THE NIGHT VISION SPY BOT

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Abstract- The Night Vision Spy bot is mainly built for the purpose of Military and Mines surveillance. Using the idea of the Internet of Things, this project discusses the updated way of the current robot technologies for military surveillance. This robot, which will eventually replace humans in areas of conflict, can identify the presence of people, strange items, toxic gases, and metal fragments on the battlefield. The robot is built using two microcontrollers namely Arduino UNO and ESP32, interfaced with different types of sensors like metal sensor, IR flame sensor, and Gas sensor. The robot is controlled using Android mobile through Bluetooth. A mobile application is used to control the directions of the robot. The robot consists of a servo gripper which will be activated when metal is sensed, in order to defuse the bomb, and a DC pump motor is used to extinguish the fire when a fire is sensed. The robot will have an IP mobile camera to live transmit the field. It has light adjustment capability which gives the vision of the field even in darker regions and also stores videos in the cloud. Similarly, the data that is taken from the Gas sensors are also stored in the cloud in order to analyze.

Keywords: Spy Bot, Fire Detection, Robot, Bomb Detection, Gas Detection, Servo Motor, Self-Destruction, Bomb Diffuser using Servo Mechanism

I. INTRODUCTION

The Internet of Things (IoT) device needs simple, low-power, low-complexity, energy-efficient communication technology due to its hardware constraints and power limitations. The Night Vision Spy Bot project is a cutting- edge technology project that aims to create a versatile robot capable of detecting and neutralizing threats in the military and other hazardous environments. The robot is equipped with various sensors such as fire detection, gas detection, and metal detection, enabling it to detect dangerous situations quickly and efficiently. The robot's features include a bomb wire cutter that uses a servo motor, allowing it to cut wires from a safe distance. The robot is controlled using an Arduino microcontroller, which is a widely used open-source electronics platform that allows for easy programming and control of the robot's various functions. The Night Vision Spy Bot is a significant project that combines several advanced technologies, including robotics, microcontrollers, sensors, and wireless communication. The project is designed to meet the needs of the military and other organizations that require sophisticated technologies to perform complex tasks. The robot's fire and gas detection features make it suitable for a range of applications, including firefighting, search and rescue, and hazardous material handling. The metal detection feature, on the other hand, makes it suitable for detecting potential threats such as landmines or unexploded ordnance. the Night Vision Spy Bot project is a highly innovative project that brings together various cutting-edge technologies to create a robot that can perform complex tasks in hazardous environments. The robot's advanced features, including fire and gas detection, metal detection, and a bomb wire cutter, make it

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an ideal tool for military and other hazardous applications.

II. LITERATURE SURVEY:

A project called "MedBuddy" was suggested by Akshet Patel [7] et. al. to lower the incidence of coronavirus among medical professionals and doctors. They did this by creating a Bluetooth-controlled robot automobile that is powered by an Arduino Uno microcontroller and fitted with a spare smartphone whose camera will stream live video to an MIT App Inventor-developed app. The robot has a tray that makes it easy to dispense medications to patients while keeping a safe distance between them. As a result, patients will receive their medications on time, and unnecessary contact with the patients will be reduced, lowering the risk to medical staff.

Abdelhakim LATOUI[1] and Mohamed El Hossine DAACHI proposed this project to prevent COVID-19 spread by reducing human interaction using Mobile Robots (MR). These MR robots are built using Arduino, Bluetooth module and Colour sensor (TCS230). This colour sensor is used to read coloured sticky notes using Q-Learning Algorithm. Each colour of the sticky note represents a command that the MR follows. An android application is also used for remotely controlling the MR.

Akash Singh [6] et. al. proposed a robot that is controlled by Bluetooth (HC-05) interfaced with Arduino UNO. The smart phone application will communicate to the robot with the help of Bluetooth module which is fitted on the Robot. A\V Wireless camera is used for surveillance purpose. An IR sensor is used for obstacle detection and a motor driver (L293D) is used to control the chassis wheels.

Oguzhan Dalgic [17]et.al. proposed a Bluetooth Low Energy (BLE) based communication systems that communicates with the main processor of the robot without the need of bulky cabling.

Ch.S.N.Sirisha Devi[18] et. al. proposed an IoT based robot for military application which is built using an Arduino UNO along with sensors like ultrasonic sensor, proximity sensor, GPS module and ESP8266 Wifi. The robot is controlled by using a mobile application for its movements. If a metal or obstacle is detected the robot will stop and send the location to the user. The result will also be displayed in the LCD.

Abhijeet Dhule [2] et. al. built this system using Arduino UNO, PIR sensor for obstacle avoidance, a robotic arm which performs functions like human hand. A camera module is used for surveillance and also transmits live data to the output screen.

A practical proposal for military real-time applications was put out by Jyoti L[15] et al. The precious human life can be saved by using the proposed Raspberry Pi-based robotic vehicle technology. Sometimes during a conflict or when military personnel enter new area (such as hostage situations), they will be attacked unexpectedly by the enemy. This robotic vehicle offers a fresh way to identify the adversaries and utilise that knowledge to plan a strategic move. It is equipped with all the tools required to track down opponents, including a long-range camera that records and live-streams video to the control station, sensors to detect the presence of people, and a GPS/GPRS system to locate and broadcast enemy targets. The system is capable of replacing the soldier at the border to provide surveillance as well for reconnaissance circumstances.

Using the idea of the IoT, Supreeth B K[19] et. al. proposed a new method for robots used in military surveillance. The suggested robot is capable of spotting people, strange objects, temperature changes, and the presence of metal objects in the environment. Both manual and automated controls are available for the robot's mobility.

. There are several existing systems that incorporate some of the features of the Night Vision Spy Bot project. For example, there are fire and gas detection systems that use sensors to detect dangerous levels of gases or heat, which can then trigger alarms or activate automatic suppression systems.

Similarly, there are metal detectors used for security and landmine detection,

which use electromagnetic fields to detect metal objects underground.

Proposed System:

The proposed Night Vision Spy Bot system is a versatile and highly capable robot that can perform a range of tasks related to detecting and neutralizing threats in military and other hazardous environments. The robot will be

built using an Arduino microcontroller and a range of sensors, including fire, gas, and metal detectors, and a bomb wire cutter that uses a servo motor. The system will be controlled using a Bluetooth-based control system, which will allow for remote operation of the robot from a safe distance. The metal detector will be used to detect potentially hazardous objects such as landmines or unexploded ordnance. The system will be controlled using a Bluetooth-based control system, which will allow for remote operation of the robot from a safe distance. Overall, the proposed system will be a significant improvement over existing systems, combining several advanced features into a single robot. The use of an Arduino microcontroller and Bluetooth-based control system will make the robot more flexible and customizable, allowing for easy integration of new sensors or features as needed. The system will be highly versatile, making it suitable for a range of applications, including firefighting, search and rescue, hazardous material handling, and bomb disposal.

The Night Vision Spy Bot project can be controlled using a Bluetooth- based control system developed using MIT App Inventor. The control system allows the user to remotely control the robot various functions, including movement, sensor readings, and the bomb wire cutter. The system works by using the Bluetooth module on the Arduino board to establish a wireless connection with the user smartphone. The user can then use the MIT App Inventor interface on their smartphone to send commands to the robot. These commands are received by the Arduino board, which interprets them and executes the corresponding actions. The MIT App Inventor interface is designed to be user friendly, with buttons and sliders for controlling the robot movement and sensors. For example, the user can use the interface to move the robot forward, backward, left, or right, or to adjust the speed of the robot movement. The interface also provides real- time sensor readings for the fire, gas, and metal detectors, allowing the user to monitor the robot environment for potential hazards. The bomb wire cutter can also be controlled using the MIT App Inventor interface. The user can use the interface to activate the servo motor, which will then cut the bomb wire from a safe distance. This feature is particularly useful in situations where the robot needs to disable explosive devices without risking harm to operators. Overall, the Bluetooth-based control system developed using MIT App Inventor provides a user-friendly and efficient way to control the Night Vision Spy Bot project. The system allows the user to remotely control the robot various functions, making it suitable for use in hazardous environments where human operators may be at risk.

III SYSTEM DESIGN AND ARCHITECTURE:

3.1 SOFTWARE TOOL: Arduino IDE

The Arduino Software (IDE), which is also available, has a text editor for writing code, a message box, a text console, and a toolbar with buttons for frequently used activities. It connects to the movement in order to upload programmes and converse with them. For Arduino devices, the interface also offers real-time sensor readings.

3.2 MIT APP INVENTOR:

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3.3 HARDWARE DESIGN

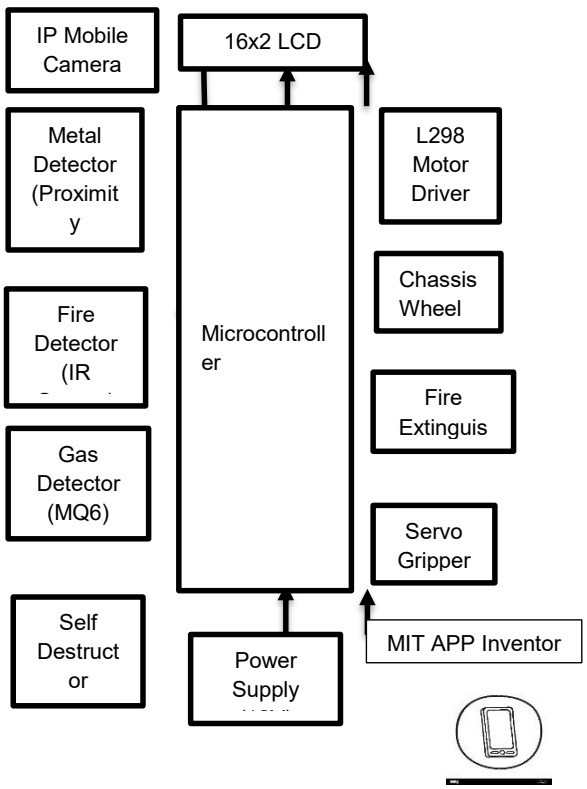

Figure 1 Block Diagram

A) ESP32:

Antenna switches, RF baluns, power amplifiers, low-noise amplifiers, filters, and power-management modules are all built into the ESP32. ESP32 can run entirely independently or as a slave device for a host MCU. The ESP32 may link to other systems to provide Wi-Fi and Bluetooth functionality using its SPI/SDIO or I2C/UART interfaces.

B) Arduino Uno:

single-board microcontroller called an Arduino is utilised in the creation of projects. A 32-bit Atmel ARM or an 8-bit Atmel AVR microprocessor is the foundation of the Arduino Uno. The software that runs on the microcontroller consists of a boot loader and a compiler for a popular programming language.

C) Fire Sensor:

To identify a fire, a fire sensor is employed. The sensor shorted out when it discovered the fire. The sensor turns into an open circuit when there isn't a fire.

D) Gas Sensor:

Suitable sensor for use in detecting the existence of a hazardous LPG leak in a storage tank environment at a petrol station or in car. This device is simply installed into an alarm system to sound an alarm or display the LPG concentration visually. The sensor offers a quick response time and great sensitivity. Moreover, the sensor can detect cigarette smoke, iso-butane, propane, and LNG.

E) Motor Driver:

The L298 Driver is a high voltage, high current twin full bridge driver intended to drive inductive loads such relays, solenoids, DC motors, and stepping motors. It also accepts conventional TTL logic levels. To enable or disable the device independently of the input signals, there are two enable inputs available. Each bridge's bottom transistors have connected emitters, and the associated external connector can be used to attach an external sensing resistor.

F) Metal Detector Sensor:

Only metal items can be detected by inductive proximity sensors. In essence, they are made up of an oscillator whose windings serve as the sensing face. In front of these windings, an alternating magnetic field develops. The oscillation stops when a

metal object is positioned within the magnetic field the sensor produces because of the greater load created by the induced currents. According to the type of sensor, this triggers the output driver to work, producing a NO, NC, or NO + NC (complementary) output signal.

G) DC Pump Spraying Motor:

An electromechanical or electronic internal mechanism is present in DC motors. By adjusting either the supply voltage or the amount of current flowing through a DC motor's field windings, the speed of the motor can be adjusted over a wide range. Small DC motors are commonly found in tools, toys, and appliances. The universal motor, although being a compact motor used for portable power tools and appliances, may run on direct current.

H) Servo Gripper:

A servo is a mechanically powered device that can be programmed to move a servo wheel or arm's output shaft to a predetermined location. A DC motor is housed inside the servo box and is mechanically connected to a position feedback potentiometer, gearbox, motor drive electronic circuit, and electronic feedback control loop circuitry.

An ordinary R/C servo resembles a rectangular plastic box with a rotating shaft sticking out the top and three electrical wires running from the servo side into a plastic three-pin connector. A servo wheel or arm is fastened to the output shaft that protrudes from the top of the box. Often made of plastic, these wheels or arms have holes for pushing or pulling rods, ball joints, or other mechanical linkages to be attached to the servo. V- (Ground), V+ (Positive voltage), and S Control are the three wires coming out of the side for electrical connections (Signal). Pulse Width Modulation (PWM) signals delivered from an external controller are received by the control S (Signal) wire and transformed to operate the servo by the servo on board electronics.

I) LCD Display:

Materials used in liquid crystal displays (LCDs) contain characteristics of both liquids and crystals. They don't have a melting point; instead, they have a range of temperatures where the molecules are practically as mobile as they would be in a liquid yet are arranged in a manner like a crystal.

The liquid crystal material is sandwiched between two glass panels that make up an LCD. Transparent electrodes that define the characters, symbols, or patterns to be displayed are deposited on the inner surface of the glass plates. Polymeric layers are present between the electrodes and the liquid crystal, causing the liquid crystal molecules to preserve a specific orientation angle. Outside of the two glass panels, one polarizer for each is pasted. The light rays travelling through these polarizers would be rotated to a specific angle and in a specific direction.

J) Battery:

Figure 2 12V,1.3Ah Battery

Figure 2.1 represents the image of 12 volts, 1.3 Ah Battery. It is a rechargeable sealed lead acid battery used as power supply for the robot.

K) IP Camera Mobile App:

An IP camera mobile app is an application that allows users to remotely view and manage their IP cameras through their smartphones or tablets. IP cameras are cameras that can connect to the internet and transmit video and audio data over a network. With an IP camera mobile app, users can access their cameras from anywhere with an internet connection, allowing them to monitor their homes, businesses, or any other location they wish to monitor remotely. The app typically requires the user to log in with their camera credentials, and once connected, users can view live streams, playback recordings, adjust camera settings, and receive alerts for motion detection or other events. Some IP camera mobile apps also offer additional features, such as the ability to pan, tilt, and zoom the camera remotely, two-way audio communication, and cloud storage for recorded footage. An IP camera mobile app provides a convenient and user-friendly way to access and manage IP cameras, offering users peace of

mind and security when they are away from their property.

***IV WORKING DESCRIPTION**:*

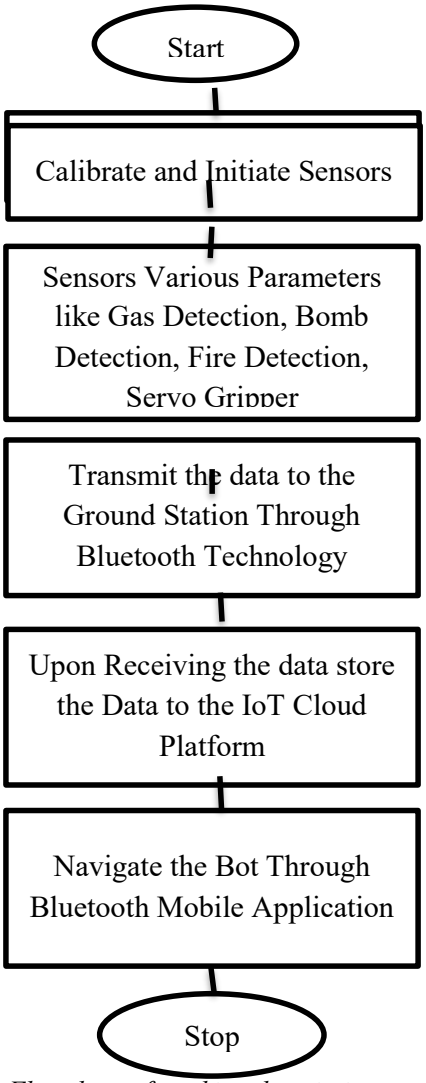

Figure 3 Flowchart of working description

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V. RESULTS

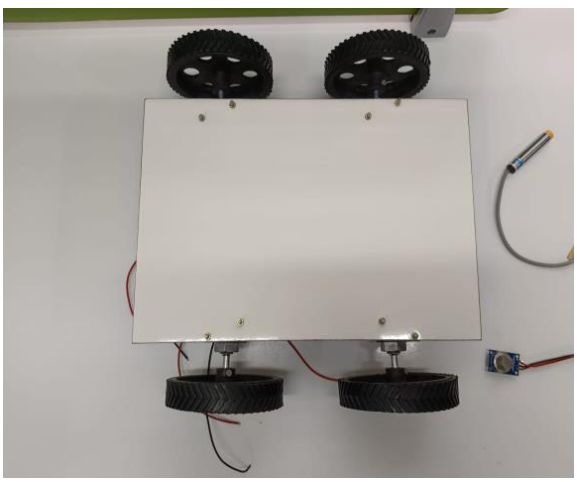

Figure 4 represents the chassis setup of the Spy bot.

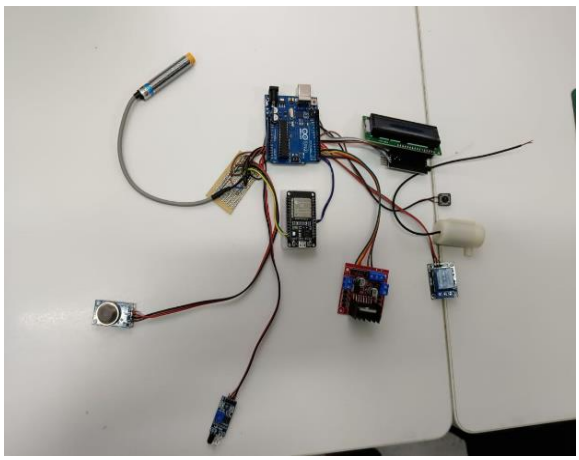

Figure 5 Connections of the components

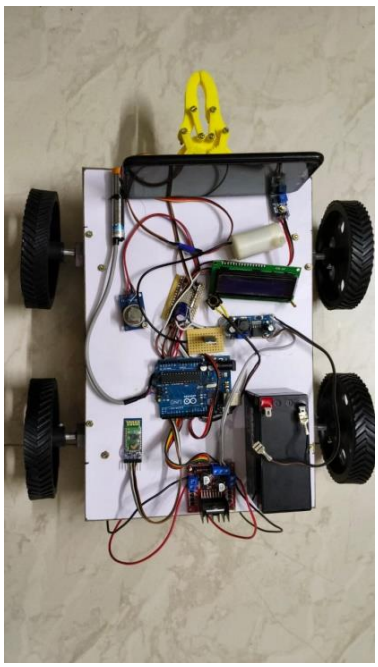

Figure 6 Final Prototype of the proposed system.

VI. CONCLUSION

The Night Vision Spy Bot project is a highly advanced robot designed for military and security applications. The project incorporates a range of sensors, including fire, gas, and metal detectors, as well as a bomb wire cutter controlled by a servo motor. The robot is also designed to be controlled remotely using a Bluetooth-based control system developed using MIT App Inventor, allowing the user to monitor the robot's environment and control its movement and functions from a safe distance. The project represents a significant advance in robotic technology, with potential applications in military and security operations, as well as search and rescue missions and hazardous material handling. The use of Arduino microcontrollers and MIT App Inventor programming makes the project accessible to a wide range of users, from hobbyists and students to professionals and engineers. Overall, the Night Vision Spy Bot project demonstrates the potential of combining advanced sensors, robotics, and wireless control systems to create highly capable and versatile machines capable of performing complex tasks in challenging environments.

VII. FUTURE SCOPE:

The Night Vision Spy Bot project has significant future scope for further development and enhancement. Here are some potential areas of future research and improvement. One potential area of future research is to develop the robot's ability to operate autonomously, using artificial intelligence and machine learning algorithms to analyze sensor data and make decisions based on the environment. This could allow the robot to perform complex tasks without the need for human control. This would make it easier to adapt the robot to different environments and applications. The project could be improved by incorporating more advanced wireless communication systems, such as long-range radio or satellite communication, to allow the robot to operate over longer distances and in remote or hazardous environments.

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