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CLOUD BASED MULTIPURPOSE CONNECTED ROBOT USING THINK SPEAK CLOUD

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Abstract:

This research aims to develop a multi-purpose surveillance robot to perform surveillance activities in industrial areas, militarized war zones or radioactive field areas with the objective of analyzing, governing and protecting the areas from unwanted threats. The use of robots and their role in our day-to-day life has been rapidly increasing since the day they were introduced to the world, further reducing the errors and life risk to humans. The objective is to design and develop an Internet of Things (IoT) based autonomous multi-purpose surveillance robot at a low cost that will roam around freely and give live updates about their surroundings by broadcasting video and information through the sensors installed. The sensors collect the data from the surroundings and send it to the ATmega328P which can be seen by the user any time. This technology is controlled by the user remotely through any device such as mobile phone, tablet or laptop with the help of IoT based services. The entire project is built and monitored by wireless platform to minimalize the use of wire and help it work smoothly in remote places. Further improvements and advancements in this project can help in reducing life risk of valuable soldiers or identification of any hostage in unknown places.

Keywords: ATmega328P, IoT, Autonomous, Surveillance, ESP32 Module, Thing speak.

I. INTRODUCTION

Surveillance is the method of systematic close observation of a person or area of suspicion. Surveillance is mainly required in the area of defense, intelligence gathering, disaster affected areas and in public places. Nowadays, tracing, tracking and attacking enemy troops in different areas proves to be a tedious task for army personnel[1]. There is always a chance of loss of the lives of soldiers on the battlefield and during emergencies. To develop a technology that serves the high speed and advanced capacity to control the robots and to devise new methods of control theory. To realize the above standards, some technical improvements along with the need for high performance systems are required to create a faster, reliable, accurate and more intelligent robot. This can be devised by advanced control algorithms, robot control devices and new drivers. To meet the requirements, we can use multimedia to control the user-friendly robot. Earlier, the robots were being controlled through

wired networks. But now, to make robots more user-friendly, they are framed to make user commanded work. The design of our project i.e., IOT based Multipurpose Surveillance robot encourages the development of a robotic vehicle based on Wi-Fi technology for remote operations connected with the phone that acts a camera mounted on the robot for monitoring/surveillance purposes. This IoT based Multipurpose Surveillance robot has or is embedded with a Node MCU (ESP8266) microcontroller for the desired operation and is generally used for monitoring purposes. The transmitting module on PC consists of push buttons that send commands to the receiving module for controlling the movement of the robot either to right, left, forward or backward. In the receiving module of this Surveillance robot, 2 DC motors are interfaced with the Node MCU(ESP8266) microcontroller to control its movement via motor driver IC(L298N). The Wi-Fi control transmits the signals to the receiver and has a range of up to 400m. The receiver collects and decodes the received signal's before feeding them to the Node MCU (ESP8266) microcontroller to drive the DC motors via motor drivers(L298N). Interfacing is done between the device and the Wi-Fi module. Wi-Fi module device receives the signals or commands from the ESP8266 microcontroller.

II. LITERATURE SURVEY

1. **J. Gao, X. Gao, W. Zhu, J. Zhu and B. Wei [1]**, have proposed a new snake robot with all body drive system based on rope system. This is a disaster management device and can climb into ruins to detect people and controlling it is simple compared to other kinds of snake robots. Snake robot has 11 bodies and 10 joints. Head and tail bodies have a main CPU, camera and communicator. The middle body has 9 tubes and all tubes have rope drive system on surface. Joints are used to sway and raise the body.

2. **Sushant Kumar and Dr S. S. Solanki [2],** 2016, discuss a system developed for remote surveillance of homes using an Arduino, IP camera and Team Viewer to monitor the system. A DTMF controlled remote is used to switch on the PC, camera and robot. Once the mobile phone is called and a particular set of keys are pressed, corresponding relay switches activate all the components required in the remote surveillance.

3. **Mohammad Shoeb Shah, P.B. Barole [3],** 2016 represents a low-cost, cost-effective robot using microcontroller Arduino UNO which can perform the act of tracking as well as rescue act. The robot is equipped with a passive infrared sensor, ultrasonic range module, temperature and humidity DHT11 sensor, air quality sensor MQ-135, accelerometer sensor, gyro sensor, magnetometer sensor, GPS sensor, Bluetooth and WIFI module, motor controller and robotic arm. The robotic arm is a type of articulated arm and consists of gripper for easy grasping of objects. It is controlled remotely by the end user via the Internet. It is connected with a solar panel to provide a device for charging the battery with solar energy.

4. **G. Anandravisekar, A. Anto Clinton, T. Mukesh Raj, L. Naveen, M. Mahendran [4],** designed a robot that perform the act of continuous surveillance in the household areas. The robot is controlled by a mobile phone or laptop via IoT using Cayenne software. Used to send instructions for a robotic system. Arduino connected with Wi-Fi module ESP-8266 for an unlimited range of operation accepts these commands. DC motors, ultrasonic sensor to detect any obstacle, IR sensors and a wireless camera that provides audio and video streaming data to the user used in this project.

5. **S. Jagadesh et al [5],** 2021designed this robotic vehicle using Wi-Fi technology for remote control of a wireless camera mounted on the robot. This robot uses a Node MCU ESP8266 microcontroller for the desired operation. Interfacing is done between the device and the Wi-Fi module. The Wi-Fi module device receives the commands from the ESP8266 microcontroller. This robot can be used for longer-range surveillance and capturing images during live streaming. Night vision camera makes surveillance easier during low lighting conditions. Lack of GPS, so the robot's location cannot be determined.

6. **Telkar, Aishwarya K and Baswaraj Gadgay [6],** 2021, has proposed a robot with a Wireless Night Vision camera that gives the live streaming of the robot surrounding area even during the night. Using an Android or PC, a controller unit controls the robot wheels via the Internet of Things. The GSM technology provides the notification to the control unit once the robot stops upon detection from sensors. The GPS receiver is used to track the robot and also to notify the user of the landmine or bomb's exact location.

7. **M. Sunitha et al [7] ,** 2022, propose a security robot that uses IoT to monitor key points in a home or workplace for the presence of intruders. With a live-stream camera attached to the robot, the picture of the intruder can be seen. As soon as the PIR sensor on the robot detects a human, the NodeMCUs attached to the GSM module triggers sound, alerting the user about the intruder. The Raspberry Pi board controls, monitors, and supervises all of these.

III. EXISTING SYSTEMS

The existing models such as Radio Frequency (RF), Bluetooth & GSM (Global System for Mobile communication) have various cons/disadvantages, few are that it works only for a short-range of distance or coverage area making it a bit difficult for surveillance or spying for a long range of distance, limited data transfer and lag in bandwidth.

The car is built primarily on a platform based on a microcontroller. Some of the fields that can

likewise be equally enhanced are the effect of the mouth-microphone range on the robotic, the overall performance (scope) of the robot and the effect of noise on the translation of speech to textual content. In the existing system Bit Voice Server is used, it's a database for speech processing and automation synthesis. It was designed to make voice operation possible with simple gadgets having low processing power. Microcontrollers usually do not have enough storage and computing ability to perform sophisticated speech treatment and synthesis. By doing the tough work Bit Voice Server removes the consequences of these limitations so that the microcontroller can assign its key functionality to most of its origin sources.

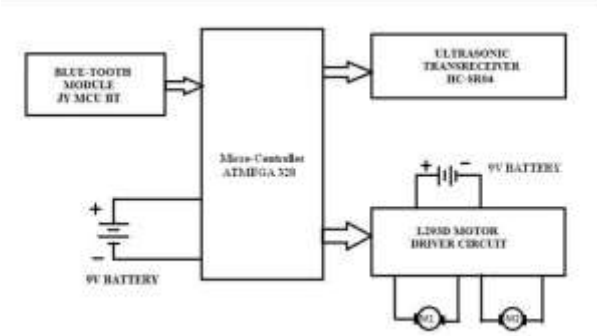

Figure-1: Existing System

IV. PROPOSED SYSTEMS

The main components of our block diagram are ATmega 328P controller, Node MCU (ESP8266), Metal Detector, Motor Driver(L298N), Battery(12V), Metal Detector, IR sensor, 2 DC Motors and ESP 32 used for capture the images as shown. DC motors are used for controlling robot's direction. Metal detector is used for detecting land mines which are placed on the ground. IR sensor is used to determine if the robot is near to an object. Building on this idea, the Robot is Controlled by the Arduino uno with the feedback provided by the Metal Sensor. It is controlled with the help of the remote control provided in the Arduino uno.

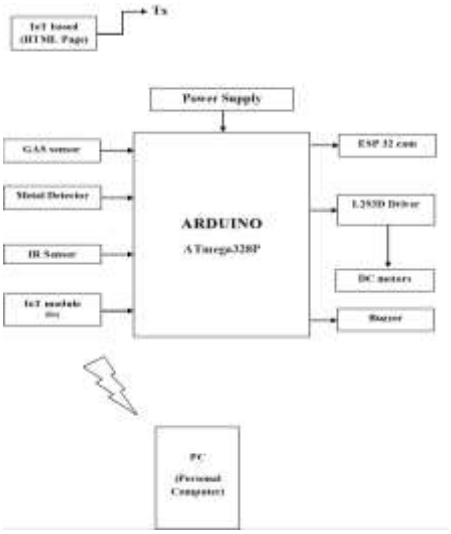

Figure-2: Proposed System

The surveillance camera, mounted on the robot, offers real-time video streaming for monitoring purposes. Operators can control the robot's movement using a remote interface, directing it towards areas of interest. The combined functionality of metal detection and surveillance makes the robot effective for security patrols, exploration of hazardous environments, and industrial inspections, providing a comprehensive solution for various applications.

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IoT module: - The ESP8266 is a Wi-Fi module which is used to provide internet access to the microcontroller. The commands are provided to the microcontroller via Blynk App to control and monitor the motion of the robot.

Motor driver (L298N): - As the name suggests, it is mainly used to drive motors. A single L298N is capable of running two DC motors at the same time; Also, the direction of the two motors can be controlled independently. The motor driver is used as an amplifier, to amplify the voltage supply to the motors. The motors operate at 12V, but the microcontroller provides only 3.3V to 5V at its output pins.

DC Geared Motors (150 RPM): - A DC motor is an electrical machine that converts electrical energy into mechanical energy. In a DC Geared Motors, the i/p electrical energy is the direct current (DC) which is transformed into the mechanical rotation. Robot Chassis & Wheels: - It's a simple accessory that particularly supports the making of a robot. Chassis is a very essential component not only in constructing robots but also for many mechanical devices. The components that are interfaced

are handled by a chassis for connecting components and accessories on it.

IR sensor: - IR Sensor Module is an electronic device, that emits the light in order to sense some object of the surroundings. Infrared (IR) sensors are also capable of measuring/computing the heat being emitted by an object and detecting the motion.

Metal Detector Sensor: - A metal detector is an instrument/device that detects the presence of metal nearby. It is also known has Proximity sensor. Proximity sensor means – if any object/target comes into its vicinity, it senses that object. A proximity sensor (metal detector) is a sensor able to detect the presence of nearby objects(target) without any physical contact. The metal detector is used to detect landmines or bombs underneath the robot.

Gas Sensor (MQ2): - A gas sensor is a device which detects the concentration or presence of gases in the atmosphere. Based on the concentration/presence of the gas, the MQ2 gas sensor produces a corresponding potential difference by Software requirements are as follows.

Arduino IDE: - Arduino IDE is an open-source software. It makes it easy to write the code and upload it to the board. This Arduino IDE software can be used with any Arduino board.

V. RESULTS

Assemble the circuit on the bread board and general board. After assembling the circuits on the boards check it for proper connections before switching on the power supply. The implementation of "**Cloud Based Multipurpose Connected Robot Using Think speak cloud**" is done successfully. The communication is properly done without any interference between different modules in the design. Design is done to meet all the specifications and requirements. It can be concluded that the design implemented in the present work provide portability, flexibility and the data transmission is also done with low power consumption.

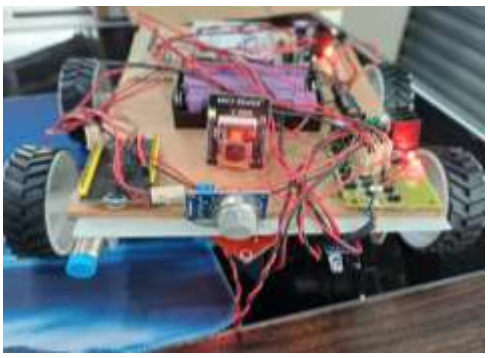

Figure-3: Hardware Kit

Figure-4: Blynk IoT Application

Figure-5: Surveillance app

CONCLUSION

In conclusion, the metal detector robot leveraging surveillance camera technology presents a promising amalgamation of hardware innovation and software algorithms and an object and metal detection system using IoT controlled robotic vehicle has the potential to provide significant benefits to various industries, particularly in terms of automation, efficiency, and safety. By harnessing the power of surveillance cameras with high-resolution imaging capabilities and integrating metal detector sensors into a mobile robotic platform, this project achieves a versatile solution for detecting metallic objects in diverse environments. enables real-time analysis of the camera feed, facilitating the identification of potential threats or targets. By utilizing wireless communication and metal detection technology, such a system can enable precise operations while also detecting and removing any metallic objects that could pose a risk to machinery or personnel.

In essence, the metal detector robot represents a compelling advancement in robotics and surveillance technology, poised to make significant contributions to fields requiring efficient detection and response capabilities. However, the system's effectiveness can be limited by factors such as power supply, signal interference, and accuracy of metal detection. Overall, a pick and place object and

metal detection system using Internet controlled robotic vehicles represents a promising technological solution for improving efficiency, safety, and productivity in various industries. As technology advances and further improvements are made, it is likely that such systems will become even more widespread and transformative in their impact.

REFERENCES

[1] J. Gao, X. Gao, W. Zhu, J. Zhu and B. Wei, "Design and research of a new structure rescue snake robot with all body drive system," 2008 IEEE International Conference on Mechatronics and Automation, 2008.

[2] Sushant Kumar and Dr. S. S. Solanki, “Remote Home Surveillance System “, 2016 International Conference on Advances in Computing, Communication, & Automation (ICACCA), 29 September 2016.

[3] Shah, Mohammad Shoeb, and P. B. Borole. "Surveillance and rescue robot using Android smartphone and the Internet." 2016 International Conference on Communication and Signal Processing (ICCSP). IEEE, 2016.

[4] G. Anandravisekar, A. Anto Clinton, T. Mukesh Raj, L. Naveen, M. Mahendran, “IOT based Surveillance Robot”. Department of Electronics and Communication Engineering Saranathan College of Engineering Trichy, Tamilnadu, India. “International Journal of Engineering Research & Technology (IJERT)”,2018.

[5] S. Jagadesh, R. Karthikeyan, R. Manoj Prabhakaran, R. Ramesh and C. Shanmugam. "Surveillance Robot Using Microcontroller ESP8266". IJAREEIE Vol. 8, Issue 3, March 2019.

[6] Kumar, N. Ashok, P. Nagarajan, Mr Neeruganti Vikram Teja, and Mr Raja Suresh. "Intelligent Greenhouse Monitoring and Controlling By Using Python on Raspberry Pi." EFFLATOUNIA-Multidisciplinary Journal 5, no. 2 (2021).

[7] Telkar, Aishwarya K., and Baswaraj Gadgay. "IoT Based Smart Multi Application Surveillance Robot." 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA). IEEE, 2020.

[8] Sunitha, M., et al. "IP Based Surveillance Robot Using IOT." 2020 Fourth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC). IEEE, 2020.