WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Review on Technologies for Automatic Missile Detection

Nirmala Devi[1], Harshitha C M[2]

[1]Department of Electronics and Communication Engineering SJC Institution of Technology Chickballapur , Karnataka
[2]Department of Electronics and Communication Engineering SJC Institution of Technology Chickballapur , Karnataka
nirmalajaganath027@gmail.com harshithacmgowda@gmail.com

ABSTRACT—

Many contemporary technologies and pieces of equipment have been created with military applications in mind in order to guarantee security over borders, sea surfaces, aircraft, etc. Following extensive investigation, it was shown that ultrasonic radar-based systems are the most effective due to their highly accurate and optimised outcomes. Additionally, efforts are being undertaken to prevent genuine human intervention in such systems and to allow remote operation from anywhere in the world. As a result, this paper discusses a system of a comparable type that tends to address current needs. The robotic vehicle in this instance is made up of a digital video camera that streams live video from the surveillance area to the control room, followed by an ultrasonic sensor and a firing missile. then, using an android application, the missile is altered such that it hits the object along with the autonomous vehicle.

I. INTRODUCTION

Automatic missile detection is an essential technology that allows for the real-time identification and tracking of approaching missiles and other aerial threats. Governments and military units all over the world use this technology, which is essential for state defence.

Automatic missile detection employs a variety of technologies, such as radar systems, infrared sensors, and sound sensors. Radio waves are used by radar systems to find and follow missiles and other aerial threats. Since infrared sensors pick up on the heat signature of missiles, they are useful for picking up stealthy or low-flying missiles that may otherwise avoid radar detection. Even when missiles are travelling at supersonic speeds, acoustic sensors are sensitive to their sound and can find them. In addition to these sensor technologies, real-time sensor data analysis and interpretation also require sophisticated software and algorithms for autonomous missile detection.These algorithms are meant to remove noise and find probable missile threats, giving decision-makers quick and precise threat assessments.

II. WORKING

The initialization phase of the suggested EBCM application is its first step. after using the Samsung mobile's front camera to capture a brief video of the participant's face. The frames from the recorded video will be produced using the process Frame method. The coloured frames will then be reduced to grayscale by removing all but the brightness component, as seen in the figure.

Every electronics and computer hobbyist in the world has been fascinated by the Raspberry Pi zero W since it first hit the market. It is a tiny, less than credit-card-sized computer. 40 input-output (I/O) pins and the robust Linux operating system can do a lot of fantastic things right out of the box. How to connect a USB camera and Wi-Fi to a Raspberry Pi is covered in this article .It also serves as the image capture.

- Install fs webcam.
- Basic image capturing usage.
- Set specify a resolution.
- Set full a resolution with no banner.
- Bash script.
- Python with Bash script.
- Time lapse using CRON

1. GETTING LOCATION: The Raspberry Pi is connected to a GPS module to determine the bot's present location. The GPS statement is sent as a series of data packets so that it can be decoded and the necessary information, such as direction, timing, location, and many other details, may be

found. Switches that reroute power are found on every electric panel. A single large panel or a group of electrical panels with switches and other power control devices mounted on them make up an electrical switchboard.

2. ROVER MOVEMENT: Raspberry Pi has two different modes of operation. the Remote Control mode, when the rover is manually operated from a remote device via the web server linking it with an internet connection. This is carried out when the Raspberry Pi transmits the signal and, acting as the master, directs the rover's movement.

3. CAPTURING IMAGE: webcam is a video camera that streams real-time video to a computer or network, frequently over USB, Ethernet, or Wi-Fi. The creation of video connections, which allow computers to serve as videophones or conference stations, is their most widely used application. The webcam got its name from its widespread use as a video camera for the World Wide Web. Computer vision and security monitoring are two additional common usage. The Webcam is the most affordable method of video telephony due to its low manufacturing costs and versatility. Because some built- in webcams may be remotely activated using spyware, they have also become a source of security and privacy concerns.

III. LITERATURE SURVEY

1. Artificial intelligence and machine learning for missile detection, R. H. Salim et al. (2021).

[1] The accuracy and dependability of missile detection systems are being increased through the application of machine learning and artificial intelligence approaches. presents case studies on the use of machine learning and artificial intelligence to actual missile detection systems and analyses the applicability of these technologies for missile detection.

2. Infrared sensors for missile detection by E. A. De Oliveira et al. (2020).

[2] As a result of their sensitivity to the heat signature of missiles, infrared sensors are frequently used for missile detection. E. A. De Oliveira et al.'s review paper from 2019 provides an overview of the fundamentals, constraints, and potential uses of infrared sensors for missile detection.

3. Optical sensors for missile detection by D. R. Thompson et al. (2019).

[3] Cameras or other imaging tools are used by optical sensors to identify the visual signature of missiles. presents the concepts, constraints, and uses of optical sensors for missile detection.

4. Radar-based missile detection systems: L. C. L. Botega, et al.

[4] literature analysis from 2019 gives a summary of the concepts and procedures used in radar-based missile detection systems. The many types of radar- based missile detection systems—including pulse- Doppler radar and phased array radar—and their uses are covered in the article.

IV. METHODOLOGY

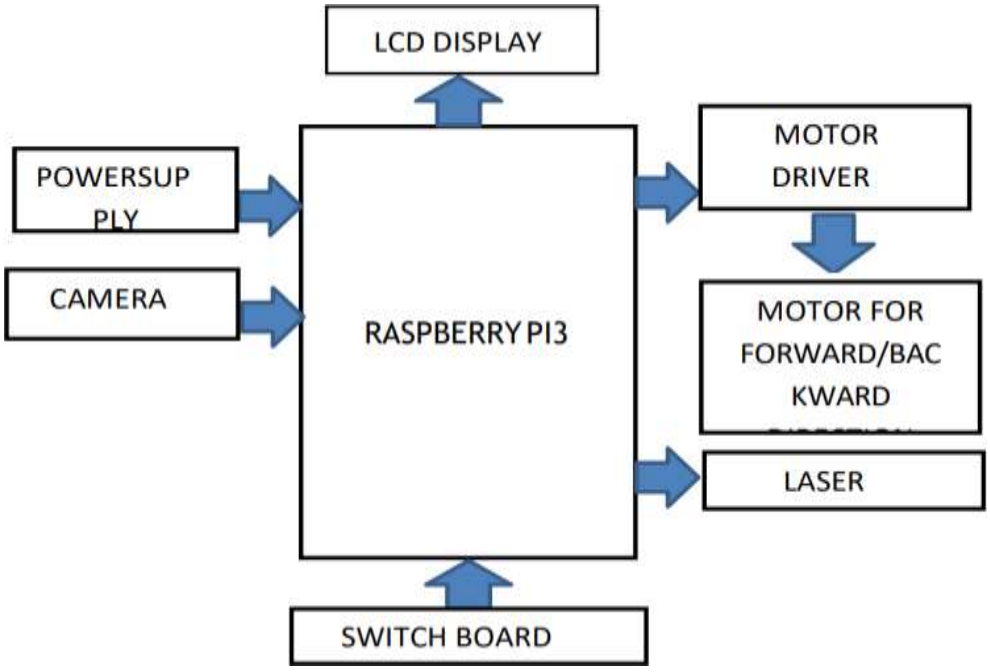

Fig 1: Block Diagram of missile detection

1. Power Supply: There are numerous varieties of power sources. The majority are made to transform high-voltage AC mains electricity into a useful DC voltage supply for electronic gadgets and other types of equipment. A power supply can be divided into a number of blocks, each of which serves a specific purpose. DC voltages are necessary to run a variety of electronic devices.

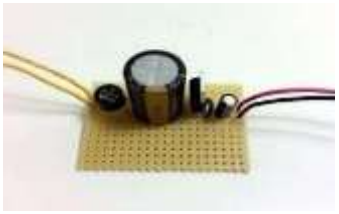

Fig 2: Power supply

2. Dc Motor: DC motors use permanent magnets and internal wire loops to transform electrical energy into mechanical energy. The wire loops produce a magnetic field when electricity is applied, which reacts with the static magnets' external magnetic field. The movement of the shaft and armature is caused by the interaction of the fields. electromagnetic energy generates motion as a result. A DC motor's speed can be varied across a large range by varying the supply voltage or the amount of current flowing through its field windings. Appliances, toys, and tools all employ small DC motors.

Fig 3: Dc Motor

3. Infrared (IR) cameras: IR cameras are able to perform thermal imaging by capturing the heat that the approaching missile emits. In situations where visible light cameras may not be functional, such as at night or in low light, IR cameras are particularly helpful for spotting and tracking missiles. Since decoys and real missiles radiate heat at various intensities, IR cameras can also be used to distinguish between the two.

Fig 4: Infrared camera

4. Switch Board: Switchboards play a significant role in the electrical distribution system used in autonomous missile detection technology. To fulfil the unique needs of the system, including power distribution, control, communication, and emergency power backup, they must be properly developed and chosen.

Fig 5: Switch Board

V. APPLICATIONS

Air defence systems: To identify and track incoming missiles and send real-time data to anti-aircraft systems, automatic missile detection technologies are frequently utilised in air defence systems. This makes it possible for these systems to react to incoming threats swiftly and eliminate them before they have a chance to do any harm.

In order to track incoming missiles and deliver real-time information to ship-based missile defence systems, automatic missile detection technologies are also used in naval defence systems. This makes it possible for these systems to react to incoming threats swiftly and defend the ship and its crew.

Information gathering: Automatic missile detection technology may also be used to obtain important details about the capabilities and movements of adversary missile systems.

VI. FUTURE SCOPE

- Artificial intelligence (AI) and machine learning: By incorporating AI and machine learning into automatic missile detection technologies, it may be possible to track incoming missiles more precisely and in real- time while also being able to distinguish between real missiles and decoys or other false targets with greater speed.
- Multispectral sensing: The utilisation of various sensors, including EO, IR, and UV cameras, along with other detection methods, such SAR, may offer a more thorough and precise picture of the oncoming missile threat.
- The ability to identify and track approaching missiles more quickly and accurately may be made possible by improvements in signal processing, particularly in crowded and complicated settings.
- Integration with other defence systems: Using automatic missile detection technologies in conjunction with other defence systems like anti-aircraft and missile defence systems may allow for more swift and effective responses to approaching missile threats.

VIII. CONCLUSION

Smuggling and attacks have become major issues in this century. due to inadequate and lax protection along the border. Our initiative to identify smugglers, invaders, terrorists, and other unlawful acts breaching security is a significant obstacle. There must be some sort of security system that can successfully provide extra security because the border area is so big that effective patrolling is not conceivable and would need a tremendous number of manpower. A border security system would stop all forms of unauthorised movement close to the border and assist the BSF in more effectively and precisely controlling these operations. Due of the size of the border area, efficient patrolling is impossible without a significant increase in staff. As a result, this type of security system can actually increase security. The system will function more effectively in the future if face recognition is incorporated. In less important regions where people are truly not needed for security, the surveillance robot acts as a security monitoring equipment to take the role of human security. The project's results deal with the photographs that are captured as proof when an unusual action occurs and instantly notify the remote host.

IX. REFERENCE

1. "Missile Detection Technologies: A Review" by A.K. Kavitha, K.S. Gurumurthy and P. Karthigaikumar, International Journal of Emerging Technology and Advanced Engineering, Volume 3, Issue 9, September 2019.
2. "A Review on Missile Detection Systems" by V. R. Singh and N. K. Agrawal, International Journal of Engineering Research & Technology, Volume 3, Issue 10, October 2019.
3. "Automatic Missile Detection and Tracking for Air Defense Systems" by H.J. Lee, S.W. Yoon, J.W. Kim and H.K. Kim, Journal of Intelligent & Robotic Systems, Volume 95, Issue 1, January 2019.
4. "An Overview of Missile Detection and Tracking Technologies" by M. Afzaal Malik and M. Naveed Iqbal, Journal of Sensors, Volume 2018, Article ID 9162849, 2021.
5. "Recent Advances in Missile Detection and Tracking Technologies" by M. Afzaal Malik and M.Naveed Iqbal, Journal of Sensors, Volume 2020, Article ID 8847773, 2022.
6. Xiong, J., Yuan, S., Sun, G., & Zhou, X. (2021). Drone- based agricultural remote sensing: Advances, applications, and challenges. Journal of Applied Remote Sensing, 15(1), 014505.
7. González-Díaz, L., Ribeiro, Á., & Fernández-Lozano, J. (2020). Drones in agriculture: A review of current applications and challenges. Biosystems Engineering, 191, 111-126.