Defence Robot

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***Abstract*— The goal of the defensive robot is to make the soldier's life less dangerous by using machine learning and other advanced sensing technologies to identify the enemy's territory. Automating target item recognition and pinpointing its precise location is this paper's major contribution in this approach. The article suggests using artificial intelligence to recognise objects and their locations. The report also describes how the missile may be precisely automated-positioned using this information.**

I. Introduction

The world just recently understood the significance of AI. Therefore, the use of AI to be exact and make activities easy is greatly needed. This is being planned for further development and will soon be adopted in the defence forces of numerous nations.Only a few nations have begun to create their AI soldier robots and AI vehicles like launchers, missiles, tanks, etc. Artificial intelligence-guided missiles employ traditional algorithms, such as proportional navigation algorithms and their derivatives, which are ideal when the speed.The advantage of a guided missile is quite great, and the target's manoeuvrability is poor.This demonstrates the Indian Army's growing demand for AI. These technologies enable the Indian Army to maintain the highest standards while also keeping personnel safe.

II. Explanation On This Model:

The working model described above simply lies on the battlefield and, with the help of some input power, moves forward. If, however, an object (TERRRITORY, CAMPS, TC,.) is discovered on the other side of our battle field, the tanker automatically detects the object's movement using its (Ultrasonic) sensors and decides to stop for a while. In the meantime, the (INFRARED)Sensor prepares to fire the missile at the target in front of it as it determines whether to turn left or right as its next move. The sensors listed above are only a project model, and as we continue to improve this model, we will be able to expand it to include HITECH applications in the future.

III. USE & IMPORTANCE OF THIS MODEL:

These sorts of tankers are mostly used in risky areas of the battlefield. The SOLDIER may be in a safer location in the meanwhile. Since the generated model operates automatically but is still not entirely correct, the soldier's sole responsibility throughout this operation is to observe it. Therefore, we must continue to keep an eye on every move or action the tanker makes.

IV. COST REQUIRED:

Regarding costs, the model we are creating must be completed at the lowest possible price. In order for our Indian Army to readily be able to purchase it for our defence, we must manufacture this at a lower cost. Additionally, when the model is developed, we will use advanced technologies, and the pricing may change depending on the HI-TECH used.

V. SCOPE FOR IN FUTURE:

Since the bot we constructed at this point is unable to distinguish between a man and an object. Instead, it merely designates it a target and begins its detection process to go on to its next action, which is LAUNCHING THE MISSILE. In the future, when there is no manual and the system is totally automated, it will be able to accurately identify soldiers from India and our adversaries as well as humans or objects with ease. In order for it to behave more precisely and to be friendlier to our Indian Army, it must be 100% accurate. The basic principle known as "THE ARTIFICIAL INTELLIGENCE" can be used to build all these concepts in the future.

VI. METHODOLOGY:

Our project's technique include the employment of obstacle-avoiding robot technology, but we do it in a way that makes it an AI-controlled robot that is also known as an automated control military robot or a military tanker. This tanker's or robot's basic operation is to recognise the thing (for instance:) When our military tanker detects the thing, it stops moving abruptly, turns to the left and right, and then looks for a target to fire the missile towards. Our project's technique include the employment of obstacle-avoiding robot technology, but we do it in a way that makes it an AI-controlled robot that is also known as an automated control military robot or a military tanker. This tanker's or robot's basic operation is to recognise the thing (for instance:) When our military tanker detects the thing, it stops moving abruptly, turns to the left and right, and then looks for a target to fire the missile towards.

VII. Operation of Components:

ARDUINO UNO, a 9 or 12 volt battery, and an ultrasonic sensor with an L293N Motor shield are used in this application to control the rotating motion of the Motors. We are employing two motor drivers in this specific connection because one driver controls two motors and the second driver controls another two motors, giving each driver control over a total of four motors, ensuring that the vehicle is stable and maintains a steady pace.

VIII. DESIGN AND SETUP

Details of the missile guidance system's design are described in this section. Object identification methodology, rocket motor igniting mechanism, quadcopter system utilised for streaming, hardware and software specifics, and overall system architecture are all included.

IX. SCOPE OF WORK

Create a working prototype of a missile guidance system that can choose targets on its own depending on the priorities that are provided to it. Toy missile-equipped UAVs (Unnamed Aerial Vehicles) will be used to test this guidance system. The YOLO algorithm will be used to create the missile guidance system. The Naza Flight Controller will serve as the foundation for the UAV, it will be equipped with an IP camera as its payload and feed live data to a ground station where our smart Agent will be working.

X. IMPLEMENTATION OF SOFTWARE WITH HARDWARE

1) We employe YOLO v3 to identify objects in picture frames that come from the camera streaming module that our UAV will be carrying. Our intelligent agent will next decide which targets to attack, if any, after analysing the observed items it has extracted from the frame in accordance with the priorities we have provided. The rocket propellant Rocket Candy (RCandy) is used to create the missile prototype.

The NodeMCU/Arduino is attached to a spark plug, which ignites the missile based once more on instructions from an intelligent agent.

Hardware includes 4 Simonk Electroic Speed Controls, 4 930KV Brushless DC Motors, Nichrome Wire, IP Camera, F450 Quadcopter Frame, and a 2200mAH 4S Lithium Polymer Battery.

XI. AUTOPILOT UNMANNED VECHICLE

Unmanned aerial vehicles (UAVs) are a kind of aircraft that have no onboard human pilots and are capable of flight. In unmanned vehicle systems, an aircraft component, payloads, and a base station for operating various aircraft components are often included. The NAZA M Lite flight controller that was included inside the UAV will allow us to test our missile guidance system in real time from the air.

XII. Ignition OPERATION IN ROCKET

- Open-source and widely used, Arduino is an electronics platform built on simple hardware and software toolkits.
- Arduino boards may respond to these inputs by providing output signals since they can read inputs from a variety of sensors or any Relational Database. Arduino's open-source IDE makes programming easy. This micro-controller-based Arduino-based triggering module will be used to ignite any possible rocket fuel in the prototype missile.
- If there are any targets, the estimates from our YOLO method are given to this module. The ignition system is based on Nichrome metal.
- After receiving the coordinates from the feature extraction module, the Arduino will send a high signal to the relay, and the relay will then light the Nichrome wire connected to the rocket fuel. the rocket motor's ignite module pinout.

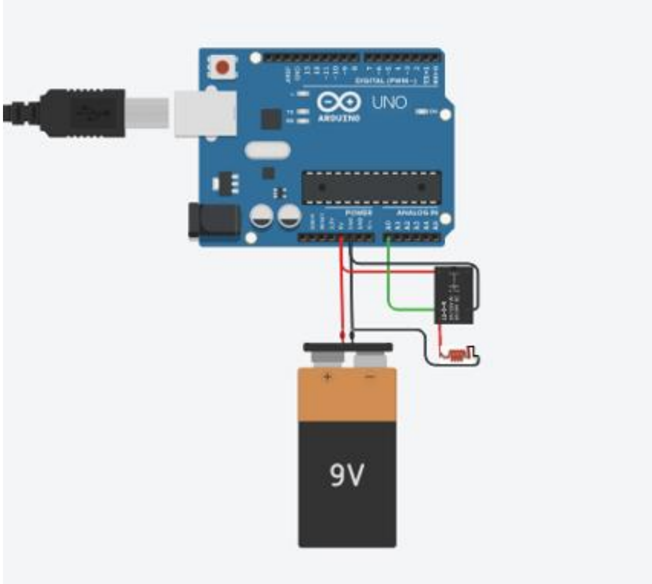


Fig. 1 (Rocket Ignition System)

XIII. DUCATING THE SYSTEM

- Every deep learning activity requires system training, which once again requires a dataset to work with. The system is put into practise utilising the pictures from the freely accessible online coco Dataset and Google's OpenImagesV4 dataset. With about 500 classes of items and their labels, it is a sizable dataset.
- The bounding box annotations for these items are also included in the dataset.The neural network framework known as "darknet" is built in CUDA and C and is available as open-source code.

XIV. Splitted parts

- As with every machine learning method, it becomes necessary to divide the data into a train set and a test set in order to monitor and evaluate the outcomes.
- This is a sample of data drawn at random from our dataset that we utilised to train our model.
- The programme selects between 70 and 90 percent of the data for this collection at random, depending on the need. This is a sample of data taken at random from our dataset and used to evaluate our model. The algorithm selects between 10% and 30% of the data for this collection at random, depending on the demand.

XV. ARCHITECTURE OF THE SYSTEM

This displays the proposed system's overall system architecture, which essentially depicts each system component, how it functions, and how the system flows. To enhance its functionality, video streaming is acquired from an IP camera and placed through pre-processing stages. the Yolo approach was used in our object detecting module, is then given these processed video frames. Yolo examines each frame it receives and then uses our training model to attempt to identify any items. The intelligent agent evaluates the tagged labels and signals the rocket motor ignite module depending on their priority after Yolo transmits the detected items to it.

XVI. Annotation of Data

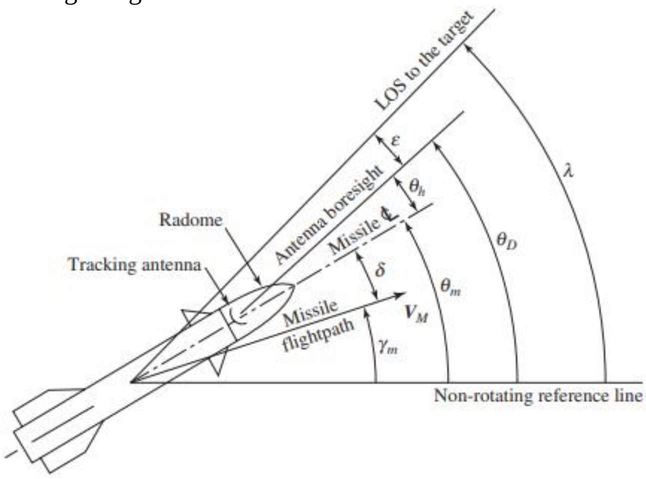
- In computer vision and machine learning, the method of data annotation is used to label the data in a form that the machine can comprehend. Humans often do this stage using data. Software for annotation is available to store the massive volume of created data.
- The most popular method of image annotation, the bounding box, essentially draws attention to a specific item in the image so that computers may learn to recognise it and produce related results.
- The annotated pictures are used as datasets in machine learning to build an AI-based model that can work independently and help users with a variety of tasks without requiring human involvement.

XVII. Feature Analysis and Processing

- We merge the numerous components into a single neural network to detect things. Our network uses features from the entire image to produce each bounding box prediction. Additionally, it predicts all bounding boxes for an image across all classes simultaneously. This suggests that while reasoning, our network takes into account the complete image and all of its objects.
- The YOLO stands structure allows for end-to-end training at real-time speeds while maintaining great average accuracy. The input image is divided into a S * S grid by our method. If an item's centre falls within a grid cell, that grid cell is responsible for detecting the object. UAV and missile guidance system prototypes are developed to test the recommended method, as indicated.

XVIII. XIX. OUTCOME

- In current conflicts, autonomous missile guiding technologies can reduce unintended devastation. The suggested tries to reduce this devastation by offering an intelligent agent that is simple to train and selects the hitting target without a human contact.
- The proposed technique is based on a trained intelligent agent with a priority system. In order to detect things in real time, our system analyses the video frames.
- The intelligent agent then selects the High Risk target to hit on based on the priorities provided to it during training and object labelling. The identified objects are then supplied to the intelligent agent.



- Fig.2 (Angular Motion of the Missile)

XIX. FUTURE SCOPE

ZigBee may be used instead of Wi-Fi to identify things from a distance with greater precision. This system may be made powerful by the high precision and rapid responsiveness of Zig-Bees.

XX. CONCLUSION

A missile guiding system is being efficiently run using deep learning and artificial intelligence. The approach takes a video stream as input, recognises objects in video frames in real time, and chooses one high risk target out of several to be attacked on.

XXI. References

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