DAYANANDA SAGAR UNIVERSITY

TECHNOCOGNITION '25

Inter-College 36-Hour International Level Protothon

Project Title : AI-Powered Smart Wildlife Intrusion Prevention System (SWIPS)

Team Name : FieldBarriers

Team Members : Sanath G R – ENG23EC0031
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Theme : Fusionronics (Embedded + IoT)
Aegis-Robotics (Automation)
Human-Tech Synergy

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PROBLEM STATEMENT

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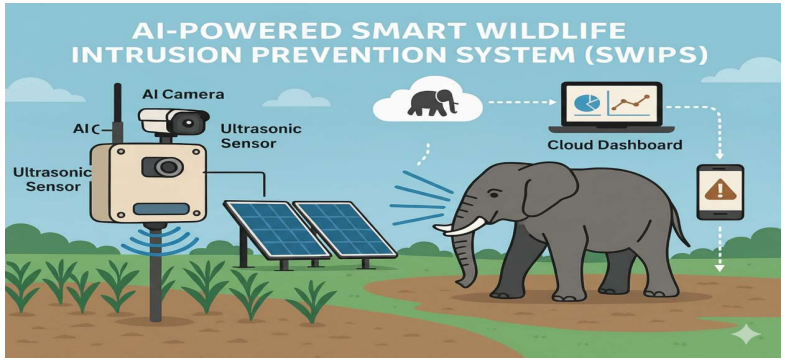
Human–wildlife conflict has become a major global concern, especially in regions near forests and agriculture-dense areas. Wild animals such as elephants, boars, and deer frequently enter farmlands, residential villages, highways, and solar fields in search of food or habitat



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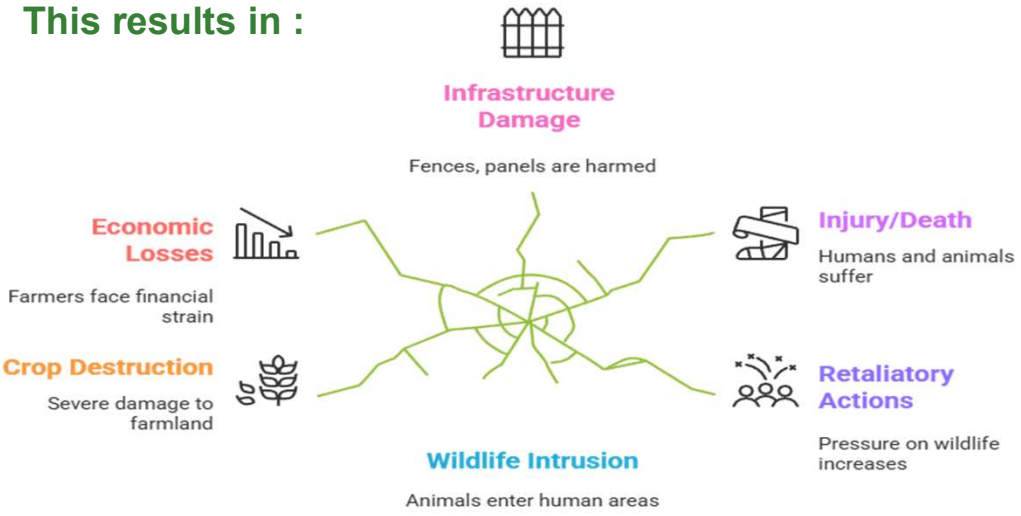
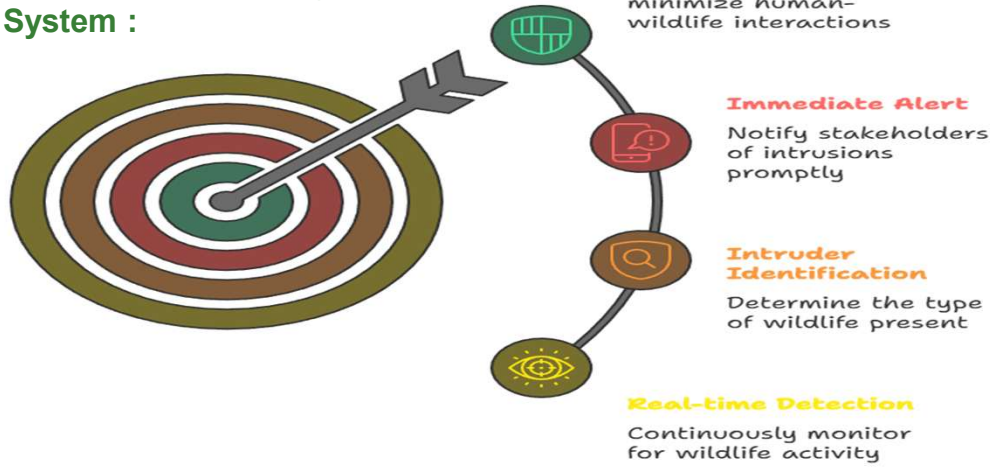


Smart Wildlife Management System :



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SOLUTION OVERVIEW

Solution Overview :

- To mitigate the increasing human–wildlife conflict, the proposed solution SWIPS (Smart Wildlife Intrusion Prevention System) introduces an intelligent, automated, and non-harmful mechanism for detecting, identifying, and deterring wildlife in sensitive zones. The system employs edge-based AI vision using ESP32-CAM / OpenMV modules to continuously monitor the protected area.
- Deep-learning models trained on wildlife datasets enable the camera to recognize intruders and differentiate between animals, humans, and irrelevant objects. In parallel,
- PIR/Ultrasonic sensors are used for motion detection and redundancy, ensuring robust performance in low-visibility conditions.

SWIPS Response Sequence :

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IMPLEMENTATION/PROTOTYPE

SWIPS Prototype Operation Sequence :

18650 Battery — Provides portable DC power for the system. Rechargeable and suitable for long-duration field use.

TP4056 Module — Safely charges and protects the 18650 battery. Converts USB 5 V input into regulated charging current.

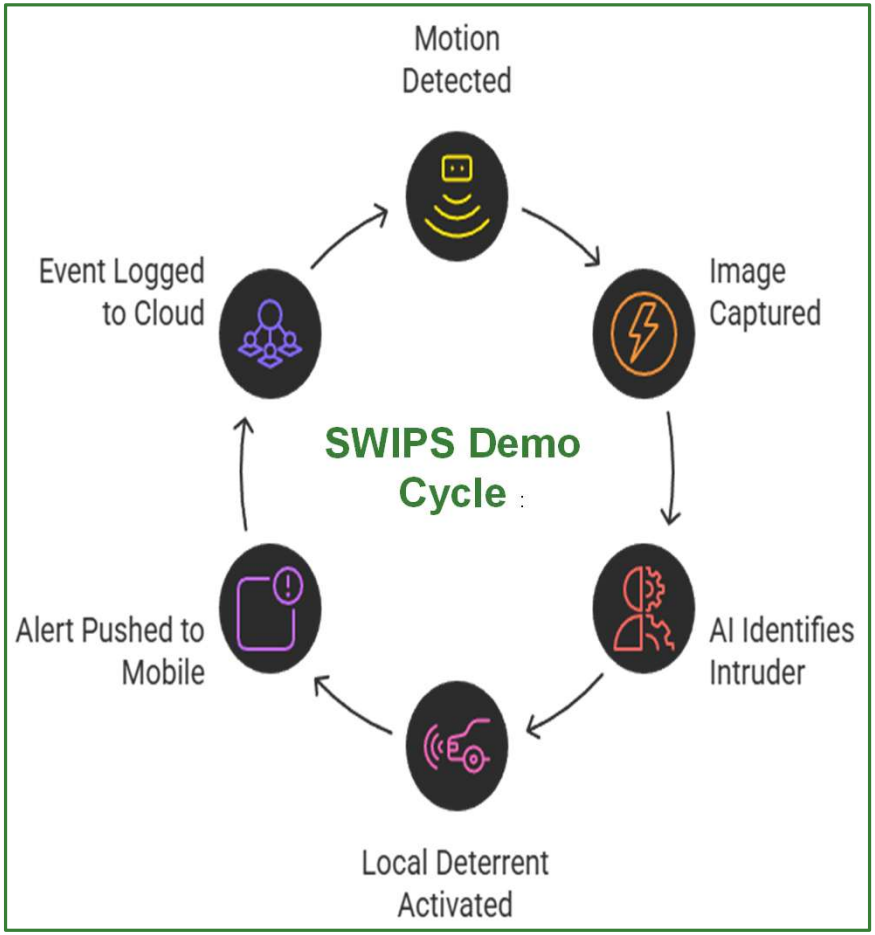
Switch — Used to turn the system ON or OFF manually. Helps save battery power when not in use.

7805 Voltage Regulator — Converts battery voltage to stable 5 V output. Ensures proper voltage for ESP32, sensor, and buzzer operation.

ESP32 Board — Acts as the main controller to process sensor data. Controls the buzzer and communicates detection status.

Ultrasonic Sensor — Measures object distance using sound waves. Sends distance data to ESP32 for decision-making.

Buzzer — Produces sound alert when an object is detected nearby. Activated by ESP32 when the measured distance is below the set limit.



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TECHNOLOGY STACK

Project Components :

Software Components

Firmware, CNN, and IoT communication

Hardware Components

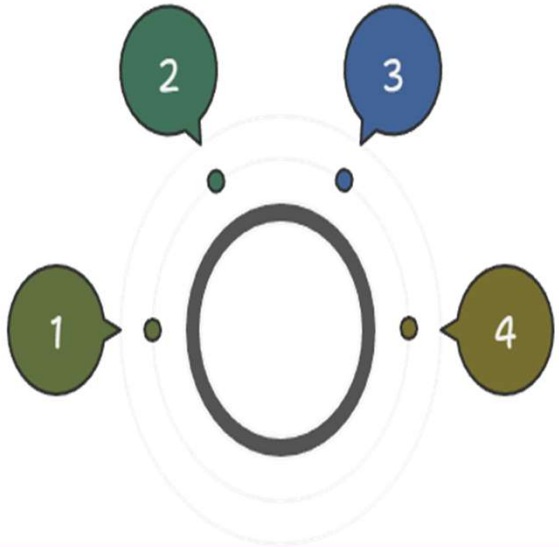
ESP32, sensors, and power supply

AI-Powered IoT System

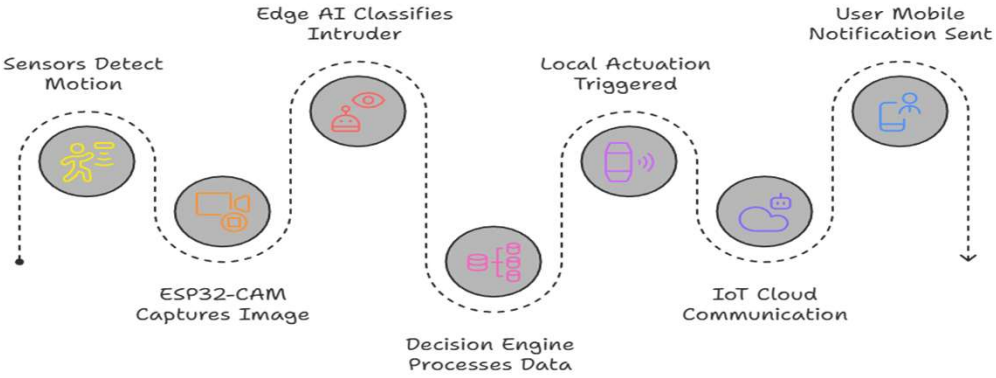
Core functionality and integration

Tools & Frameworks

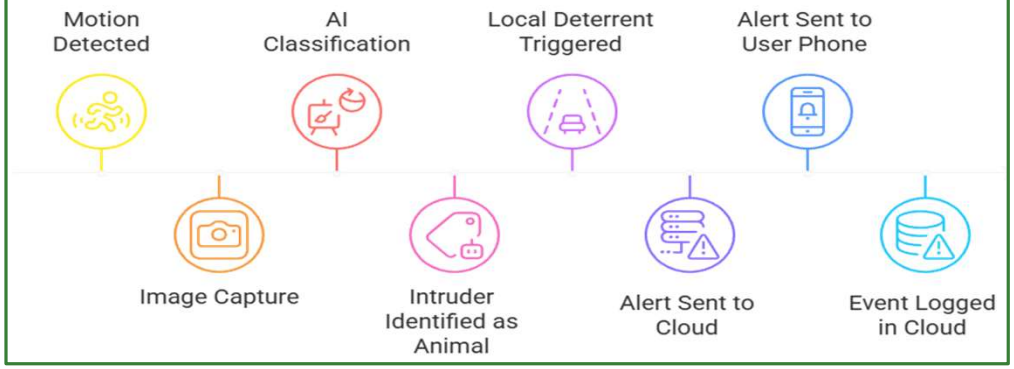
Edge Impulse, TensorFlow Lite, and IDEs



System Architecture Sequence :



Intruder Detection and Response :



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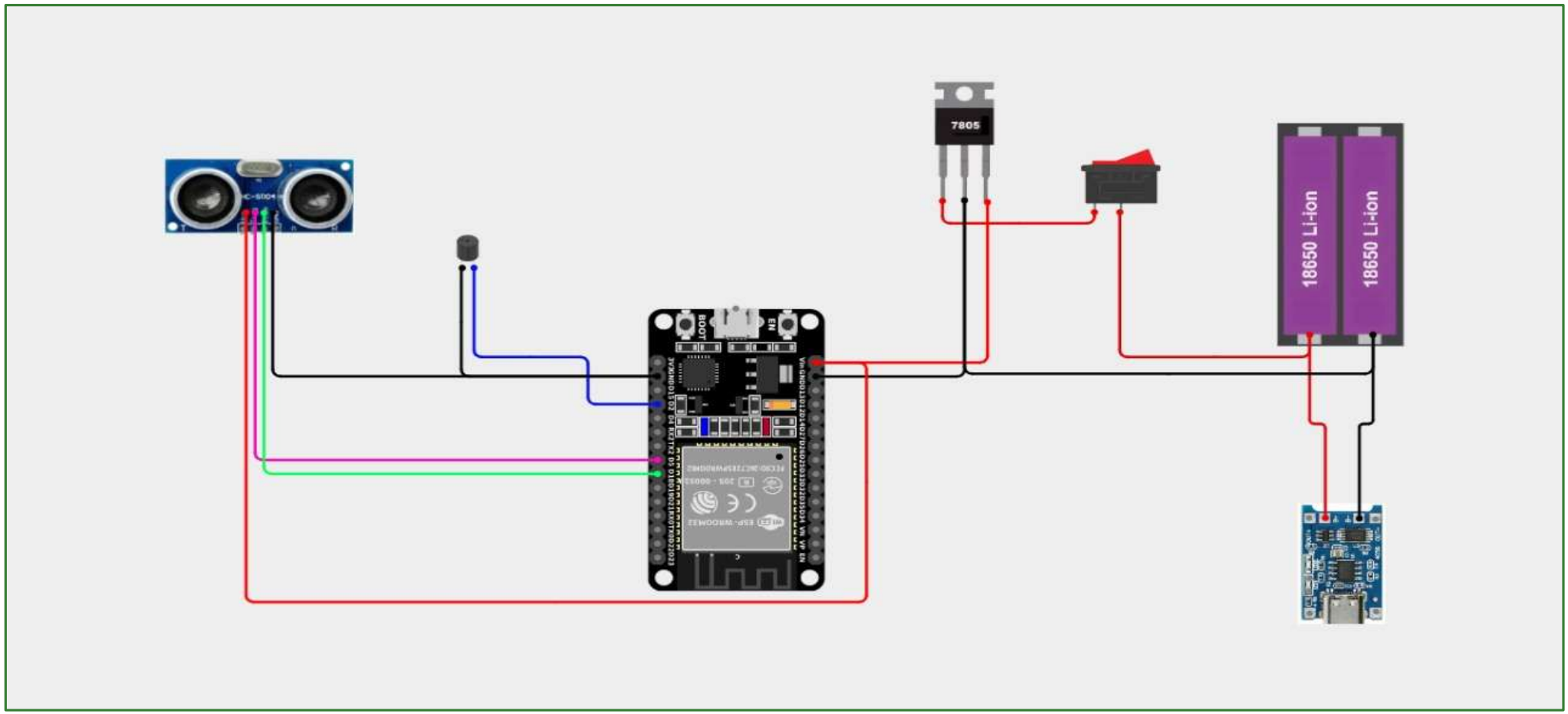
Circuit Diagram



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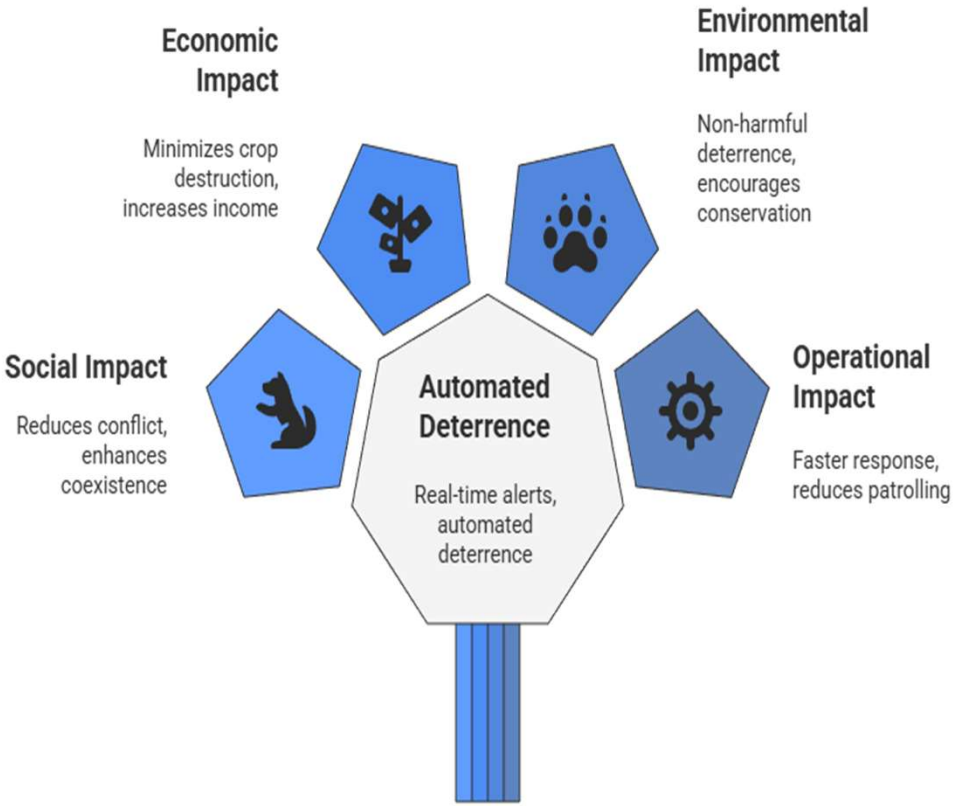
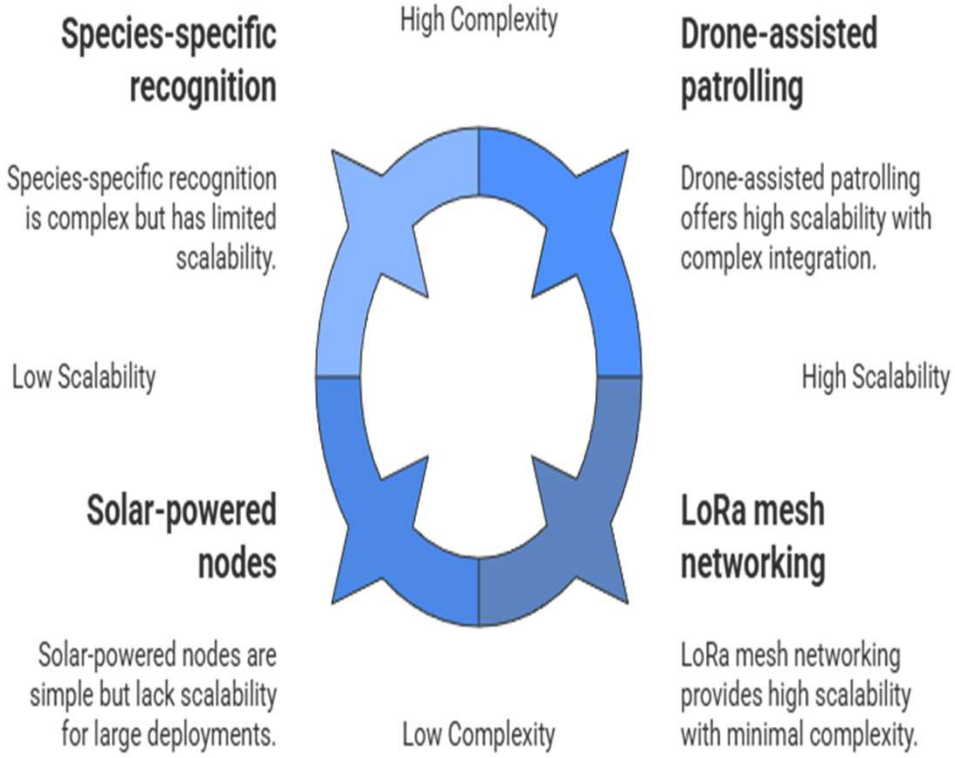
IMPACT & SCALABILITY

IMPACT :



SCALABILITY :



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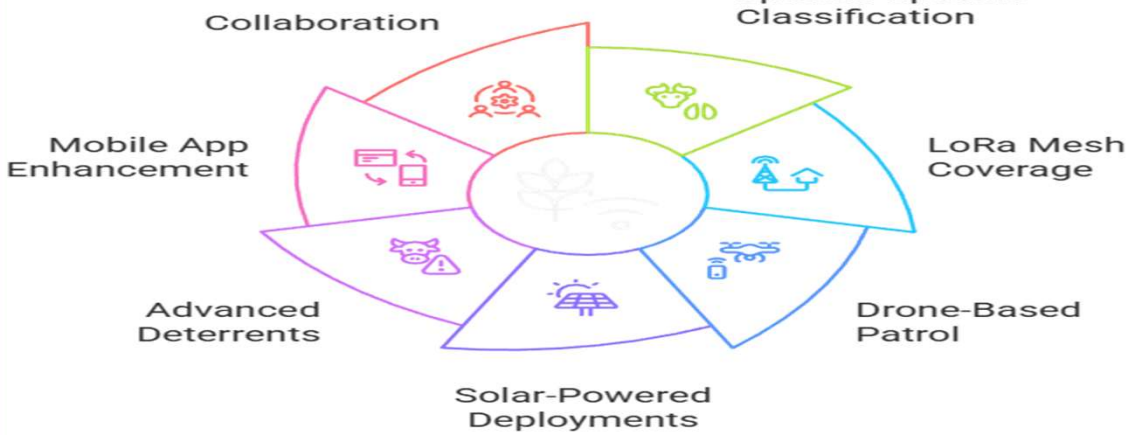
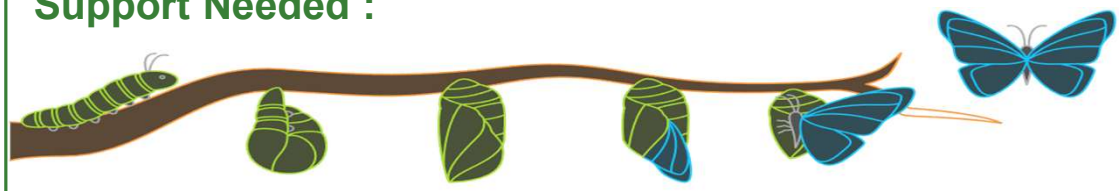
RESULTS/FUTURE SCOPE

Future Scope :



Support Needed :



Initial Phase	Data Acquisition	Field Testing	Funding	Mentorship	Commercial Product
Research and development	Gather wildlife datasets for ML	Test with community/forest partners	Secure funding for hardware & scaling	Get guidance on design & certifications	Scalable smart-farm & conservation

RESULT :