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IOT BASED WIRELESS MULTI-FUNCTIONAL WAR ASSISTANT ROBOT

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Abstract— An IoT-based wireless multi-functional battlefield assistant robot that can carry out a variety of activities remotely is suggested in the article. The robot has sensors, cameras, and microcontrollers that allow it to interact with its surroundings and carry out activities including reconnaissance, surveillance, and weapon deployment. The suggested system can be managed via a mobile application and is made to be user-friendly. The robot can be used in combat areas to help soldiers do their responsibilities more efficiently. The use of a wireless communication system that enables the robot to communicate with other devices and get real-time updates improves the efficiency of the system. Overall, the proposed IoT-based wireless multi-functional battle assistance robot is an inventive solution that can improve military operations' efficacy while lowering the hazards that soldiers must take.

Keywords— IoT, wireless, multi-functional, sensors, cameras, microcontrollers.

I. INTRODUCTION

Soldiers are frequently exposed to serious risks in modern warfare, and their safety is always of the utmost importance. Robotics are being used more frequently on battlefields to lower these risks. These robots can help soldiers do their responsibilities more successfully by performing a variety of functions like observation, reconnaissance, and weapon deployment. The Internet of Things (IoT) has received a lot of attention recently, and its possible uses in the military have been investigated. In this work, a wireless, multifunctional battle assistant robot with Internet of Things capabilities is proposed. The robot may be operated with the help of a smartphone application and is made to be user-friendly. Microcontrollers, sensors, and cameras allow it to interact with the surroundings and carry out the required functions. The proposed technology is made to increase military operations' efficacy while lowering the risks that soldiers must take. We will go into great detail on the parts and features of the suggested system in the sections that follow.

These descriptions do provide us a general concept of what makes up a robot, which must perceive its environment and respond appropriately. Locomotion is made possible by a variety of mechanical systems, including motors, pulleys, gears, gearboxes, levers, chains, and many more. A number of the robot uses sensors such as sound, light, magnetic fields, and others to gather data about its surroundings. The robot can engage with people through the use of speakers, screens, microphones, and other devices such as processors that are driven by sophisticated software to assist it understand environmental data that has been recorded and instruct it on what to do next.

II. OBJECTIVES

1) The project's major goal is to use RFID technology to track and monitor the soldier's close-by war robot.
2) Using GSM technology, the IOT server is updated with information on soldiers located close to the robot.
3) An Android application using Java is implemented as an IOT Local Server.
4) Metal sensors are employed in combat zones to find bombs and land mines and alert authorities to potential tragedies.
5) The robot may enter areas of the battlefield that are off-limits to humans. It can also detect soldiers there, sends a message to a server—an Android mobile device—and receives speech output describing the soldiers' current conditions as well as their names and batch numbers.

III. METHODOLOGY

Renesas Microcontroller, Alphanumeric LCD, Temperature Sensor (LM35), 2 DC Motor, L293 driver circuit, PIR Sensor, RFID (Radio Frequency Identification), and GSM (Global System for Mobile Communication) are used in the robot module of the unit, which consists of 2 parts. The Android mobile is used in the server.

When a soldier's body temperature drops to 10°C, we consider him to be gradually dying. This message will be sent to an Android mobile for a chief, and he will take care of the person in the war field. In this case, we are using a robot to run in the war field to monitor the live bodies by Temperature sensor. Soldiers will have their own unique RFID numbers before entering the battlefield, which will allow you to identify the name and batch of the soldier. When a soldier is

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identified by a PIR sensor, the server will receive this specific number, and an Android phone will display the soldier's name and batch along with voice output.

In this project, an LCD is utilized for display purposes, a temperature sensor measures body temperature, a PIR sensor locates people in the battlefield, an RFID reader creates a unique military identification, and a microcontroller communicates with a server through Bluetooth. Android mobile is primarily used on the server side, where it is used to provide voice output for human detection along with the user's name and batch number as well as a second voice output to indicate if the user is live or not.

For demonstration purposes, we are using two wheels that are powered by two DC motors and attached to the robot base. which allow robots to move from one location to another. For this motor to run, an L293 driver circuit is required. We use passive RFID to identify the soldier's name and ID number for identifying purposes. The microcontroller transmits that data through Bluetooth to the server.

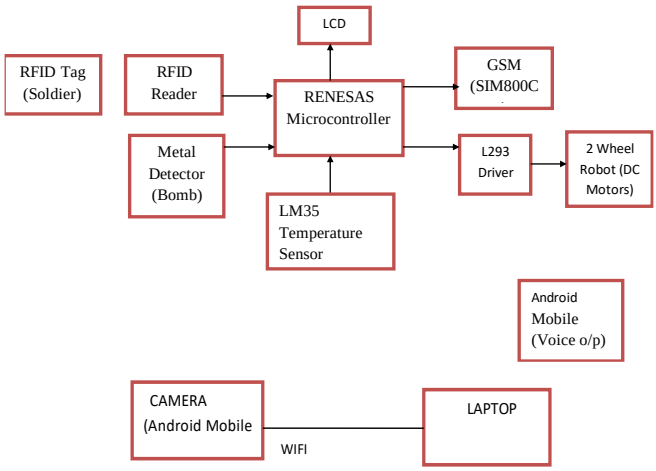

Figure 1: Block diagram

A. MOTOR DRIVER CIRCUIT

The Device is a monolithic integrated high voltage, high current, four channel driver made to drive inductive loads (such relays, solenoids, DC and stepping motors, and switching power transistors) and accept normal DTL or TTL logic levels. This driver circuit was utilized to power the robot's motors. The L293D drives two motors simultaneously.

Four motors are driven by two L293Ds. When the first input is high and the second input is low, the motor will move forward; when the first input is low and the second input is high, the motor will move backward; and when the first input is low and the second input is high, the motor will be in the halt state.

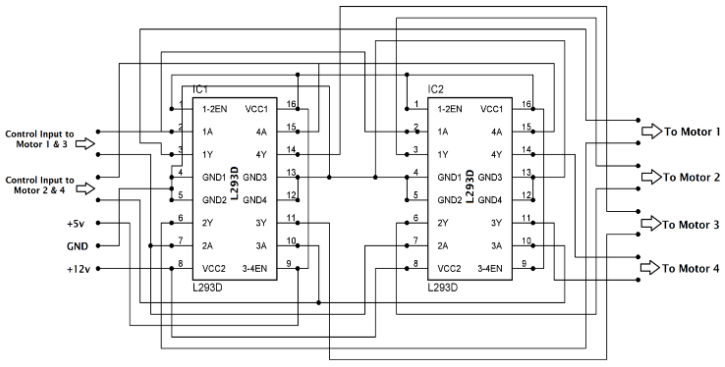

Figure 2: Motor driver circuit

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B. L293 Motor Driver

The L293 is an integrated circuit motor driver that can be used to control two tiny motors simultaneously and in both directions. Small is truly small. However, unless you have done some major heat sinking to keep the case temperature down, the L293 can only take currents that are much smaller than its 600-mA maximum. Unsure about the L293's compatibility with your motor? Maintaining your finger on the chip while operating the motor after connecting the circuit. You cannot use your motor with it if it becomes too hot to handle.

The L293 is packaged as a common 16-pin, dual-in line integrated circuit. Below is a top view of the pinout for the 16-pin L293 package. When the notch in the package is facing up, Pin 1 is in the upper left corner. Two PIC pins are required per motor.

Remember that the enable pin is always high when the motor is running, therefore by pulling it high on the etc. board, it won't require two more PIC pins.

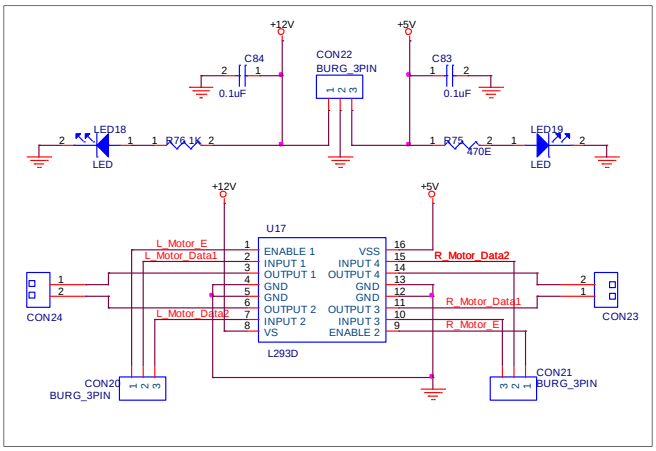

Fig 3: L293 Schematic Diagram

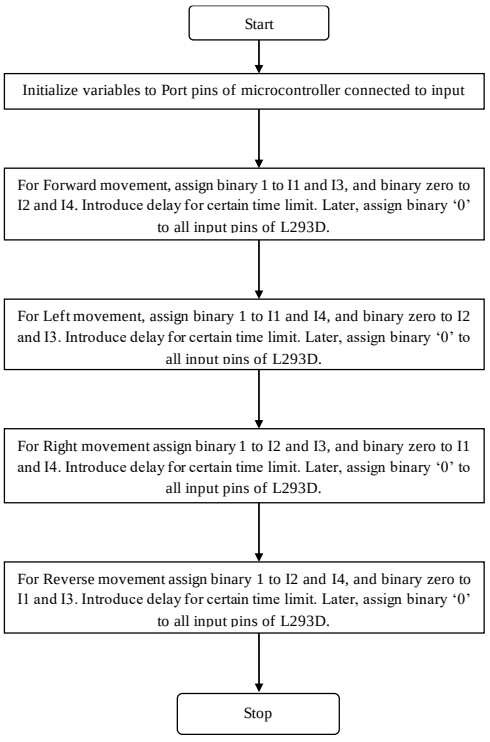

Fig 4: L293D Working Flow Char

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IV. APPLICATIONS

Surveillance: In war zones, the robot can be employed for surveillance. It has sensors and cameras that can spot and keep an eye on any unusual activity in the vicinity. The robot can travel about the area and give the soldiers updates in real time.

Reconnaissance: The robot is capable of conducting operations in hazardous environments for soldiers. The robot can gather information and give the soldiers up-to-the-minute updates.

Weapon deployment: The robot is capable of deploying weapons in conflict areas. It is capable of transporting weaponry and deploying them in places that soldiers might find challenging to reach.

Communication: Establishing communication channels between soldiers and commanders in combat zones is possible with the robot. It can transmit communications and give the commanders up-to-the-minute information.

Rescue operations: In regions where it may be dangerous for soldiers to penetrate, the robot can be employed in rescue missions. It can go around the region, find survivors, and give the rescue crew real-time reports.

V. ADVANTAGES

Minimizes risk to soldiers: The robot may carry out activities in places that it might be dangerous for soldiers to enter, reducing the risk that soldiers must take.
Efficiency gain: Since the robot can complete jobs more quickly and effectively than soldiers, military operations will run more smoothly.

Real-time updates: The robot can give soldiers and commanders real-time updates so they can make wise judgements.

Remote operation: The robot may be controlled remotely, allowing soldiers to carry out their duties from a secure distance.

User-friendly: The robot is built with ease of use in mind and may be operated by soldiers with the help of a smartphone application.

Cost-effective: By removing the need for extra soldiers and equipment, the employment of the robot can lower the cost of military operations.

VI. CONCLUSION

Military operations could be changed by the IoT-based wireless multi-functional combat assistant robot, which is a novel option. The robot has sensors, cameras, and microcontrollers that allow it to interact with its surroundings and carry out activities including reconnaissance, surveillance, and weapon deployment. The robot may be operated with the help of a smartphone application and is made to be user-friendly. Using a wireless communication system that enables the robot to communicate with other devices and get real-time updates improves the robot's efficiency. Numerous military tasks, such as surveillance, reconnaissance, weapon deployment, communication, and rescue operations, can use the robot. The robot can help soldiers do their tasks properly while reducing the threats they are exposed to. The usage of the robot can boost military operations' effectiveness while cutting costs.

In conclusion, the IoT-based wireless multi-functional battle assistance robot is an important technological advancement that can improve military operations' efficacy while lowering the risks that soldiers must take. The robot is a useful addition to the military's technical arsenal since it can make military operations safer and more effective.

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