AN EFFICEIENT LANDMINE DETECTION SYSTEM USING RASPBERRY PI3

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ABSTRACT

The future of analytics in this innovative world is ruled by Deep learning, Machine learning and Artificial intelligence. The term Machine learning is a subset of Artificial Intelligence and it makes computers and other machines to learn and work independently without being explicitly programmed. Our nature is described as a self-made machine, and it is 100% perfectly automated than any other automated machine. Machine automation is the upcoming technology which will be the ruler of technological kingdom. In this paper, we propose an idea to develop a landmine detection system that is used to identify the landmines in a particular area using Raspberry Pi3. When the mine is detected then the user is notified about it by capturing the images and the particular location is also shared to the user. The landmine is operated by the user by using live video streaming. The user has all the control over the Robot to make sure it doesn't step on to the landmine.

KEYWORDS:

Artificial Intelligence, machine learning, Global Positioning System, landmine, Raspberry pi 3, Ground Penetrating Radar.

1. INTRODUCTION

Artificial Intelligence is a branch which aims to develop tools and techniques for solving complex problems that people at good at [1]. Machine learning is a sub division of artificial intelligence, concerned with the design and development of algorithms that allows the computers to evolve its behaviors based on logical data. The growth of internet of things (IoT) [2] is based on the continuous growth that has been witnessed in the last couple of years in the fields of microelectronics, information technology and communications and it is evident this trend will continue. There are four technical communications implementation models for internet of Thing (IoT) as defined by the Internet Architecture Board [3]. These models are: "Device-to-Device (D2D), Device-to-Cloud, Device-to-Gateway/Server (D2S) and Back-End Data Sharing".

As indicated by official figures, in excess of 100 million landmines lie covered far and wide. Albeit expected for fighting, these mines stay dynamic after fighting closures. Every day these mines are activated coincidentally by non military personnel exercises, attacking the land and killing or harming pure individuals. To help stop this devastation of the earth and humankind, mainstream researchers must create successful philanthropic demining.

Mine discovery is particularly indispensable to compassionate demining. The objective of military demining is to sufficiently clear mines rapidly to permit troops through a land zone. Military demining as a rule requires mine devastation rates of 80%. The objective of helpful demining, conversely, is to sufficiently clear mines to allow ordinary regular citizen utilization of the land. Helpful demining in this way requests a pulverization rate moving toward flawlessness: Specifications require a rate superior to 99.6%. Obviously, a basic part of mine leeway is mine identification. Before one can evacuate mines, one must find them. Many landmines are buried around the world. Some mines remains active even after warfare ends, these remained mines triggered accidentally and kills many innocent people. Before one can remove mines, they must know the exact location of the mines. This paper includes mine detection technology to prevent human risks as much as possible. Robotic technology has developed tremendously now a days. This project highlights low cost detection of mines through simpler robotic technology. This is mainly used for the military purposes.

Fig. 1. Robot system for Mine detection

This robot used in the project is capable to “track and follow a mobile human subject is of high interest as this ability can be used in many applications such as photography drones”. There will be computational complexity in the part of human detection as a result increase in cost of hardware intense routines. This paper highlights studies included in mine detection.

To help logical investigation into mine recognition, this paper surveys the significant present and creating innovations for mine identification. We don't claim to incorporate each innovation. This paper features critical investigations of mine recognition innovations, talked about in a few late meetings and in numerous current s and reports, to indicate promising bearings for future research. Mechanical innovation

has prospered hugely after some time. The capacity of a robot to track and take after a versatile human subject is of high enthusiasm as this capacity can be utilized as a part of various applications, for example, helping the incapacitated, diverting babies, photography automatons, and military robots, and so on to give some examples. Regularly, the human discovery part of the human after vision calculation postures trouble as far as computational many-sided quality thus bringing about an expansion in the cost of equipment fit for running computationally exceptional schedules. Barely any illustrations incorporate the utilization of facial acknowledgment, laser, profundity imaging, skin identification, infrared detecting and radio recurrence imaging to do the assignment.

2. LITERATURE SURVEY

A literature survey is about the data sets of information which is collected in a form of a report. Robledo et.al, [4] proposed the best in class in arrive mine discovery innovation and calculations. In this paper, portrayed and broke down sensor innovation accessible including cutting edge innovation, for example, ground infiltrating radar (GPR), electromagnetic enlistment (EMI) and atomic quadrupole reverberation (NQR) among others. Apply autonomy, information handling and calculations are specified, considering bolster vectors, sensor combination, neural systems, and so on. At last, we set up conclusions featuring the need to enhance the way pictures are obtained, as well as the way this data is handled and thought about.

Kyungmi Park et.al, [5] displayed a strategy for identifying hostile to tank or people killing landmines covered in the ground. An arrangement of information produced by a ground infiltrating radar is handled to evacuate the surface reflection and mess, yielding signs for conceivable landmines. Keeping in mind the end goal to recognize landmines in the signs, highlights are registered and analyzed against a database, which contains those of different landmines.

A lot of research has been already done in the domain of mine detection, extracting and demining. Sensor technology, “ground penetrating radar (GPR), electromagnetic induction (EMI), nuclear quadrupole resonance (NQR) and many others are examples of research done in this area [6]”. For all these technologies, detection is most probably done by expert humans (detectors) holding a detector to scan a suspected area of land. This process introduces a high cost in terms of time, money and man power.

Different methods utilized for the identification of landmines. Minesweeping and expelling landmines convey certain dangers and can be moderate and expensive. Utilizing an independent robot during the time spent distinguishing mines will guarantee the wellbeing of neighborhood occupants and the individuals who are occupied with the minesweeping work and the demining procedure. A landmine-identifying robot clears the ground to recognize the presence of a mine. The robot can utilize different sensors to look for mines. The present advances fall under five principle regions [7]: metal finder advances, electromagnetic techniques, acoustic/seismic strategies, natural techniques, and mechanical techniques.

In the current system landmine detection is done manually by the user. The user himself takes the detecting device along with him. There is a possibility of the person to accidentally step on landmine. This causes loss of human life. We can prevent such fatal accidents with our proposed system. This was mainly used by the military people for landmine detection. It was able to detect the landmines but the main problem was carelessness or unawareness of the landmine.

Fig. 2. Existing System for detecting Landmine

When the landmine is detected by the person he makes a mark in order to identify the location where exactly the landmine is or he will have to wait for the squad to deactivate the mine so it was time consuming process or we can say not much effective work.

3. SYSTEM ARCHITECTURE

In the proposed system, we presented landmine detection and army soldier status updation using robo-pi. First we are proposing video streaming based landmine detection, so easily identify the mine in suspected area so avoid the human risk. Mine is detected that time will be images are taken to the robo-pi and send to the central server. Second computationally minimal effort elective answer for identify and take after an individual in view of label discovery and recognizable proof utilizing a camera. The tag can be helpfully worn by a human subject which at that point can be distinguished and followed by an independently working robot running PC vision innovation. At the point when human is hazardous circumstances camera caught in video and spilled to web server. Our outcomes demonstrate that the proposed technique is both computationally less requesting and doable. We are using only Raspberry pi.

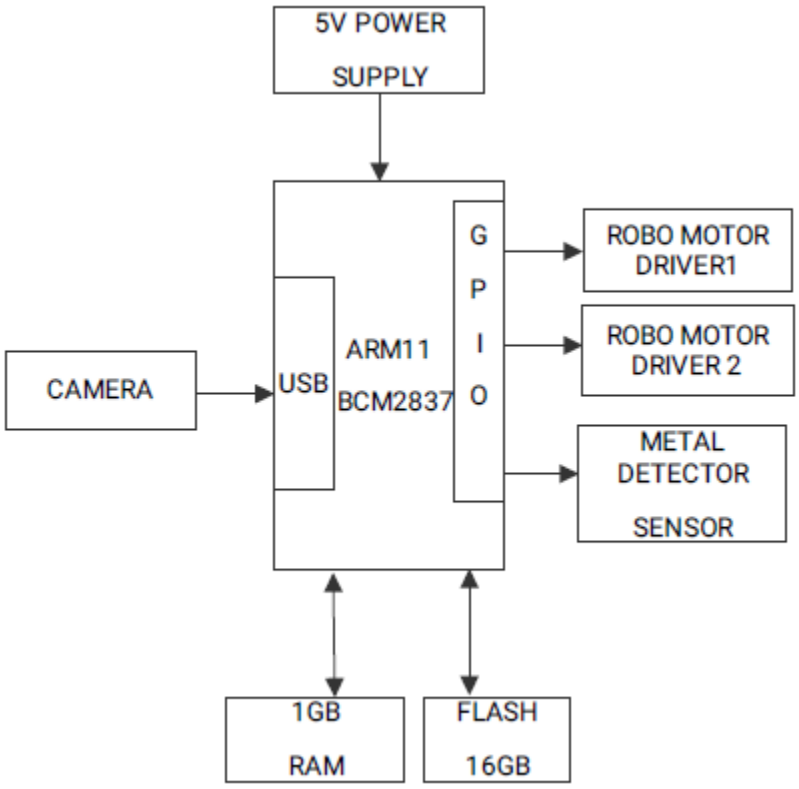

Fig. 3. System Architecture

System architecture is given in the figure 3. It has the following parts:

- **Metal Detector Sensor**

  The metal detector is an instrument which detects the metal nearby.

- **Motor driver**

  The Motor driver is a little current amplifier which is used to take a low current signal and then converting to the high current signal.

- **ARM 11 Processor**

  The ARM 11 Processor is developed based on RISC (Reduced Instruction Set Computer).The ARM 11 is a multi-core processor it could process MIPS Instruction with High speed data The ARM 11 which has the entire control over the data transfer

When landmine is detected then the images are taken to the robo-pi and then they are sent to the central server. This is also low cost detection method because human based detection is done through tag detection and identified by using the camera. Here tag can be worn by the human. This is also useful when humans are in dangerous situations camera captures the images and sent to the web server.

Raspberry pi 3 [8] is a small processor which can be used for multiple applications. Processor speed ranges from 700 MHz to 1.4GHz for the Pi3; on-board memory ranges from 256MB to 1GB RAM.

Fig.4. Raspberry Pi 3 Model B

WORKING OF LANDMINE DETECTION USING ROBOT

Now the landmine and tracking the color in army soldier, color tag to the army soldier , if the soldier is attacked by any one and the red color is present ,the robot capture the video and send to the server . The dc motors are used for robot movement .Camera is used to streaming the video. Metal detector is used to detecting mine in suspected area.

4. CONCLUSION

In this paper, we found the position of the vehicle can be detected with GPS (Global Positioning System) and reducing human risk of detecting landmines. This examination point is to give a review to building up a robot that can distinguish mine, as the robot may utilize a few sensors with a specific end goal to help in mining. Incrementally enhancing existing advances, expanding the likelihood of recognition, decreasing the false alert rate, and arranging useable sending situations.

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