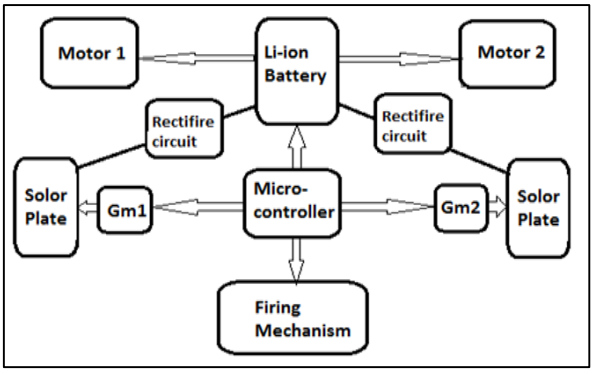

Fig. 1: General Block Diagram

IV. PROPOSED SETUP

A. Cutting Operation of Raw Material

All metal strip and angle are cut with the help of Power Cutter according to dimensions. These machines are available in our Workshop Facility. Firstly, we cut all the materials according to the required dimensions and then we proceed for the remaining machining operations.

B. Joining All Raw Metal Components

All metal components are join together with the help of Arc Welding and make a frame as per requirement.

C. Fixing the Chain and Sprocket

Firstly we weld the metal plate on the sprocket, and then drill on plate as per requirement of shaft size. Then fix the sprocket and chain mechanism on the frame by using nut and bolts.

D. Fixing of Motor

For the propagation of vehicle we use the wiper motor as a input power source. This motor is fixed at front side of frame. Motor shaft are connected to the shaft of the sprockets by welded joint between them.

E. Mounting of Screw Jack on Base

Mount the screw jack on the base of frame by using nut and bolt arrangement by using required calculations.

F. Posist the Sliders

Posist the sliders on the top of the frame by using the welding joint. For the moment of solar plate, we can use the rack and pinion.

G. Assembled of electronic circuit

Interact the electronic circuit in the robot as per required moments of mechanism. Electronic circuit wires are direct connected to battery.

V. WORKING PRINCIPAL

When enemy detected by the intelligence of the military, the control room send the triggering input to the system of robot by using wireless network. This triggering signals received by antenna of robot. When this triggering signal received by robot then it be ready for the firing. After receiving the command from control room micro controller run the program. As per the given condition micro controller actuate the slider motor by providing supply to the relay of motor for sliding the solar plate by using rack and pinion arrangement powered by motor. After opening the solar plate's micro controller trigger the relay of screw jack motor, by using power of motor screw jack moves in upward direction up to certain level. At reaching the certain position micro controller ic trip the supply of screw jack motor. And actuate the ultrasonic module for enemy detection and position changing motor of gun. The position changing motor rotate the gun in 359 degree in clock wise and anticlockwise direction. Gun rotate in 359 degree by using motor power the ultrasonic fitted on the gun detects the enemy and send signal to the micro controller. Micro controller compare with the standard data. And take the decision of firing. After that it triggers the motor of gun by using relays. Then gun fire the bullet on enemy. When enemy change his position, the rotation motor rotate the gun for finding the new enemy. After detecting new position rotation motor stop at that position and gun start to fire. At the end of war stop signal send by the control room sense by robot antenna and send signal to controller, then micro controller read the signal and stop the ultrasonic and rotational motor of gun. Then signal send supply reverse supply to the screw jack motor and screw jack goes to the downward initial position. After reaching of screw jack to initial position, microcontroller send command and trip the power of motor and connect reverse supply to the slider motor to close the slider and keep the robot in its initial state.

VI. APPLICATIONS

1) We can use it for the border security.
2) It is also used in desert, glassier and uneven ground surface.
3) It is used in High Mountain.

VII. CONCLUSION

After creating working prototype of Unmanned Ground Vehicle (UGV) achieved our objectives that we have successfully created economically cheap robot and made it from good quality material. It is reliable and works in any environmental condition. We can also minimize the killing of our soldier. There has been significant progress in the canonical areas of perception for UGVs: road following, obstacle detection and avoidance, and terrain classification and traversability analysis.

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