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Robot for Defense & Security with IOT

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***Abstract*- This Project is an IR & camera-based security system or robot for protected areas & borders, which senses the Intruders, trespassers and transfer video to other end. The robot to be built is going to have an IR Sensor which senses any intruders / trespassers and will activate the alarm as well as switch on the guns. The robot will also be capable of shooting the intruder when he cross the border, the bullet shall also be equipped with a GPS facility so that incase if the intruder tries to escapes he can be tracked with devices or smart phone. The robot will also activate the Camera, which will start capturing the live video and transmit the same to the receiver end, the smart phone. It will trigger the alarm and the data will be transferred to the mobile device.**

***Keywords*- Raspberry pi, Robotic wheel, Raspberry pi based camera, Motor controller IC, Wi-Fi, Raspberry pi based operating system.**

I. INTRODUCTION

The domain Internet of Things (IoT) is a field that concentrates on developing systems of interrelated components or systems such as computing devices, some mechanical machines, digital components, non- living entity or living beings. Each component that related to the system is issued a Unique Identifiers (UIDs). They are also capable of transferring data over a network from source to the destination. This can also be accomplished without the need of human-to-human interaction.

Even the human-to-computer interaction is also not required. This field has evolved and developed along with the up gradation of hardware components, software programs, sensors, communication devices, machine learning, real-time data analytics and many other such multiple technologies.

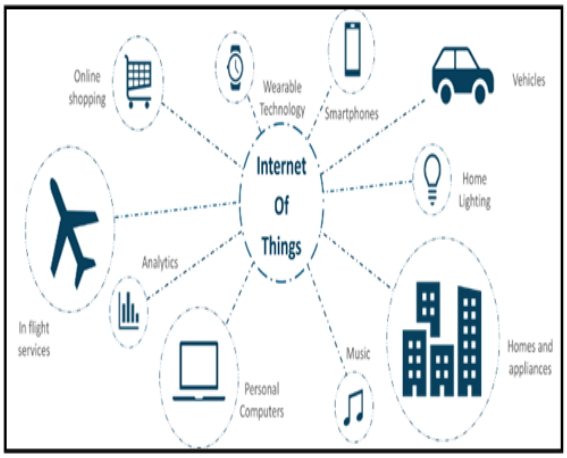

Fig 1. Internet of Things.

Internet of things is a network of physical objects or people called "things" that are embedded with software electronics, network, and sensors that allows these objects to collect and exchange data. The goal of IoT is to extend to internet connectivity from standard devices like computer, mobile, tablet to relatively dumb devices like toaster.

IoT makes virtually everything "smart" by improving aspects of our Life with the power of data collection, AI algorithm, and networks. The thing in IoT can also be a person with a diabetes monitor implant, animal with tracking devices, etc. The entire IoT process starts with the devices themselves like smartphones, smart watches, electronic appliances like TV, washing machine which helps you to communicate with the IoT platform.

1. Challenges of IoT:

- Inefficient testing and updating
- Concern regarding data security and privacy
- Software complexity
- Data volumes and interpretation
- Integration with AI and Automation
- Devices require a constant power supply which is difficult.
- Interaction and Short-range communication

2. Iot Services and Applications:

- **Consumer Applications:** IOT is used for consumer applications such as Smart Home and Elder Care.
- **Commercial Application:** IOT is used for commercial applications such as Medical care and Health care, Transportation, V2X communications, Buildings and Home Automation.
- **Industrial Applications:** IOT is used for Industrial applications such as Manufacturing and Agriculture.

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- **Infrastructure Applications:** IOT is used for Infrastructure applications such as Metropolitan scale deployments, Energy management, Environmental monitoring.
- **Military Applications:** IOT is used for Military applications such as Internet of Battlefield Things, Ocean of Things.

II. LITERATURE SURVEY

Literature Review 1:
Title: IOT Based Surveillance Robot
Author: Sweeta Deshmukh; Priyadarshini; Mamta; Madhura Deshmukh; Dr. Md. Bakhar Year: 2017

Abstract: Today's world is worried regarding security due to increment in crime percentage in the general public. This has brought about an expansion in the significance of a productive observation framework. Reconnaissance can be characterized as checking of conduct exercises of the individuals or assets. This procedure can incorporate perception from a separation by the methods for hardware types of gear and different devices. The individuals are not any more typical with the military and other security advances.

Today observation system are present everywhere. Raspberry Pi is a charge card estimated PC that establishes connection to the TV and a console. This is a small CPU which is being utilized in gadgets ventures and for some tasks that does the PC work. The Raspberry Pi additionally has a significant job in playing top notch video. This paper focuses on observing Raspberry Pi being utilized by many people everywhere around the globe. This paper suggests on novel joining of camera with Raspberry Pi. The Raspberry Pi additionally controls the camcorder for exploring and records the video.

Keywords: Raspberry pi, Robotic wheel, Raspberry pi based camera, Motor controller IC, Wi-Fi, Raspberry pi based operating system.

Literature Review 2:
Title: Robot Based Wireless Monitoring and Safety System for Underground Coal Mines using Zigbee Protocol: A Review
Author: Sachin M. Ledange; Swarup S. Mathurkar Year: 2017

Abstract: In the mining business wellbeing of a laborer or the individual is essential worry in all sector industry particularly in the industry of underground coal mining. Correspondence in under the ground submits is vital in request to screen ecological boundary, for example, temperature, moistness, poisonous gases and different angles. Nearby it is additionally take fundamental activities likewise so as to stay away from any kinds of unsafe occasions. This paper presents a remote checking and security based robotic system or framework for underground mines utilizing remote correspondence convention zigbee is proposed.

So the proposed framework will get the information of natural boundaries of underground mine. This is finished by utilizing various sensors and afterward sends the information to the room or control center utilizing the zigbee technology. This complete system will be included in the remotely working robot. The execution and utilization of remote robot reduces the human involvement in security aspects and will improve the wellbeing.

Keywords: wireless, protocol, robot, coal mine, sensor, zigbee.

Literature Review 3
Title: An Android Based Automatic Gas Detection And Indication Robot Author: Ch. Manohar Raju ; N. Sushma Rani Year: 2017

Abstract: This paper contains an advancement of a model of a self-ruling based on the android platform portable robot system for detection and recognition of spilling of gas also restriction in enormous modern offices. The goal was to assemble a framework that can perform examination undertakings in mechanical offices. This must be managed without approaching dangerous territories legitimately and furthermore without requiring any human nearness. The robot can be used for routine examinations of offices or for focused investigations of explicit framework segments.

The nature of the robot framework was highlighted with changed route sensors. Along these lines the decision of manual intercession through gadget during whenever is made. The real object is the advancement of imaginative observing procedures that makes the most best in class estimating and mechanization innovation. Furthermore just as mechanical autonomy guarantees improvement in the unwavering quality, productivity and cost- adequacy of examinations. Thus, it likewise mitigates the specialized staff of repetitive, long and effortful assignments.

Keywords: Android, LP Gas Detection, Mobile Robot.

Literature Review 4:
Title: Design and Development of Multifunctional Robot for Military Purpose Applications
Author: Bhawana D. Parate; Jagruti J. Shah Year: 2014

Abstract: Robots are created and exceptionally intended for people to make life and work simpler. Robots are intended for different purposes, for example, military, industry and locally situated application. At the fringe assortment of tanks, rocket, weapons and so on are applied by restrictions against our nation. This prompts issues and

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mischief our conveyed powers or troopers. Therefore just the robot is planned and created for military reason and applications so as to secure our military.

The strategy proposed in this paper includes two legged biped strolling robot that utilizations equal leg component. It incorporates various capacities like catching true information utilizing advanced picture preparing. This is utilized to recognize its snag which is found in its way.

Assume on the off chance that it finds any snag in its way; at that point it will ready to fire that deterrent utilizing the firearm instrument. For making it into a multifunctional robot, all the activities that are performed by the client are performed by the robot utilizing stretch sensor.

Every one of these systems is inserted onto the propeller IC. This is a remote robot correspondence that happens among server and customer by utilizing Wi-Fi through the window attachment.

Keywords: Multifunctional Robot, PLM, Propeller IC, Winsock.

Literature Review 5:
Title: Touch screen controlled defense robot: a comprehensive review
Author: Ramesh Nayak; Mithuna Shetty; Rakesh Ganapthi; Sushwitha Naik; Varsha Aithal
Year: 2015

Abstract: Robots are the innovative manifestations that assume a significant job in the present life and are broadly utilized for different purposes, for example, regions of protection, ventures, clinical and home apparatuses. They can complete diverse dangerous employments that are high in chance and that is impossible by people. The robot framework can be worked with the current financial condition that can be utilized for various refined automated applications.

The control framework comprises of a Touch screen and a ZigBee module. The microcontroller gathers and controls the robot. This framework is highlighted for ceaseless visual checking through the remote camera appended to the robot and sends constant information to the control unit. The automated arm that is fitted on the robot is utilized for pick and spot activities.

Essentially the laser weapon appended to the robot is utilized for hitting the objective article. The body of the robot is fixed with two wheels that are joined to the equipped engines. The robot is controlled through a Touch screen which is mounted on ARM9 through the ZIGBEE gadget.

Keywords: Defense robot, ZigBee module, wireless camera, Touch screen, Laser gun.

Literature Review 6:
Title: Unmanned multi-functional robot using Zigbee adopter network for defense application Author : Premkumar .M
Year: 2013

Abstract: Practically all military associations are presently using robots and taking their help for unsafe employments which cannot be made easily by officers and deployed forces. These robots that are utilized for military are typically utilized with coordinated framework that incorporates cameras and sensors for input and screens for video output. Each and every robot has various different shapes in which they are designed.

The proposed new system or framework in this paper takes the assistance of Zigbee remote sensor system to trace the gatecrashers and the robot will take the necessary actions required without anyone else. Therefore the proposed framework in this paper is an Intelligent Unmanned Robot that utilizes ZigBee to spare human life and furthermore diminishes manual mistake in protection side. This robot is a uniquely planned mechanical framework for sparing human life and shields the nation from foes.

Keywords: Military robot, Zigbee Wireless network, Intelligent Unmanned Robot (IUR).

Literature Review 7
Title: Hazardous Gas & Mine Detecting Robot
Author: Sharath Sethu Raghavan; Jasim M; Aqib Saman K; Jisnu Thomas; Faheem E S; Lilly Raffy Cheerotha
Year: 2017

Abstract: For the purpose of replacing people the robots are used in place of them for various tasks and difficult works. Remote imparting robotic system is another age of robot in mechanical technology field in which explores is being directed routinely. The gas identifying robot is additionally another age of robot which gives a response to the issues of coal mineshafts. Likewise this sort of robots gives a straight forwardness to the aggressor activities in war fields and outskirts. The gas recognizing robot has numerous points of interest, for example, it can identify risky gas just as the mines that can be found in places such as war fields. The proposed system is a remotely controlled vehicle, mechanical in model is introduced with sensors fitted and furthermore a camera is installed for recording the environmental factors in the form of a video into a framework. This system is additionally actualized with Bluetooth that is useful in sharing or forwarding the data of the system's condition. The proposed robot is also controlled by a remote controller. This factor also plays a vital role in development.

Keywords: Robot, Sensor, Detection, wireless communication, coal mine.

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Literature Review 8
Title: Wireless Multifunctional Robot for Military Applications Author: Tarunpreet Kaur; Dilip Kumar Year: 2015

Abstract: An advanced methodology is proposed in this publication for the purpose of observing at remote places and outskirt territories. The proposed idea makes use of a multifunctional robot in this project. This system also depends upon the 3G innovation used in protection and military applications. This mechanical vehicle can substitute the solider or conveyed powers at necessary protected areas.

The idea of the system presented in this system works in both ways like independently and physically controlled. This robot works on web as a control and communication medium. This is a multi sensor robot that helps to identify people, bombs, hazardous gases and also detection of fire at remote and war fields. In all actuality the remote security robot obsoletes because of cutoff in both recurrence range and manual control. These constraints are secured by utilizing 3G innovation which can offer boundless range. The independent governing activity of the robot is constrained by using ultrasonic and infrared sensors. The proposed project is mainly for observation just as reconnaissance in certain circumstances.

Keywords: Wireless Sensor Networks (WSN), DTMF, Sensors, PIR, GSM, GPS, Internet of Things.

3. OVERVIEW OF THE PROJECT

1. Defense Budget & Losses:
The Government issues a separate budget called a military expenditure budget also known as a defense expenditure budget. It is the amount of financial support by a nation for maintaining its nation's protection forces or any other such measures and technologies essential regarding.

This particular budget has a major impact on how strongly a country protects and secures itself over the threats against itself and its people. This budget views an outline of the amount of financing that should be reserved for the upcoming financial plans and budget.

Fig 2. Defense Budget.

2. Risks Faced By Deployed Forces:

There are a lot of extreme risks faced by the deployed forces in the protected areas and few of them are mentioned below.

- The soldiers will be facing different types of infectious diseases in the areas.
- They may also have to come across non battle related injuries and body damages.
- The deployed forces will face injuries due to their exposure in varying temperature such as heat and cold.
- They are also subjected to psychological stress in the area of duty.
- There are also toxic industrial chemicals that affect the deployed forces.
- Chemical weapons are also used to attack the human forces.
- Biological weapons such as virus that causes harm are applied against the forces.

Fig 3. Risks on Deployed Forces.

Fig 4. Deployed Forces on Borders.

3. Do We Have Solution For This?

- Yes Prevention Is Better Than Cure.
- Our Project Is The Solution For This At The Protected Areas And Loc (Line Of Control)

The Government had to bare huge losses in the field of Defense & Security such as Human loss, Machine loss, Aircrafts, Tankers, etc. The Country's economy decreases by a large scale, cost of all commodities increases, taxes increase altogether people has to face tremendous loss.

4. Military Applications of IOT:
The Internet of Things field has a wide range of military applications. They are used in connecting defense vehicles like ships & planes. Their applications are also in tanks

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and drones too. The IOT's military application involves the process of sensing, computing communication and scaling of the information produced by the components such as sensors and other computing units.

Fig 5. Military Applications of IoT.

IV. INTRODUCTION TO PROJECT

This project introduces a military robot whose working is based on IOT technology. This robot is developed for the purpose of defense and security. This is a replacement for the deployed forces in the borders.

This system is embedded with an infrared sensor. This sensor senses any intruders or trespassers across the protected areas and sends a signal to activate the alarm. Following this the system will also trigger the gun to shoot the intruder when he crosses the specified limits.

The system is also installed with a camera featured with live recording. This camera will record live video of the happenings in the areas and then transmit the equivalent towards the advanced phone which acts as the collector. At the same time it will also start giving alert and the information will move from the transmitter and receiver to the cell phone.

1. Special Features:

The following are the special features that the IoT controlled robot possess.

- Wireless Movements–Forward, Reverse, Right & Left
- All axes of the robot will have 360 Degree Rotation with Angle free movements.
- Sensors– Motion Sensor is featured which senses a trespassers
- Sensors–Ultrasonic, Obstacle detection & Direction changing
- Wireless Solutions – RF
- Obstacle Sensing
- Collision Avoidance
- Direction Sensing
- Model designed for Real Time Operations.

2. Mechanical Features of the Model:

There are many mechanical features of the model and are mentioned below:

- Unbreakable - The robot system is unbreakable and withstands pressure.
- Less in Weight - The robot system is light weight and is portable.
- Easy Movements - The robot system has easy movements in different angles.
- No need for surface grinding - The robot can also move in hard surface.
- Economic in Fabrication - The robot can be manufactured in affordable price.
- Electrical Isolation - The robot can withstand electrical faults and damages.
- Thermal Stability - The robot can withstand high temperature.
- Free Rotation - The rotational movements of the robot is free and smooth.
- Metal Construction - The robot is built with metal body hence strong enough.
- Stepper Motors - Stepper motors are used for required purposes.
- Hose Clamps - Hose clamps are also utilized in the robot.
- Shaft Collars & Couplers - Shafts are utilized in the robot.
- Universal Joints - Joints are provided for movements wherever required.
- Wheels - The robot is provided with wheels for easy travel.

V. EXISTING SYSTEM

1. Existing System:

Studying about existing system the military soldiers are not autonomous robots or remote- controlled mobile robots. They are living beings. They have emotions, fear, and limitations and are inaccurate compared to machines and robots. They are sensitive to external factors and are subjected to environmental effects easily.

2. Disadvantages of Existing System:

- The expenditure bared by the Government is very high for living beings compared to the machines or robot.
- Life Losses occurs often which cannot be regenerated or repaired.
- Modifications / Up gradations cannot be made or implemented on Humans.
- Psychology factors such as a human dropping his/her attention and concentration after 30 minutes or so. Also getting tired gradually are few factors.
- Living beings are subjected to factors such as Infectious Diseases, Non-Battle Injuries, High/Low Temperature Injuries, Mind/Body Stress, Toxic Chemicals that are

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industry released, Chemical Weapons, Biological Weapons.

VI. PROPOSED SYSTEM

The vision of the system that is being described is to solve the problem such as the life losses of the deployed forces that occur and also to build a machine that traces the intruders and also records and transmits its movements and also launch an attack against the enemies.

1. Advantages of Proposed System:

- The investment is also less and affordable compared to the existing system. One time investment can serve for many years.
- Life Losses can be prevented since they are machines and can be repaired if damaged.
- Modifications & Up gradations can be made by implementing according to the latest technologies.
- The accuracy, performance & efficiency of the robots are very high compared to humans.
- Tiredness does not affect the machines like humans. The machines do not drop concentration or take rest. Machines are not afraid of anything.

VII. APPLICATIONS

This IOT robot has a lot of applications with respect to factors like reducing life losses, reducing the expenditure and investment and helpful in increased performance and efficiency. And other uses of the project are explained below.

1. Applications of the Project

The following are the applications of the Project:-

- The expenditure can be reduced up to a great extent for Government.
- Implemented in areas where Life Losses has to be prevented.
- Implemented where Modifications & Up gradations has to be made periodically.
- The areas where accuracy, performance & efficiency and high concentration is required.
- If autonomous robotics is required for assistance.
- Deployed in areas where emotions are to be avoided.

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