INDIAN INSTITUTE OF INFORMATION TECHNOLOGY

TIRUCHIRAPPALLI

REMOTE CONTROLLED THREAT DETECTOR

Team Name: *TRIGGERZ*

Team Members:

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Problem statement overview:

In modern times the means of threat to human life has metamorphosed its form and often camouflages in plain sight. This gives birth to various problems–

- *Risking human lives in danger detection and threat analysis*
- *Lack of effective countermeasures in solving problems in particular situations.*
- *Inexistence of data regarding these situations.*

We aim to address mentioned domains affected by this problem-

- *Border security*
- *Counter terrorism operations*
- *Internal security*
- *Military installation*
- *Humanitarian*
- *Demining*
- *Remote area surveillance*

Context:

The project's primary context is to address the challenges faced in conflict zones or areas with historical landmine usage. These areas often pose threats to both military personnel and civilian populations. The integrated system aims to enhance security, minimize risks during military operations, and contribute to post-conflict humanitarian efforts by facilitating safe demining processes.

Project Outcomes:

- *Enhanced Security and Safety*
- *Efficient Demining Operations*
- *Real-time Surveillance and Monitoring*
- *Data Analytics and Reporting*
- *Adaptability and Remote Operation*
- *Humanitarian Impact*
- *Collaboration with Stakeholders*
- *Educational and Skill Development*

Stakeholders:

This project will prove helpful in domains of defense sector, public surveillance, industry activity, mapping purposes, and research field

Objective:

To design, develop, and implement an innovative system that combines a landmine detector with a 360° surveillance rover to address critical challenges in conflict zones, border security, and humanitarian demining efforts.

Components:

- *Landmine Detector-*

Utilize advanced sensors, such as ground-penetrating radar and metal detectors, for efficient and accurate landmine detection.
Implement machine learning algorithms to enhance detection accuracy and reduce false positives.

- 360° Surveillance Rover-

Develop a rugged and versatile rover equipped with high-resolution cameras, thermal imaging, and other sensors for comprehensive situational awareness.
Incorporate autonomous navigation capabilities to cover large areas efficiently.

In addition to this, there are several modules incorporated which are mentioned below-

- *Battery charger control module*

- *Remote controlled transmitter and receiver module*
- *Central processing module*
- *Open camera vision module*
- *Ultrasonic sensor*
- *Motor drivers*
- *Software*

Ideation process:

- *We start with constructing a flexible multi purpose chassis for movement. In order to improve maneuverability, we have incorporated a single link dual axle drivetrain powered by respective motor drivers.*

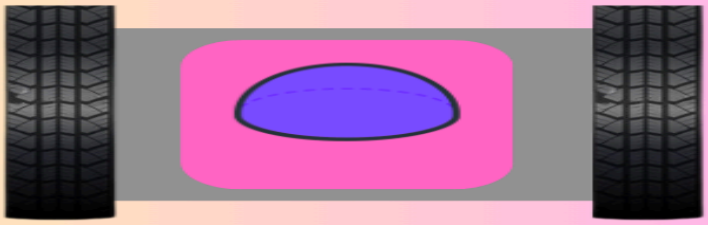
- *The power generation is taken care of by the LIPO battery as it helps save weight.*

- *As for the sensors we are using the aforementioned sensors(see Components) for obstacle and terrain detection.*

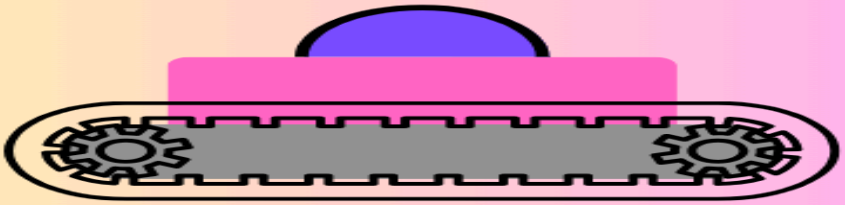
- *To make the device remote controlled compatible we are using our software for better connectivity and range.*

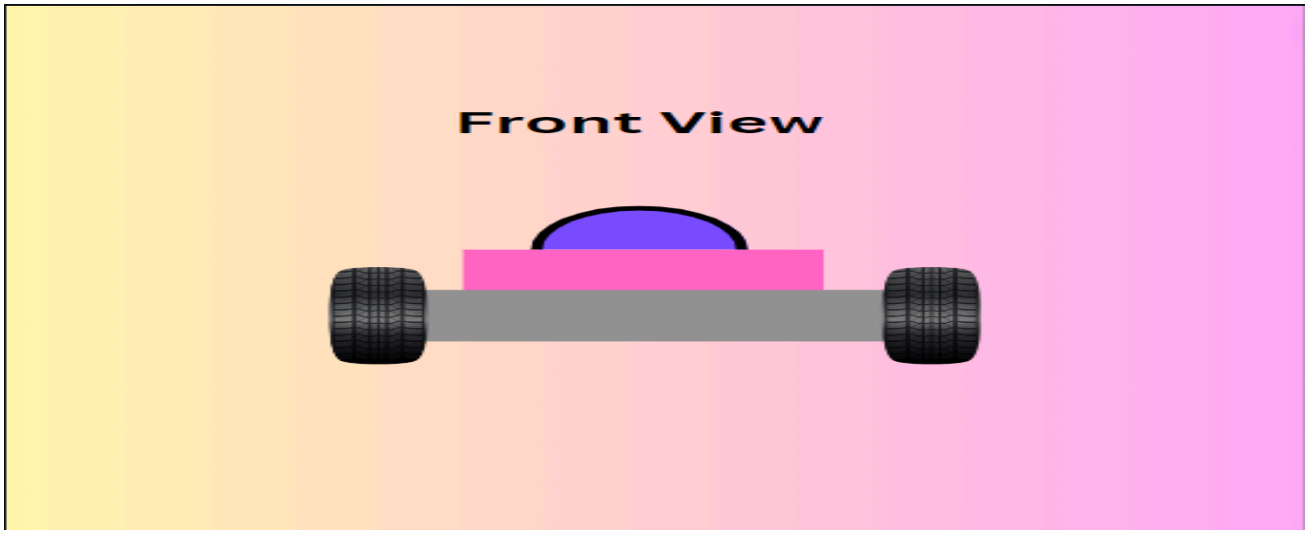
- *As far as output is concerned we are using a screen to provide a resolution of 640 X 480 Pixels.*

Top View



Side View





Unique selling points(USPs):

- *Improved Landmine Detection-*

Increased accuracy in detecting landmines, reducing the risk to military personnel and civilians in conflict zones.

- *Enhanced Border Security-*

Improved surveillance capabilities for border areas, allowing for early detection of unauthorized activities and potential threats.

- *Humanitarian Demining Support-*

Facilitating safer and more efficient demining operations, contributing to the removal of landmines in post-conflict regions.

- *Reduced Casualties-*

Minimization of casualties through timely detection and neutralization of explosive devices in conflict zones.

- *Versatile Surveillance-*

A versatile 360° surveillance rover capable of adapting to different terrains and providing real-time information for strategic decision-making.

- *Research Contributions-*

The project could contribute to academic research in the fields of robotics, sensor technology, and autonomous systems.

- *Potential Commercialization-*

The developed technology may have potential applications beyond defense, leading to commercial opportunities in surveillance, security, and disaster response.

Challenges and Considerations:

Open camera vision usage-

- *Collaborate with experts in sensor technologies to integrate landmine detection sensors seamlessly into the rover.*
- *Ensure the synchronization of data from various sensors for real-time analysis.*

Wireless transfer-

- *Establish a robust wireless communication system to enable real-time data transmission between the rover and a control center.*
- *Ensure encrypted communication for security purposes.*

Obstacle detection-

- *Implement algorithms for autonomous navigation to enable the rover to move through challenging terrains and navigate around obstacles.*
- *Develop a user-friendly interface for remote control and monitoring.*

Proposed future developments:

- *Wifi/Internet connectivity*
- *Autonomous driving feature*
- *Ground penetrating radar*
- *GPS/GSM*
- *Slip differential*
- *Adjustable monoshock*
- *Improved screen resolution*

THANKING YOU