War Field Spying Robot

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Abstract : In This Paper aiming to increase the safety because by using this robot we can know their activities by keeping some safe distance from the enemy, the flexibility of attacking will be increased because we can know their activities and there will be a laser that will lock the position of the enemy and guides the missal, this is also contain the metal detector that will helpful in detecting the land mains which will lead to death, and control of this robot will be very easily done because it is controlled wirelessly and by connecting to Bluetooth of any android mobile. We have done this project for our army to detect the land mains safely and for the safety of our soldiers and to attack them without keeping our army soldiers life on the line. he intention of this system is to reduce human victims in terrorist attack such as 26/11. So this problem can be overcome b2y designing the RF based spy robot which involves wireless Devices, So that from this it will be easy to examine rivals when it required. This robot can quietly enter into enemy area and sends us the information via wireless Devices. Robotics has been a staple of advanced manufacturing for over half a century. As robots and their peripheral equipment become more sophisticated, reliable and miniaturized, these systems are increasingly being utilized for military and law enforcement purposes. Mobile robotics play an increasingly important role in military matters, from patrol to dealing with potential explosives. "With suitable sensors and Devices to perform different missions, mobile robots are operated remotely for reconnaissance patrol and relay back video images to an operator. Now-a-days android smart phones are the most popular gadget. There are multiple applications on the internet that exploit inbuilt hardware in these mobile phones, such as Bluetooth, Wi-Fi and ZigBee technology to control other devices. With the development of modern technology and Android Smartphone, Bluetooth technology aims to exchange data wirelessly at a short distance using radio wave transmission comprising features to create ease, perception and controllability. Here we have designed a robot that can be controlled using an application running on an android phone. It sends control command via Bluetooth which is interfaced to the controller. The controller can be interfaced to the Bluetooth module though UART protocol. According to commands received from android the robot motion can be controlled. And hence the required actions can be taken.

I. INTRODUCTION

Project War Field Spying Robot is an innovative initiative focused on developing advanced robotic systems for reconnaissance and intelligence gathering in challenging battlefield environments. The project aims to design and deploy robots equipped with cutting-edge sensors, cameras, and communication technologies to gather crucial information from hostile territories without risking human lives. The War Field Spying Robot comprises several key components, including a rugged and maneuverable robotic platform capable of navigating diverse terrains such as rough terrain and urban environments. It is equipped with a variety of sensors, including visual cameras, infrared cameras, microphones, and environmental sensors, allowing it to perceive its surroundings, detect enemy movements, and gather valuable intelligence data.

Advanced communication systems enable the robot to transmit real-time data and video feeds to military command centers or remote operators, facilitating informed decision-making based on the latest intelligence gathered by the robot. Additionally, the robot possesses autonomous capabilities, allowing it to navigate and perform tasks independently, crucial for situations where communication with operators may be limited or disrupted.

To avoid detection by enemy forces, the robot may be equipped with stealth features and camouflage capabilities, enabling it to operate covertly and gather intelligence without alerting the enemy. It is also capable of processing and analyzing data in real-time, identifying relevant information and prioritizing it for transmission to command centers, thereby enabling rapid decision-making by military commanders. Project War Field Spying Robot aims to develop advanced robotic systems for reconnaissance and intelligence gathering in challenging battlefield environments.

It involves designing robots equipped with cutting-edge sensors, cameras, and communication technologies to gather crucial information from hostile territories without risking human lives. The robot serves as the physical platform for carrying out reconnaissance missions, designed to be rugged and maneuverable. Its sensor suite includes visual and infrared cameras, microphones, and environmental sensors for perceiving surroundings and detecting enemy movements. Communication systems enable real-time data and video transmission to military command centers. The robot possesses autonomous capabilities for independent navigation and task execution, crucial for situations with limited communication.

The major innovative prior work in the defined sector of automated robots for military operations provides the window for major development as being one of the major requirements of time in the current geopolitically changing world. Thus, another attempt has been made to introduce robots for spying and monitoring the territories, borders, and desired areas. The present robot includes a combination of hardware and software thereby making it more reliable and trustworthy for ground-level applications. The primary hardware used includes Bluetooth Wi-Fi and Zigbee technology which controls the robotic systems as per the instructions of the operator. Bluetooth technology strives to communicate data wirelessly at a short distance through radio wave transmission, with features to produce ease, perception, and controllability. The proposed robot can further be controlled using Android phone applications thus weekend produce an accurate and technologically advanced robot that can prove worthy oground-levelel inventory actions and provide necessary prerequisite access to the military.

Furthermore, the robot proposed by Yadav Priyanka et al. has the main motive to avoid and assist in terrorist attacks and major conflicts. The proposed RF-based spy robot involves a wireless camera that from this it will be easy to examine the actions aimed at people when and while required. This robot can quietly enter the enemy area where it gathers and transmit information via wireless camera. The movement of this robot is wirelessly controlled by a handheld RF transmitter to send commands to the RF receiver mounted on the moving robot. Since human life is always valuable, these robots are the substitution for soldiers in war areas. This spy robot can also be employed at places where the population is highly best including at railway stations, airports, public gatherings, hotels, shopping malls, and others.

Currently, the unprecedented changes in geopolitics in the world have made a strong military one of the key priorities of major countries. As a result of which there are many technological advancements being carried out in-ground systems naval systems and air-operated systems of the military. In the current warfares, artificial intelligence machine learning robotics systems have been extensively used on a large level to replace the man system with machines and the machines have been introduced with highly cleverer and intelligent systems which are capable of multiplying the effort of an individual and assist the military in applications where actual human systems cannot be deployed. Such an example of which is the spying and patrolling of border areas wherein there is always a security threat of getting caught while keeping an eye on the territorial changes and adverse advancements in the border areas. One of the research papers by Jignesh Patoliya, proposed the robotic systems wherein the main objective behind developing this robot is for the surveillance of human activities in the war field or border regions in order to reduce infiltrations from the enemy side. The robot consists of a night vision wireless camera which can transmit videos of the war field in order to prevent any damage and loss of human life. Military people have a huge risk of their lives while entering unknown territory. The robot serves as an appropriate machine for the defense sector to reduce the loss of human life and will also prevent illegal activities. It will help all the military people and armed forces to know the condition of the territory before entering it [1]. Another spy robot was proposed by Yadav Ankit et al. wherein the Spying Robot is developed by a combination of various technologies and sources. The study proposed was primarily focused on how the next generation war spy robot is to be made and what the sources or technologies used to make this robot and how this robot would prove helpful in so many ways to the military and other miscellaneous applications. Basically, the project is designed to develop a robotic vehicle named Smart Spy Robot using RF technology for remote operation attached with a webcam application for monitoring purposes. The robot along with a wireless camera can wirelessly transmit real-time video and will give confidential information regarding opposite parties. An 8051 series of microcontrollers have been utilized for the desired operation.

II. SIGNIFICANCE OF THE SYSTEM

The paper mainly focuses on how Robotic techniques in the War field can be applied to reduce the risk factors of human lives in the war field. The study of literature survey is presented in section III, Methodology is explained in section IV, section V covers the experimental results of the study, and section VI discusses the future study and Conclusion.

III. LITERATURE SURVEY

1. Application of automation and robotics in construction work execution. Author : Zuzana strukova , Matej liska .The construction of any building includes different stages of construction processes from earthworks, through the construction of structure (concreting, frames assembly, walling ...) to finishing works. It is desirable to lower the level of labor force dependence and increase efficiency by applying specialized automation in construction sites. Hence, several researchers have intensively searched for suitable ways to introduce automation and robotics into construction sites.

2. Arduino-based Spy Robot using Night Vision Wireless camera. Author: Vishwal Karad, Jasawini Pradhan, Meghana Patil, S.S. Jadhav. This paper describes the Spyrobot's utility to be operated at Night irrespective of the intensity of the available light. Also, it explores the capability of fire and metal detection for such robots.

3. Future Warfare and the Decline of Human Decision making. Author: Thomas K. Adams ."human space," meaning the traditional four-dimensional battle-space that is discernible to the human senses. In essence, war has always consisted of human beings running, dodging, and hurling things at each other, lately with the help of machinery. Even such revolutionary developments as gunpowder only enhanced our ability to throw things at enemies we could see and hear. The first crude examples of autonomous weapons were probably the early experiments by the US Navy and Sperry Gyroscope Company on unpiloted aircraft during the last years of the First World War. Then came the advent of electronics, especially radar, and warfare began to leave the realm of human senses. Ships and planes could fire on enemies that were no more than ghostly green images on a cathode ray tube. Later came military robots such as cruise.

4. Adaptive Mobile Robot Navigation and Mapping. Author: Feder HJS, Leonard JJ, Smith CM. The task of building a map of an unknown environment and concurrently using that map to navigate is a central problem in mobile robotics research. This paper addresses the problem of how to perform concurrent mapping and localization (CML) adaptively using sonar. Stochastic mapping is a feature-based approach to CML that generalizes the extended Kalman filter to incorporate vehicle localization and environmental mapping.

5. Smart Phone controlled robot using AT MEGA328 microcontroller. Author : Aniket R. Yeole ,Sapna M . Brahmankar , Monali D .Wani , Mukesh P . Mahajan. This paper explores the operating system of Android-based smart phone programs which can be developed effectively to control robots via Bluetooth connection.

6. Arduino-controlled War Field Spy Robot using Night Vision Wireless camera and Android application. Author: Jignesh Patoliya, Haarad Mehta, Hitesh Patel .The main objective is surveillance of human activities in the war field. The proposed robot is built to monitor the war field using a Wireless Night vision camera based upon Bluetooth technology and operated by an Android application.

IV. METHODOLOGY

In the project Raspberry pi is main controller . Also with that other modules like metal sensor, smoke sensor , ultrasonic sensor , camera, Bluetooth terminal , flame sensor, DC motor are the components using in the project. For motor the motor driver used, Motor is used for the movement of the robot control through mobile via Bluetooth. Also for detecting the opponents face ultrasonic sensor is used. First we have to store the images of the person which is authorized for that. When any object comes in range of ultrasonic sensor then automatic the camera gets switch ON and capture the images of the person and processes it with the images saved in the database. If the image does not match then it send the message "Unauthorized person detected" and also send the photo and location coordinates of that person. Robot is able to detect the weapon for that metal sensor is used. For all sensors the location coordinate will send to mail if it detect according to there properties. All these sensors will run one by one once we connect controller to monitor or screen.

Circuit Diagram:
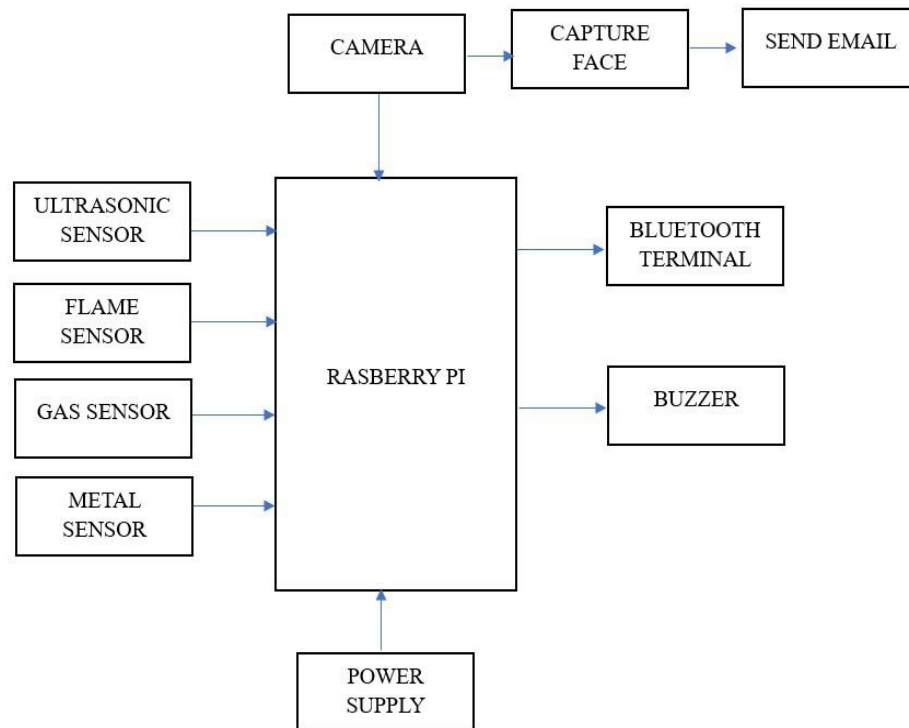
The circuit diagram of the robotic system which is employed for the presented application can be seen in figure 2, wherein the power supply is given by the lithium-ion battery which can be replaceable with another in accordance to the requirement and working cycle. The metal detector which has been used in the circuit has the prime object to detect the metallic surfaces and decode the message with the help of a converter and transmit the signal to the processing unit. As can be seen in the present circuit ultrasonic circuit has been used to detect the object and calculate its distance from the object's surface to the ultrasonic wave propagating unit. The sound waves are dead converted into numeric form thereby providing the distance between them. Moving further, the global system for mobile communication has been employed which is used the keep track of the robot by the controller from operator's end. For sending and receiving the signals from the sender and receiver Bluetooth system has been employed which provides the operation from the maximum range of distance.
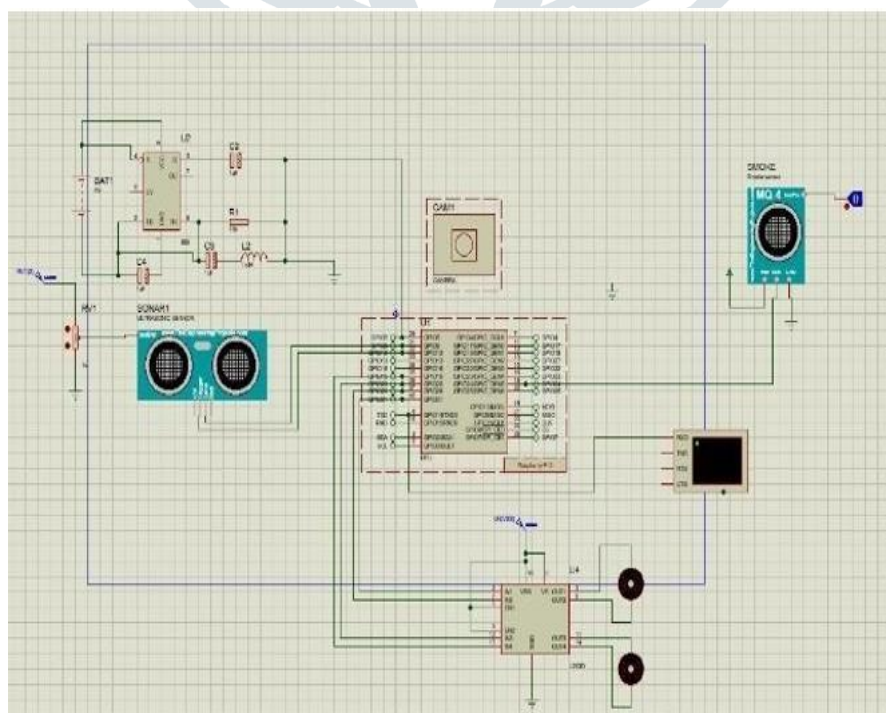

Fig. Circuit diagram used for the robotic system.

After implementing all the software and hardware systems in one unit the final output can be seen in figure 3. The presented photograph shows the actual utilization of discussed hardware and software systems. Arduino has been employed to carry out the required functioning of the robot which is coded by the computer system using Python language script.

V. SOFTWARE REQUIREMENTS SPECIFICATION

The primary object of the proposal is to introduce the latest developments in the monitoring robots utilized primarily for military and miscellaneous applications. Moreover, manufacturing and the description of key components used in the edition have been discussed for further better understanding. The key assumption to be made while developing the robot is that used Embedded C Technique input used as Sensor responsive data. While the embedded C libraries s like Tensorflow, Keras, OpenCV, and Tkinter were used as dependencies thereby 2 major the output in the form of detecting metallic artilleries, bombs, the distance of the present entities, and the movement at the ground.

While developing the introduced automated robot, a few of the functional specifications included its user-friendliness and adaptability with the operating unit and providing an easy interface to use. Moreover, it was noted that the accessibility or the response time of the robot and its monetization should be quick and with a minimum time lag.

While the robot is dependent on a few other aspects and has certain constraints including user applications that need to be developed in windows OS add the scripts should have been written in embedded C. Moreover, Singleton should we use as the application design pattern to be utilized in the automatic robotic system.

Furthermore, the nonfunctional requirement includes the key considerations of performance requirements to be utilized in the robot system where the functions and the module used need to be working well in all conditions. It also needed to be taken into attention that the performance of encryption of the data that transmitted bidar robot from remote place to the receiver at the operator's place needed to be highly encrypted secured and relatively zero delayed.

The specification of the hardware and software system requirements utilized in the present robot system can be summarized as discussed below.

For Hardware Interfaces;
- Hardware: Intel core
- Speed: 2.80 GH
- RAM: 8GB
- HardDisk: 500 GB
- Key Board: Standard Windows Keyboard

For Software Interfaces;
- Operating System: Windows 10(64 Bit), rasp-bean
- IDE: python IDE
- Programming Language: Python

VI. RESULT

- The robot moves relying upon the engines, which are reliant on the data we give about the transmitter (remote). RF signals are utilized as control signals. By utilizing these characters, the coding is done and signal is sent by the sender.

- The robot is utilized for brief detachment and along these lines ensures the wellbeing of the territory. This makes the powers see precisely what's going on in the encompassing locale and to set it up as it ought to.

VII. CONCLUSION

While the developed product is comparatively small in size it can be extensively used for spying and keeping an eye on the activities and moments of foreign things. Considering its autonomous functioning and being controllable from a remote area makes it more suitable for military operations which is the key application. However, being dependent on an external battery, the robotic system still needs considerable attention with regard to its possibility of getting caught in battery drought conditions. The essential point of view of the military reconnaissance robot should make it straightforward. The administration operator robot can move without quite a bit of a track, getting pictures and transmitting them remotely, at that point the warriors give a recommendation about the dangers and conditions in the field of war.

Moreover, the camera being one of the most important parts of the system, its crushing and damage may in endanger the primary object of the proposed spying system. The key application of this kind of autonomous robotic system in military operations can be monitoring the border areas, identifying the location of land mines hidden below the ground level, and monitoring the moment and actions of the foreign units. In addition, the present system can be used in domestic as well as miscellaneous applications to monitor the heavily populated places and most valuable and highly secured areas.

REFERENCES:

1. Jignesh Patoliya, Haard Mehta, Hitesh Patel, "Arduino Controlled War Field Spy Robot using Night Vision Wireless Camera and Android Application", Conference Paper, November 2015, V. T. Patel Charotar University of Science and Technology, Changa, Anand, Gujarat, India.

2. Ankit Yadav, AnshulTiwari ,Divya Sharma, Ratnesh Srivastava, Sachin Kumar , "Smart Spy Robot" ISSN: 2278 – 7798 International Journal of Science, Engineering and Technology Research (IJSETR) Volume 5, Issue 4, April 2016 973 All Rights Reserved © 2016 IJSETR.

3. Priyanka Yadav, LeenaChaudhari, Swati Gawhale , "War Field Spying Robot with Wireless Night Vision Camera", International Journal for Research in Applied Science Engineering Technology (IJRASET) ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor :6.887 Volume 5 Issue XII December 2017.

4. Chaitrali Jadhav, Shamli Gibile, Snehal Gaikwad, Neelum Dave D, "Military Spying and Bomb Disposal Robot Using IOT", International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056 Volume: 05 Issue: 04 — Apr2018.

5. Yamaguchi, A. Tak. Kato.: Development of a biped walking robot compensating for three axis moment by trunk motion. Paper presented at the IEEE/RSJ international conference on intelligent robots and systems, Yokohama, Japan, 26-30 July 2012.

6. K. Naga saka, H. Inoue, M. Inaba. : Dynamic walking pattern generation for a humanoid robot based on optimal gradient method. Paper presented at the IEEE international conference on systems, man, and cybernetics, 12-15 Oct. 2015.

7. Dhiraj Singh Patel, Dheeraj Mishra, Devendra Pandey, Ankit Sumele "Mobile Operated Spy Robot" International Journal of Emerging Technology and Advanced Engineering

8. J. Yamaguchi, E. Soga, S. Inoue, A. Takanishi.: Development of a bipedal humanoid robot – control method of whole body cooperative dynamic biped walking-. Paper presented at the IEEE international conference on robotics and automation, Detroit, Michigan, 10-15 May 2014.

9. K. Kaneko, F. Kanehiro, S. Kajita, H. Hirukawa, T. Kawasaki, M. Hirata, K. Akachi, T. Isozumi.: Humanoid robot HRP-2. Paper presented at IEEE international conference on robotics and automation, New Orieans, LA, 26 April - 1 May 2004.

10. Chinmay Kulkarni, Suhas Grama, Pramod Gubbi Suresh, Chaitanya Krishna, Joseph Antony, First International Conference on Systems Informatics, Modelling and Simulation, Surveillance Robot Using Arduino Microcontroller, Android APIs and the Internet, 2014 IEEE, pg. 83

11. Y. Sakagami, R. Watanabe, C. Aoyama, S. Matsunaga, N. Higaki, K. Fujimura.: The intelligent ASIMO: System overview and integration. Paper presented at the IEEE/RSJ international conference on intelligent robots and systems, Lausanne, Switzerland, 30 Sep.- 5 Oct. 2012.

12. K. Pooventhan, R. Achuthaperumal and C. Manoj Balajee, "Surveillance Robot Using Multi Sensor Network", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control, vol. 3, no. 2, pp. 113-115, 2015.

13. Y. Shimosasa, J. Kanemoto, K. Hakamada, H. Horii, T. Ariki, Y. Sugawara, F. Kojio, A. Kimura, S. Yuta, "Some 6481results of the test operation of a security service system with autonomous guard robot", 26th Annual Conference of the IEEE on Industrial Electronics Society, Vol.1, pp.405-409, 2000.

14. W. T. Miller III.: Real-time neural network control of a biped walking robot. IEEE Control Systems Magazine. 14(1): 41-48 (2016) [6]. C. L. Shih.: Ascending and descending stairs for a biped robot. IEEE Transactions on Systems, Man and Cybernetics. 29(3): 255-268 (1999)