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IOT Based Multi-Tasking Robot for Military Applications

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ABSTRACT:

In recent years, the integration of Internet of Things (IoT) technology with robotics has led to the development of versatile and intelligent robotic systems capable of performing a wide range of tasks autonomously. In this study, we present the design and implementation of an IoT-based multitasking robot equipped with a metal detection system. The robot is designed to operate in various environments, including industrial settings, public spaces, and disaster recovery scenarios, where the detection of metallic objects is crucial for safety and security purposes. The main theme of this project is to design a multitasking robot that can be controlled by an IOT platform from anywhere in order to monitor the area where people can't go such as restricted buildings, central rooms, as a military spy robot. One can monitor the location on live by an IP camera from their mobile phone.

Additionally the robot has a feature of metal detection with the help of metal detector proximity sensor which will give us a notification of metal being detected at the point as an alert.

Keywords: IOT, Multi-Tasking Robot, Monitor, Metal Detection System.

Introduction :

This versatile robotic platform seamlessly integrates IoT technology, enabling remote monitoring and control via connected devices such as smartphones or computers. Equipped with an array of sensors and actuators, this robot boasts unparalleled multitasking capabilities, capable of performing a myriad of tasks across different environments.

At the heart of this robot lies its advanced metal detection system, utilizing state-of-the-art electromagnetic sensors to detect metallic objects with exceptional precision and accuracy. Whether it's in industrial settings for detecting metallic contaminants in manufacturing processes or in security applications for identifying concealed weapons, this system ensures reliable detection while minimizing false alarms. Moreover, the IoT integration empowers users with real-time data insights and seamless automation. Through cloud connectivity, users can remotely monitor the robot's activities, receive alerts, and even program autonomous routines for specific tasks. This not only enhances operational efficiency but also enables proactive maintenance and optimization of workflows.

In industrial scenarios, this multitasking robot can navigate complex environments, performing tasks such as inventory management, equipment inspection, and even assisting in maintenance operations. Its metal detection capability adds an additional layer of safety by ensuring that metallic hazards are swiftly identified and mitigated.

In security and law enforcement applications, the robot can patrol designated areas autonomously, scanning for metallic threats while providing live video feeds to operators. With its multitasking capabilities, it can simultaneously perform surveillance, perimeter monitoring, and respond to potential security breaches, thereby enhancing situational awareness and response times.

Overall, the IoT-based multitasking robot with a metal detection system represents a leap forward in robotics technology, offering unparalleled versatility, efficiency, and safety across a wide range of industries and applications. Its integration of IoT connectivity and advanced sensing capabilities heralds a new era of intelligent automation and security solutions.

Literature Survey :

[1]. Wireless Video Surveillance robot using Raspberry Pico; M.Kasiselvanathan, A. John Richardson, M. Karthikeyan, M. Bala Murugan; International Journal of Advanced Research in Science, Communication and Technology.

The Raspberry Pi uses a motion detection algorithm to enable live-streaming cameras and motion detection. Your cell phone can be used to see live video cameras in real-time. Additionally, the system dramatically reduces memory utilization by using motion detection techniques, which reduces investment

expenses. The Raspberry Pi uses a motion detection algorithm to enable live-streaming cameras and motion detection. Any web browser, even those on mobile devices, allows for real-time viewing of live video cameras.

[2]. Surveillance Robot using Raspberry Pi and IOT; Harshitha. R, Mohammad Hameem Safwat Hussain; IEEE

Remote surveillance and monitoring of our homes has seen a growing need in emerging times. By means of this paper, we put forward a surveillance robot which can be integrated into any kind of household. The base controller of the bot will be the powerful Raspberry Pi 3 Model B. A webcam attached to the Pi, monitors the area and sends a notification when any trespassing or obtrusion is detected. The camera also possesses face recognition algorithm which will possess the ability to identify the person responsible for the motion triggering. If it is an authorized personnel, the on board voice assistant will start talking with the person. The notification will be sent only when it's an unauthorized personnel and will contain pictures clicked of the trespasser and also activate live streaming of the webcam feed. The live streaming ability of the Pi allows the camera feed to be analyzed from any location using internet. With such a system, every user will feel more sheltered while they're not at their place of residence or when they've left their children and old ones alone at home.

[3]. Video Surveillance Robot using Smart Phone and Raspberry Pi; Ashish.U. Bokade, V.R. Rathnaparkhe; IEEE

This paper proposes a method for controlling a wireless robot for surveillance using an application built on Android platform. The Android application will open a web-page which has video screen for surveillance and buttons to control robot and camera. Android Smartphone and Raspberry pi board is connected to Wi-Fi. An Android Smartphone sends a wireless command which is received by Raspberry pi board and accordingly robot moves. The Video Streaming is done using MJPG streamer program that gets mjpeg data and sends it through a HTTP session. The Raspberry pi programming is done in python language. The experimental result shows that the video streamed up to 15 frames per second.

[4]. Surveillance Robot using Microcontroller ESP8266; S. Jagadesh, R. Karthikeyan, R. ManojPrabhakaran, R.Ramesh, C. Shanmugan; International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

It is known that humans cannot go to the hazardous places, so robots are required where human

intervention are nearly impossible. Generally, there are many threats to humans in the dangerous areas. So to avoid those causes, the wireless surveillance robot can be used. This project proposes a working for controlling the wireless surveillance robot using Adafruit server. This project is to build a Wi-Fi controlled mobile robot based on the microcontroller ESP8266.The present condition of the target place can be monitored using various sensors such as DHT11 sensor for humidity and temperature reading. It monitors each area to detect any intrusion using 360 degree camera. This gives a live video stream to the ground station authority. The control of the robot are integrated on a “adafruit ” server by using a certain commands. Finally it will be able to control the robot using computer and laptop.

[5]. Robotic Car using NodeMCU ESP8266 WiFi Module; Siddesh G.K, Rakesh Kumar Patel, Sayan Maitra, Sabitabrata Bhattacharya, Shaik Moosa, Pattubala Pavan; IEEE

This paper presents an insight into a Wi-Fi controlled car using NodeMCU ESP8266 module for car controlling, and ESP32 Cam Module, which collects the visual data, as well as maintains the Wi-Fi connection. This robot can be remotely controlled even if it’s out of sight, but within the optimum range of the connection technology, Wi-Fi. The physical movement of this robot, is controlled using the L298N Motor Driver, which in turn is connected to the 4 DC motors, and the control from this motor driver, would be directed through these 4 motors to the respective wheels, thereby letting the user to control the movement of the robot. Along with this, the ESP32 Cam Module would collect the visual data of the nearby close areas, and relay it back to the Wi-Fi connected device, which could be a smartphone or any such device. The base hardware on which this robot unit is made, is hard plastic which gives the unit a physical durability, and thus usable for use in rough areas like industrial sites or in underground mines for surveillance purposes.

Proposed System :

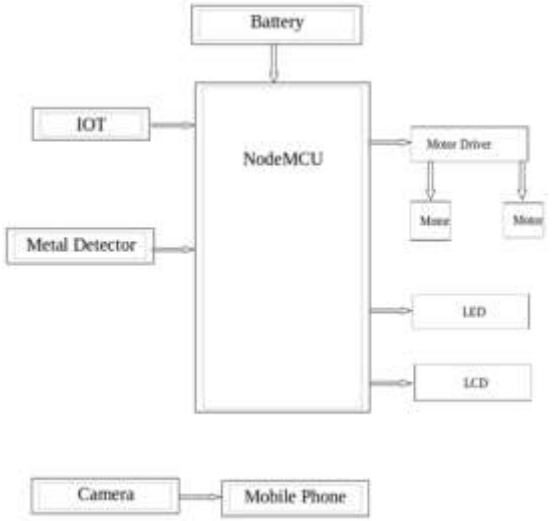

Fig. 1. Block diagram of Proposed Method

The block diagram of the proposed system is shown in Fig. 1.

In the proposed system, we will be having a nodemcu microcontroller, metal detector proximity sensor, and a robot platform that runs on battery power and also an led indicator.

The controlling of the robot is done by the user on a third party IOT platform. On detection of metal on the way of robot, an alert notification as a text is sent to user via the IOT platform. The led is to indicate the activation of self-destruction from user which will turn ON after the count of 10 once the virtual button from IOT is clicked.

Live monitoring is done via the IP camera from mobile phone.

Hardware: On Data receive from IOT, nodemcu will generate digital pulses accordingly to the L293D motor driver module in order to controll the robot platform in 4 different directions (Forward, Left, Right, Backward).

The metal detector sensor will generate analog signal at its output according to the presence of metal in front of it. Once metal is identified, a text widget on the IOT server will display Metal detected.

On virtual destruct button click from server, nodemcu will receive the data and starts the count down of 10. once counting is done, an led is indicated on the chassis.

The wifi camera access will be done through an open mobile application with various features of night vision, 360 degree rotation covering left and right and top.

L293D is used to control the direction and speed of a two motors at a time. In this IC we have a dual H-Bridge circuit for this specific operation.

Software: For Programming onto NodeMcu, Arduino IDE is used with C Programming language. And for IOT platform with virtual button widgets that sends data to Nodemcu, we used Adafruit IO.

We'll create 6 button widgets on the IOT server: Forward, Left, Right, Backward, Stop and Destruct. And one textbox widget for metal detection status.

Once all setup on the server we will get api key and username from the account and use on our source code to access the data send from the server.

NodeMCU should be connected to Wifi before connecting to adafruit server. Once wifi connected, MQTT connection to adafruit will starts. Once connected we can able to send the data from the server. If connection to MQTT fails, it will try to reconnect.

Results :

The results of the proposed system hardware kit and the control from IOT server adafruit is depicted here in this section**Fig. 3. Hardware Kit**

Fig. 4. Hardware kit with IP camera

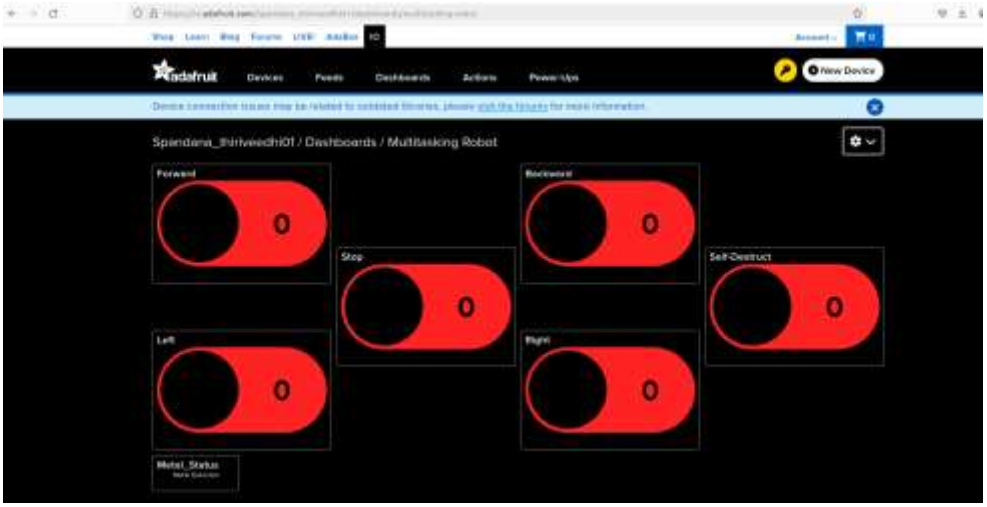

Fig. 5. Adafruit IO server

Conclusions :

In conclusion, the implementation of an IoT-based multitasking robot equipped with a metal detector sensor, utilizing ESP8266 and an IP camera for control, presents a promising fusion of advanced technology for diverse applications. By leveraging the power of the Internet of Things, this robot can efficiently execute multiple tasks, ranging from security surveillance to industrial inspections. The integration of a metal detector sensor enhances its capabilities, enabling it to detect metallic objects accurately. Moreover, the utilization of an IP camera for control offers remote accessibility and real-time monitoring, ensuring seamless operation and enhanced situational awareness. Overall, this innovative solution underscores the potential of IoT in robotics, paving the way for versatile, efficient, and intelligent automation in various domains.

REFERENCES :

[1] Sanjana,P., Mahalakshmi, P., John Clement Sunder,A., Swathi,R., “Smart Surveillance Monitoring System Using Raspberry PI and PIR Sensor”, International Journal of Computer Science and Information Technologies(IJCSIT),5(6)(2014):7107-7109.

[2] Naga Jyothi,S., and Vijaya Vardhan,K., “Design and implementation of real time security surveillance system using IoT”, International Conference on Communication and Electronics Systems (ICCES), IEEE conference(2016):1-5

[3] Gaurav S Bagul, Vikram C Udawant, Kalpana V Kapade, Jayesh M Zope, “IOT Based Surveillance Robot”,International Journal of Trend in Research and Development (IJTRD), 5(2) (2018):228-231.

[4] Dharaskar, M., Gupta, V., Priyanka, K., Reeta, C., Aayush, J., Sharadkumar, G., “IOT Based Surveillance Robotic Car Using Raspberry PI”, International Research Journal of Engineering and Technology (IRJET), 5(3)(2018):442-425

[5] Joshi, S. A., Aparna Tondarkar, Krishna Solanke, Rohit Jagtap, “Surveillance Robot for Military Application”, International Journal Of Engineering And Computer Science, 7(5) (2018): 23939-23944