"WILLY" - The Defense Bot (UGV)

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Abstract: Defense robot plays a vital role in saving human loses in the military base. Thus, it will gain more importance in the upcoming era. The robot basically consists of a vehicle mounted with two cameras, one camera is used for capturing the targets image and another one is used for monitoring them. Defense robot which are monitored, operated and controlled by military personnel, who need not be present in the terrain of activity, is a platform for multiple payloads such as mine detection and clearance, supply delivery systems. The salient feature of this defense bot is metal detector i.e. it is used to detect the buried mines which are been undiscovered as result of wars. Defense bot is mounted with a special type of gun called as laser gun. Defense bot is capable of blending into enemy territory, owing to credibility of the robot's compactness. Wi-Fi module is used to handle the robot. The movement of the robot is controlled via pc or laptop. Since human lives are more valuable this bot can be used as the substitution for soldiers in the war areas. Even Places where there can be threats from intruders or terrorists these robots can be used.

Keywords: Defense Robot, Laser Gun, Military Base, Soldiers, Mines, Borders, War areas.

I. INTRODUCTION

Internet of Things (IoT) generally refers to a fixed of technologies (e.g., sensors, tags, cell gadgets, and verbal exchange technology) to design and create advanced and intricate systems that purpose at enhancing the quality of life. Through the paradigms and the standardization of IoT, it's far possible to develop advert-hoc hardware systems where organic components communicate and cooperate, to reach a not particular purpose. Recently, new wearable devices, incorporating advanced digital technology, had been developed under the framework of IoT, to provide realistic features and functions to resource human beings in their regular lifestyles. In unique, numerous solutions were advanced using Academia to enhance the quality of lifestyles of blind and visually impaired people. For example, propose a wearable device based on each a reasonably-priced ultrasonic sensor for the detection of boundaries and vibrotactile feedback to warn the give up-person approximately the detected barriers.

Several designs of IoT answers are based totally on the ultrasonic era, which has been used for serving numerous functions, together with the detection of limitations, tracking of human and robot behavior in an environment, and the mapping of environments. Most recently, numerous programs based totally on the ultrasonic era evolved to improve the mapping and localization of a robot module for the exploration of unknown and threatening areas that cannot be accessed using humans. Ultrasonic sensors have ended up a popular size device because of both their simplicity and affordability. Robots are mechatronic devices used to help human beings in numerous activities, whether dangerous or not, repetitive and unhealthy. They are been utilized in indoor environments, including places of work, hospitals, manufacturing traces, and load transportations inside the enterprise. In the latter case, the Auto-Guided Vehicles (AGVs) stand out. AGVs are machines capable of moving and appearing in various tasks without the intervention of humans.

The navigation gadget of this kind of robot is typical constitutes using modules of belief, localization, cognition, and movement manipulation. These modules are crucial to the execution of aerial, terrestrial, and aquatic self-sufficient robotic tasks. A typical cell robot consists of the modules: belief, localization, navigation or movement management, and movement. The cycle of actions of a cellular robot begins with the extraction of statistics from the real environment (Perception Module) via the sensors coupled to the robotic inclusive of infra-crimson, ultrasound, cameras, and RFID readers. This record is processed and used as entering parameters of algorithms so that the robotic can discover itself (Localization Module). After the localization of the robot is envisioned, it's far compared with an international map, and the Cognition Module determines which subsequent movement to take. The robotic then executes actions and navigates via the environment until it reaches its destination. (Movement Control Module).

II. METHODOLOGY

Fig 1. It Represents the Defense Bot Block Diagram. The Defense Bot is controlled by Android phone, with the usage idea of Bluetooth Module, and wi-fi. The Bluetooth module used right here is HC-05. Software created such that it may

be applied inside the Android Phone. Keil software has been used to develop the necessary software program required to manipulate the Defense Bot. Raspberry Pi 4 is being used as a processor to control the complete Robotic Module. Arduino nano is used to interface the Mobile Phone related to a Bluetooth Module and with the Raspberry pi or direct connection can be made with Raspberry pi. Two cameras are related to surveillance and focused on the enemy's territory. A Metal Detector positioned at the Defense Module for Detecting mines buried underneath the ground since global wars. High Powered Laser Gun is being used to destroy the enemy's goals and burn the objectives in multiple seconds. The Motor Driver used for controlling the Robotic Module is L298N. Servo Motors were used inside the replacement of everyday dc motors. XY modifications are being applied inside the robot module to keep the correct alignment of the wheels on the floor. The Laser gun manages the usage of the android smartphone. A camera has been connected to the laser gun to offer a clean imaginative and prescient to the controller so that he has a clear view of the enemy target.
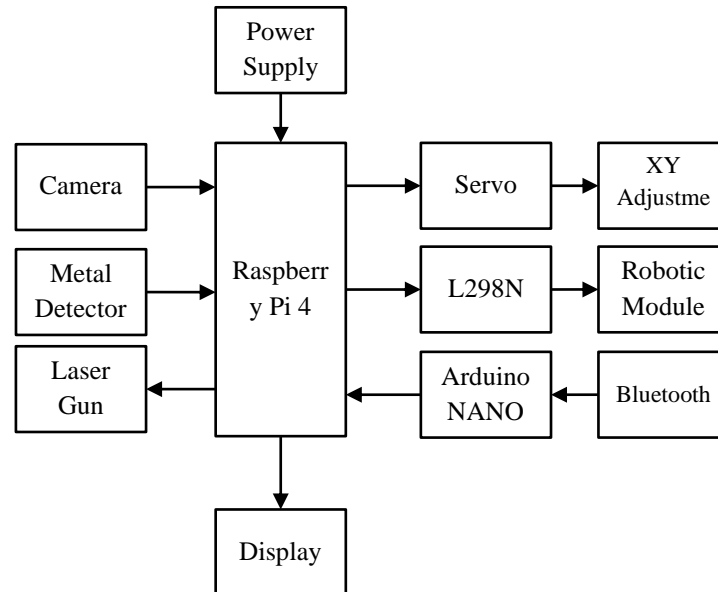
Fig 1. General Block Diagram

1) IMAGE PROCESSING

CAMERA INTERFACE MODULE

This vision sensor camera used to capture the pictures and motions of the item before it, and this set on the pinnacle of the gadget, and it is moved in and round to capture the images in specific places, and it sends the one's recordings to the net server for the later cause. Image Processing is primarily based on node localization. At first, the digital camera captures the history photograph process and shops it in reminiscence. When an interloper enters into the captured place, a contour appears in that region, and it despatched to the controller with the aid of this method. The controller of the defense bot is aware of at what distance the enemy is standing, and his axis is stored.

2) LASER GUN

A high power laser gun is used to target and damage an enemy's car. The gun works on the premise of data obtained by way of the processed picture from the camera. When the digicam captures any actions of the enemy within the central area, the processor captures and calculates the X Y Z-axis of the character and sends it to the laser gun. The laser gun process these statistics and units its vicinity in step with the information received and locks the target and waits for the controller to permit firing.

3) METAL DETECTOR

A metal detector is used to come across the buried mines. As a result of World War, lots of mines are buried underground. These undetected mines are substantial problems that kill lots of soldiers. To dispose of this, our robot is designed such that it can hit upon buried mines and saves life.

III.SYSTEM IMPLEMENTATION

A. SYSTEM REQUIREMENTS
B. HARDWARE REQUIREMENTS

- Raspberry Pi 3
- Micro SD Card
- Webcam
- HDMI – VGA Cable
- USB Keyboard & Mouse
- 15W Micro USB DC Power Supply
- Robot Mechanism
- DC Gear Motor
- 12V, 1.3Ah Battery.
- Servo Motor
- Laser Gun Diode

C. SOFTWARE REQUIREMENTS

- Raspbian OS (Noobs)
- SD Card Formatter
- Python
- OpenCV
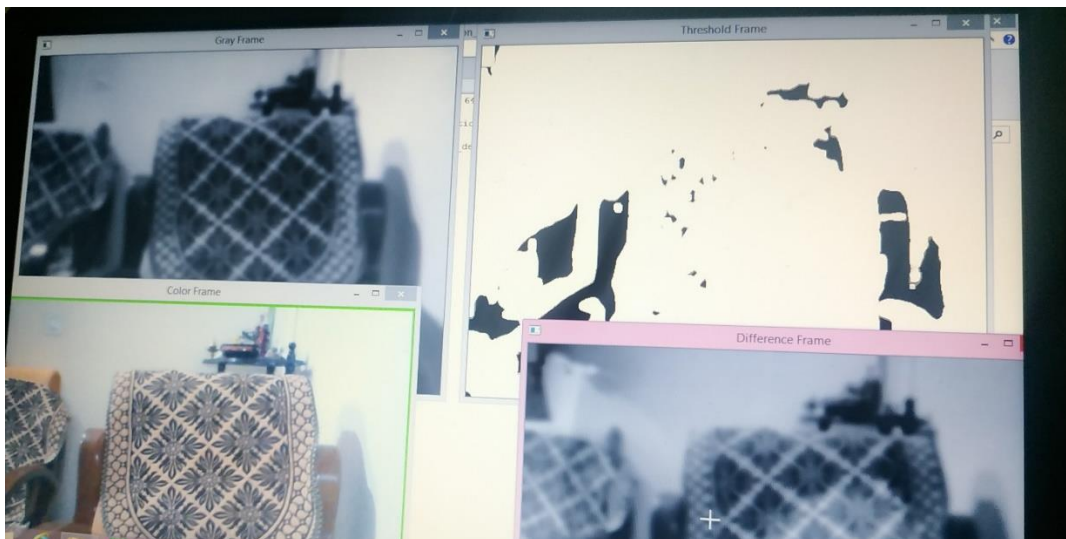
IV. EXPERIMENTAL RESULTS WITH FIGURES

Fig 1: Image captured using Spy cam

Fig 1 Represents the image captured using raspberry pi camera. The image captured using the camera is been differentiated into four types. They are Grey Frame, Threshold Frame, Color Frame and Difference Frame. The green box present in the color frame represents Contour which is used to detect the present of intruder with help of node localization. The difference Frame is used to help the laser gun to locate the intruder exact location.

Fig 2: Web page created to control the car.

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Fig 6.2 represents the webpage used to control the Defense bot. The user can control the robot by this webpage where he could has a live interaction with the robot and he could also have the live streaming form the camera so that it is easier for the controller to control the car.

V. CURRENT APPLICATIONS

The contemporary prototype used for the following applications,
(i)Border Patrolling and enemy territory surveillance
(ii)Operation in Bio-hazard location and radioactive hazard location
(iii)Operations related to spying, seek, and ruin.

VI. FUTURE SCOPE

The robotic is improvised to traverse vertical surfaces the use of amplified Van der Waals pressure of enchantment precept. The mobility on specific vertical surfaces accomplished the usage of claw – gripping effect of climbing on porous surfaces such as brick and urban partitions, mud partitions, and so forth. And electromagnetic floor attraction to climb on metallic walls. The mobility improved on air, land, and water for stealth operations. The most effective range of the existing gun is 10mts, and we can make more prominent it as much as quite a number 50mts. In addition to this, particular kinds of deadly and non-deadly ammunition such as armor-piercing rounds, anti-cloth rounds, Taser rounds, and so forth., can be carried out at the defense bot. The protection bot is modified to own computerized all-terrain mobility primarily based on GPS and impediment sensors. The protection bot module appended to an IoT gadget for controlling from a remotely localized location.

VII. CONCLUSION

The Laser gun designed within the defense bot executed according to the layout specifications, and the performance turned into calculated. The image captured using the webcam has been processed, and the nodal statistics in which the contour seems to become processed and sent to the Laser gun. The Laser Gun is fed with records from the processed photograph and objectives of the enemy location. Thus the Laser Gun and the Camera have been interfaced with each other and capabilities as required. The mobility of the defense bot covers all elements of traversing various terrains of the horizontal plane for a given altitude stage of a stable platform intended for actions. The fee of the firing of the Laser gun mounted on the protection bot proved to be enough to illustrate the stealth – offensive capabilities on the remark.

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