IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 11, Issue 8, August 2023

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

9940 572 462 | 6381 907 438 | ijircce@gmail.com | www.ijircce.com

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 8, August 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1108026 |

Defence Camoflage Robot

Aditya Kumar[1], Darshini B. S[2], Rajeshwari G. S[3], Sukumar Swamy H. S[4], Bhagya Shanthakumar[5]

Students, Department of Electronic's and Communication Engineering, Bapuji Institute of Engineering and Technology, Davanagere, India[1][2][3][4]

Assistant Professor, Department of Electronic's and Communication Engineering, Bapuji Institute of Engineering and Technology, Davanagere, India [5]

ABSTRACT: Camouflage Robot plays a vital role in saving human loses as well as the damages that occur during disasters. Thus, it will gain more importance in the upcoming era. The robot basically consists of a vehicle mounted with one camera, which captures the images and detects color accordingly as a part of the camouflaging feature. The robot can quietly enter into enemy area and send information via camera to the controller. The main motive of this paper is to make the defence more strong by using the robots, which will help defence to safeguard the human lives. This paper has proposed the system using the Arduino, metal detectors, gas sensors which help the robot to do multi functionalities to do rescue operations.

KEYWORDS: *Defence, Camouflage, App, Wifi module, Arduino uno, Metal sensor, Color sensor.*

I. INTRODUCTION

Robots are automated devices that can perform harsh complex tasks easily with much of the problem. Integrating technology with the hardware makes robots much efficient. The robots can be used for attacking enemies, disaster management, and civil supplies, in defense. The model utilizes different sensors which makes it more efficient in different conditions. By using this, we can reduce the death rate of the soldiers.

In the modern combat techniques employed by various militant forces across the globe, stealth and ability to man over in inaccessible areas plays a key role. The idea of the proposed system is to use robots which are capable of disguising itself in order to infiltrate the enemy campsite. The word robot means "A machine which is capable of performing complex series of actions automatically that is programmable by a computer." These robots used in defense are usually employed with the integrated system, including cameras, sensors and video screens. The main motive behind Camouflage Robot is to reduce human losses in terrorist attacks or military operations Many military organizations take the help of robots in the risk prone areas. Camouflage Robot acts as a virtual spy that can quietly enter into enemy area and send information via camera to the controller.

The movement of the robot is remotely controlled using a mobile. Robots can be made to interact and cooperate more closely with human beings by incorporating additional features such as robustness and autonomy. A versatile perception and recording of different parameters in this robot are accomplished using a multi-sensor platform. In this system an interfacing module is incorporated to remotely sense the object parameters using IoT (Internet of Things). Finally, the purpose of the project is to design, manufacture and operate a robot using a remote-controlled device. A small mobile robot is designed which can duplicate its colors similar to the platform it moves on, appearing as camouflaged to the outside world of the soldiers

II. LITERATURE SURVEY

In recent times, the defense sector has been investing significantly to enhance security measures, especially at borders. Robotic technologies have emerged as crucial assets, outperforming human efforts in various aspects. Camouflage robots have particularly proven their significance in minimizing human losses and damages during disasters. They comprise vehicles equipped with cameras, enabling image capture and color detection for effective camouflage. This technological advancement is anticipated to gain prominence in the foreseeable future, Arduino mega for interfacing with the BLYNK app. Arduino will provide commands and processes from sensors. GPRS module and Wi-Fi module helps in communication between the robot and the smartphone [1]. One approach to reinforcing defense mechanisms involves the utilization of robots in conjunction with advanced technologies. For instance, researchers have proposed

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 8, August 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1108026 |

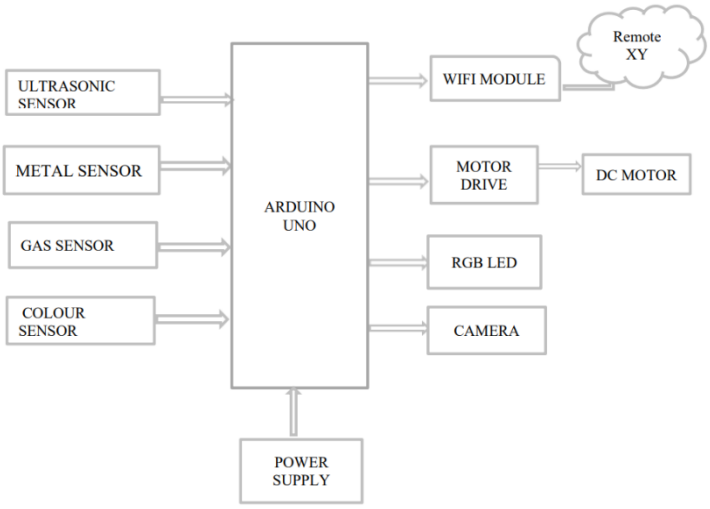
the deployment of Arduino-based systems, along with sensors like metal detectors and gas sensors. These multifunctional robots can carry out diverse tasks, including rescue operations and surveillance. IR sensors can be used for object detection in cameras [2].

Another study explores the concept of a multinational army robot, incorporating camouflage technology. These robots are equipped with cameras, sensors, metal detectors, and video screens. Utilizing Wi-Fi modules enhances real-time data processing, making use of camera input and integrating PIR sensors for intruder detection, Army robots are confining with the camera Sensor, metal detector and video by camera at the video screen and PIR sensor to trace the intrudes [3]. Furthermore, a unique innovation focuses on night vision camouflage robots for defense applications. These robots employ color sensors to analyze their surroundings and adapt their camouflage based on detected colors. This adaptive feature prevents easy detection by adversaries, marking a significant advancement in modern defense strategies. Night vision cameras complement these robots, enabling observations even in challenging lighting conditions. Different sensors in the robot. Color sensor helps us in analyzing the surrounding, Gas sensor in analyzing the toxic gases present in the environment, PIR sensor is used to detect changes made in the surrounding, metal sensor to detect metal objects in the surrounding

III. BACKGROUND AND RELATED WORK

Several apps and software programs are available in the market for children with learning disabilities. Some of these apps provide learning tools for specific disabilities, while others offer a range of features for various disabilities. Some of the popular apps in this category include "Learning Ally," "Read & Write," and "SnapType." However, there is a need for a comprehensive and user-friendly app that provides an alternative and interactive learning experience for children withlearning disabilities.

IV. METHODLOGY



Reproduce the color independently at various areas with specific spots of the ground surface which allows the robot to mock up as a checkerboard of multiple colors i.e. the various colors it drives over. In this system the movement of the robot can be controlled in any required direction using IoT platform and smart phone which receives the information from the sensors and camera. The main processor used in this system is Arduino UNO, which is a microcontroller board based on the ATmega series is much more advanced since it has many more peripherals that can be easily programmed when compared to 8051 Microcontroller. An ultrasonic sensor is incorporated which measures the distance to an object by using sound waves and helps in detecting the obstacles .

A metal detector is used for finding metal inclusions hidden within objects, metal objects buried underground and also for detecting the presence of nearby metallic devices such as bombs and guns. The color sensor employed detects the color of the ground, usually in the RGB scale . A DC motor which is a class of rotatory electrical machine is

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 8, August 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1108026 |

employed and that converting direct current to mechanical energy. Here 2 DC motors are used for the movement of the robot which is controlled via mobile (Android application).

V. TECHNOLOGIES USED TO DEVELOP

1. ultra sonic sensor
2. RGB sensor
3. color sensor
4. gas sensor
5. wifi module,
6. motor driver
7. arduino uno
8. metal sensor

Ultrasonic Sensor: An ultrasonic sensor uses sound waves above the range of human hearing to detect the distance between the sensor and an object. It emits ultrasonic pulses and measures the time taken for the pulses to reflect back after hitting an object. This technology is commonly used for distance measurement and obstacle avoidance in robotics.

RGB Sensor: An RGB sensor is a device that detects and measures the intensity of red, green, and blue light in the visible spectrum. It's used to accurately identify and quantify colors. RGB sensors are often found in devices like colorimeters and cameras, allowing them to capture and process color information.

Color Sensor: A color sensor is similar to an RGB sensor but is designed specifically for detecting and identifying colors. It can differentiate between different colors and provide color information based on the specific wavelengths of light reflected from an object's surface. Color sensors are used in various applications such as color recognition and sorting.

Gas Sensor: Gas sensors are used to detect the presence and concentration of specific gases in the environment. They work by interacting with gases, causing changes in electrical conductivity, resistance, or other properties. Gas sensors find applications in safety systems, environmental monitoring, and industrial processes.

Wi-Fi Module: A Wi-Fi module is a hardware component that enables devices to connect to wireless networks, allowing them to communicate and exchange data over the internet. These modules incorporate Wi-Fi technology, making them suitable for IoT devices, home automation, and various wireless communication applications.

Motor Driver: A motor driver is an electronic circuit or module that controls the movement of motors. It provides the necessary current and voltage to drive the motor, allowing precise control over its speed and direction. Motor drivers are commonly used in robotics, automation, and motion control systems.

Arduino Uno: Arduino Uno is a popular open-source microcontroller board based on the Atmega328P microcontroller. It offers a simple and versatile platform for creating various electronic projects. Arduino Uno is widely used in prototyping, DIY projects, and educational purposes due to its user-friendly interface and extensive library support.

Metal Sensor (Metal Detector): A metal sensor or metal detector is a device that can detect the presence of metallic objects or materials in its vicinity. It works by generating an electromagnetic field and analyzing changes in the field caused by nearby metal objects. Metal detectors are used in security screening, archaeological exploration, and industrial applications.

VI. RESULTS

The Defense Camouflage Robot utilizes a combination of diverse sensors, the Arduino UNO microcontroller, and specialized software applications to achieve its functionality. The initial configuration of the robot involves an IR sensor, which is employed to detect and provide output regarding the presence of objects. This output is communicated

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 8, August 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1108026 |

via the RemoteXY application. The advanced capabilities of the robot are enhanced by the integration of an ultrasonic sensor. This component accurately measures distances to identified objects and seamlessly relays this information through the RemoteXY application.

Furthermore, the robot is equipped with a camera that continuously captures the surrounding environment. The camera's orientation can be effortlessly adjusted to desired angles using the eZyKam+ application, providing real-time visual access. The integration of a color sensor serves a crucial role in our project. It detects the prevailing colors in the surroundings and forwards this data to the RGB sensor. Consequently, the robot's external appearance changes to blend harmoniously with its environment.The movement of the robot is made possible through a motor driver. This vital component translates commands into robot movement, allowing precise control. This movement can be managed via the RemoteXY app, facilitating the robot's navigation to intended destinations.

To bolster the robot's capabilities, both metal and gas sensors have been incorporated. These sensors effectively detect harmful metals and gases, generating corresponding outputs. If the environment is devoid of such elements, a reading of zero is displayed in the RemoteXY application. In line with its role as a surveillance tool, the robot serves as a valuable asset in military applications. Its potential to monitor and track adversaries' activities renders it indispensable in strategic operations.

Overall, the Defense Camouflage Robot showcases a synergy of cutting-edge sensors, the Arduino UNO, and software applications to create a formidable and versatile tool for defense and reconnaissance purposes.

VII. CONCLUSION

In conclusion, the development of a camouflage robot offers numerous advantages and potential applications. This project aimed to create a robot that can blend seamlessly into its environment, mimicking the appearance of its surroundings to remain undetected or to achieve specific objectives. Throughout the project, we have successfully designed and implemented a camouflage robot that utilizes advanced technologies and strategies to achieve effective camouflage. By incorporating adaptive coloration, pattern recognition, and environmental mapping, the robot can dynamically adjust its appearance to match its surroundings.

VIII. FUTURE SCOPE

The future scope of camouflage robots is vast and holds significant potential in various fields. Here are some potential areas where camouflage robots could find applications:

•Military and Defense: Camouflage robots can be used for reconnaissance, surveillance, and covert operations in military and defense settings. These robots can blend into the environment, making them difficult to detect and increasing their effectiveness in gathering intelligence or executing strategic missions.

• Search and Rescue: Camouflage robots equipped with advanced sensors and cameras can navigate through challenging terrains during search and rescue operations. By mimicking their surroundings, these robots can avoid detection by potential threats or assist in locating survivors more effectively.

• Environmental Monitoring: Camouflage robots can be deployed in natural habitats to study and monitor wildlife without disturbing their behavior. By mimicking the appearance and movement patterns of local animals, these robots can gather data on ecosystems, species distribution, and behavior.

•Industrial Applications: Camouflage robots can be employed in industrial settings to blend in with machinery, equipment, or the environment. This can aid in automated monitoring, maintenance, and inspection processes, improving efficiency and safety.

• Law Enforcement: Camouflage robots can assist law enforcement agencies in undercover operations or stakeouts. These robots can hide in plain sight, observe criminal activities, and provide valuable intelligence to law enforcement personnel.

• Entertainment and Media: Camouflage robots could be used in the entertainment industry, such as movie production, by creating realistic animatronic characters that seamlessly blend into scenes. They can also be utilized in theme parks and interactive exhibits to enhance visitor experiences.

• Urban Planning and Architecture: Camouflage robots equipped with advanced mapping and surveying capabilities can aid in urban planning and architecture. These robots can analyze the environment,

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 |

|| Volume 11, Issue 8, August 2023 ||

| DOI: 10.15680/IJIRCCE.2023.1108026 |

collect data on buildings and infrastructure, and provide insights for designing more sustainable and aesthetically pleasing urban spaces.

REFERENCES

[1] Akash Ravindran, Akshay Premkumar, "CAMOUFLAGE TECHNOLOGY", Department of Electronics & Communication Engineering, IJETC K. S. Kumar, M. R. Elara, E. A. Martinez and R. C. Ambrosio, "Designing and experimenting bio-inspired chromatic behaviours in surveillance robot," 2015 10th International Conference on Information, Communications and Signal Processing (ICICS), Singapore, 2015.

[2] A. M. Siddek, "Depth-level based camouflaging using RGB-D sensor," 2017 IEEE International Conference on Systems, Man, and Cybernetics (SMC), Banff, AB, pp. 2349-2354, 2017.

[3] A. Rodic, D. Katie and G. Mester, "Ambient intelligent robot-sensor networks for environmental surveillance and remote sensing," 7th International Symposium on Intelligent Systems and Informatics, Subotica, 2009, pp. 39-44, 2009.

[4] A. Leelasantitham and P. Chaiprapa, "A study of performances on an automatic IEEE 802.11g wireless-standard robot using infrared sensors," 2008 IEEE International Conference on Robotics and Biomimetics, Bangkok, pp. 1556-1560, 2009.

[5] B. Ammar, N. Rokbani and A. M. Alimi, "Learning system for standing human detection," 2011 IEEE International Conference on Computer Science and Automation Engineering, Shanghai, pp. 300-304, 2011.

[6] A. Alexander and M. M. Dharmana, "Object detection algorithm for segregating similar coloured objects and database formation," 2017 International Conference on Circuit ,Power and Computing Technologies (ICCPCT), Kollam, pp. 1-5, 2017.

[7] N. Oza and N. B. Gohil, "Implementation of cloud based live streaming for surveillance," 2016 International Conference on Communication and Signal Processing (ICCSP), Melmaruvathur, pp. 0996-0998, 2016.

[8] Brett Browning and Manuela Veloso “Real-Time, Adaptive Colour-based Robot Vision” August 2005, Conf.loc. Edmonton, Alta., Canada, 2005.

INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 8.379

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details