Explosive Detection and Disposable Robot (VLC Technology) Using IoT

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Abstract- *The major goal of building this robot is to monitor human activity in combat zones or border regions to limit enemy infiltration. The robot consists of a wireless IP camera that can transmit videos of the war field to prevent any damage and loss to human life. Military personnel faces a significant danger of death when approaching uncharted territory. The robot will be an appropriate machine for the defense sector, reducing human life loss and preventing criminal operations. There will assist all military personnel and armed forces in understanding the state of the land before entering it. This robot consists of a Gas sensor to detect toxic gases, a fire sensor to detect if there is any presence of fire in the robot's path, a motion detection sensor to detect if there's any enemy presence in the way of the robot, a metal detector sensor to detect the landmines, all the sensor's parameters will be transmitted from the robot using VLC technology which is a novelty of this project. In this vehicle, the signals transmitted from the user's device are used for vehicle motion, and then the camera is mounted on the robot. This information is sent back to the user's device via a wireless system.*

Keywords- Microcontroller, Li-Fi, DC motor, Bluetooth Module, Android.

I. INTRODUCTION

Our concept is based on the current state of civil wars, military instability, and terrorist scenarios around the world. Almost every day, a large number of trained personnel are hurt or killed when dealing with or attempting to disarm bombs. The limitless number of news items and films that surface every day on news channels and print media around the world can attest to all of this. Even though our project's concept is unique, other projects have comparable goals. The French police, for example, have a bomb disposal robot, as does the Israeli army, and it is also in use by bomb squads in some US states. The robot's main purpose is to assist the bomb disposal squad in ensuring their safety and security from the hazards they face regularly. Although India's bomb squads have metal detectors and maybe other technology for detecting and disposing of bombs, they must nevertheless put their lives in danger by physically approaching the device or suspicious packs without any safety or precautions. Our robot will provide an extra layer of safety for bomb squad members by allowing them to quickly verify and analyze any suspicious package, and if one is found, the robot can be commanded to defuse it as well. In most cases, a mobile robot minimizes or eliminates the need for human intervention.

II. EXISTING AND PROPOSED SYSTEM

Existing system:

In the current system, the majority of which are used in bigger airports. When in fields as army persons or entities, they must face several dangers to their lives while spying on the enemy or opposing entities. A robot will be more fit for this duty to overcome these notions, reducing the risk of human lives being lost and allowing them to better spy on their adversaries' unlawful maneuvers.

Proposed system:

We show a versatile sensor-based military espionage bot in our suggested project. This robot is equipped with a gas sensor to detect toxic gases, a fire sensor to detect the presence of fire in the robot's path, a motion detection sensor to detect the presence of an enemy in the robot's path, and a metal detector sensor to detect landmines. All of the sensors' parameters will be transmitted via li-fi from the robot.

III. MATERIALS USED

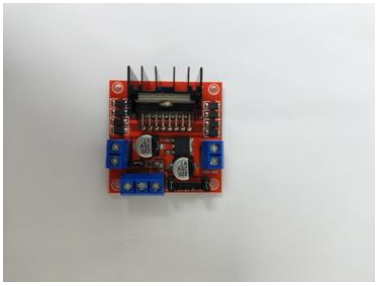

Fig -1: L298 Motor Driver Module

The L298 twin H-bridge chip, which is placed on this handy breakout board along with all essential peripherals, can drive a 2-phase bipolar stepper motor or two DC motors. It is highly suited for robotic applications.

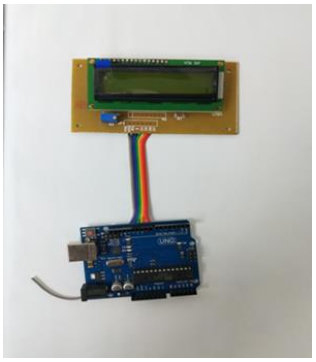

Fig -2: 16x2 (1602) Character Green Backlight LCD Display

This is a basic Alphanumeric display with 16 characters and two lines. Green background with black writing. Uses the HD44780 parallel interface chipset, which is very common. The interface code is open source. To connect to this LCD screen, you'll need at least 6 standard I/O pins. The LED backlight is included. Both 4bit and 8bit modes are supported.

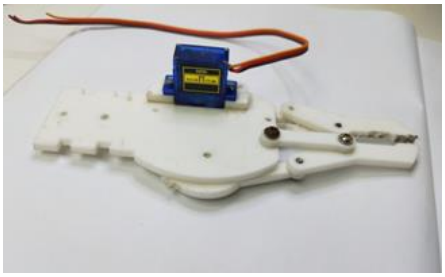

Fig -3: Servo Motor

Tower Pro SG90 Servo - 9 gms Mini/Micro Servo Motor

Fig -4: HC-05 Bluetooth Module

The HC-05 Bluetooth module is intended for use in wireless communication. This module can be used as either a master or a slave. The HC-05 contains a red LED that indicates whether the Bluetooth connection is active or not. Before connecting to the HC-05 module, this red LED blinks in a periodic rhythm.

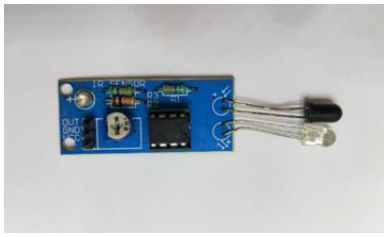

Fig -5: IR Sensor

Obstacle Avoidance Using Infrared A pair of infrared transmitting and receiving tubes are included in the IR Sensor Module (Active Low). The reflected IR waves are received by the receiver tube when the transmitted light waves are reflected. The processing is done by the onboard comparator circuitry, and the green indicator LED illuminates.

Fig -6: Proximity Sensor

A proximity sensor is a non-contact sensor that detects the presence of an object (also known as the "target") when it enters the sensor's field of view. The sensor may detect a target via sound, light, infrared radiation (IR), depending on the type of proximity sensor. Phones, self-driving cars, anti-aircraft systems, and assembly lines all employ proximity sensors.

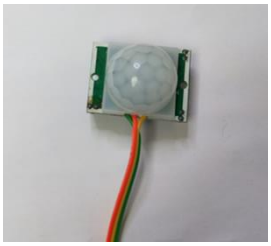

Fig -7: Motion sensor

If you want to make a device that detects perceive motion and almost always detects whether a human has entered or exited the sensor's range. You can detect motion using the HC SR501 PIR Motion Sensor Detector Module. It's almost often used to detect human movement within the range of the sensor. Sensors such as "PIR," "Pyroelectric," "Passive Infrared," and "IR Motion" are commonly used.

IV. RESULTS

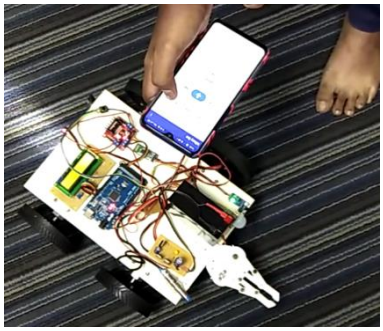

Fig -8: Mobile Control

We have an app that allows the user to control the robot's movements in the direction they want it to go. The robot can move in full 360 degrees for complete surveillance, just as it used to be able to travel in standard directions. "MIT App Inventor" was used to create the app.

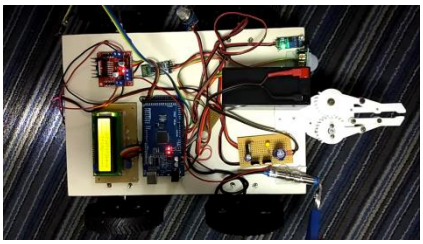

Fig -9: Metal Detection

So, now that we've seen the project's mobility and how it was developed, let's move on to detection, the first of which is "Metal Detection." When a robot encounters something made of metal, the robot will be able to detect the object, which in this example is a grenade. The robot will obtain this information and transmit it to the server, as well as disable the explosive using the gripper positioned in the front.

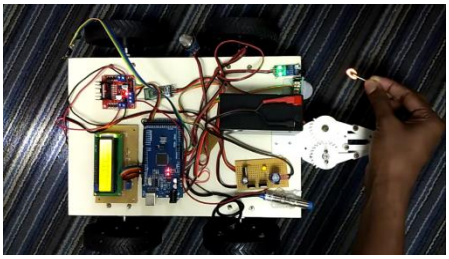

Fig -10: Fire Detection

The next sensor is a fire sensor, which is used to detect explosives, explosions, or a specific amount of heat that is present in an area where it shouldn't be. The fire sensor will be able to capture event data and communicate it to the server, where it will be saved for future use.

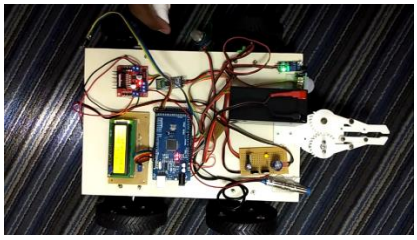

Fig -11: Gas Detection

The "Gas Detection" step follows, and this is when the sensor gets more fascinating and vital, as it will be able to detect any type of gas that is changed in the atmosphere. And, as the other detections stated previously, it will be possible to save lives.

Fig -12: Self-Destruct Mode

The "Self-Destruct" mode is the most important part of our project. As is clear, this type of machine should be protected, particularly the data contained on it, The self-destruction switch will be installed on the robot's side so that when it is pressed, data that has been collected for a long time will be destroyed and will never fall into the wrong hands again.

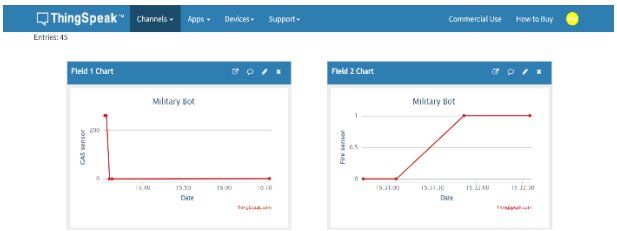

Fig -13: Data graph

The robot's data should be watched in its entirety for as long as it is required. We used "Thingspeak" - an IoT analytics platform service that allows you to collect, view, and analyze live data streams in the cloud - for this. It does this by providing real-time visualizations of data sent to ThingSpeak by your devices.That variation of the data will be seen in the graphical model above.

V. CONCLUSION

Our project is currently at the experimental stage in the current field. Our idea is a simple one in which we

employed a combination of LI-FI and Bluetooth, which is a unique feature, and we expect to see this become significantly more advanced in the future. The project is being utilized for military surveillance, but it might be used for other types of surveillance if it can be improved for years to come. The major goal of our technical expertise is to improve and protect the society around us so that future generations can benefit from it. Our project, we feel, is the type of project that will be a part of it.

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