CREWSIX

SMART INDIA HACKATHON 2025

SMART INDIA HACKATHON 2025

SHOOPEST

SIH25015

Intelligent Pesticide Sprinkling System Determined by the Infection Level of a Plant

Agriculture, Foodtech and Rural Development

Software

•Team ID–

Crewsix

CREWSIX

IDEA TITLE

SMART INDIA HACKATHON 2025

We propose ShooPest – a drone-powered AI system that detects crop pests and diseases in real time and sprays pesticide only where needed. The drone captures images of the farm using an onboard camera. These images are processed through an AI model trained to differentiate between healthy and infected plants. Based on the severity of infection, the system automatically decides the exact amount of pesticide required and performs variable-rate spraying. This ensures that only the affected zones are targeted while leaving healthy areas untouched.

How It Addresses the Problem

Farmers currently rely on blanket spraying, wasting chemicals, raising costs, and causing environmental harm. ShooPest tackles this by:

- Detecting pests/diseases early before they spread.
- Targeted spraying that saves 30–50% pesticide.
- Cutting costs while protecting crop health.
- Promoting safer food and a cleaner environment.

Innovation & Uniqueness

- AI-powered detection from aerial images.
- Variable-rate spraying based on severity – affordable and precise.
- Scalable design: works with low-cost cameras, upgradable with multispectral sensors.
- Dual benefit: improves farmer income and reduces environmental impact.

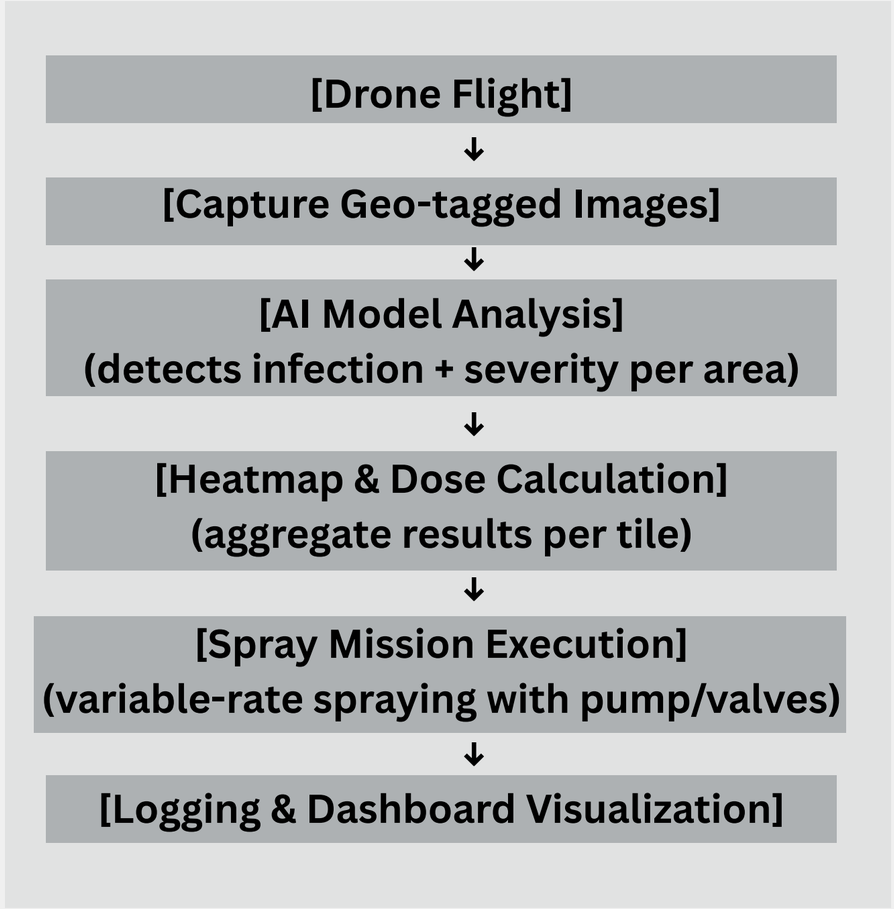
CREWSIX

TECHNICAL APPROACH

SMART INDIA HACKATHON 2025

CORE COMPONENTS:

- ESP32-CAM / RGB Camera: Captures leaf images during flight.
- AI Model (CNN): Detects infection type (e.g., rust, blight, mosaic virus) and severity.
- GPS Module: Maps infected zones for precise spraying.
- Microcontroller (ESP32 / Raspberry Pi): Controls flight path and spray logic.
- Sprayer System: Includes pump, solenoid valve, and servo-controlled nozzles.
- Environmental Sensors: Monitor humidity, temperature, and soil moisture to optimize spraying conditions.



CREWSIX

FEASIBILITY AND VIABILITY

SMART INDIA HACKATHON 2025

FEASIBILITY ANALYSIS

ShooPest is technically feasible because it integrates readily available hardware (drones, cameras, pumps) with AI software that can be trained on crop images. Low-cost RGB cameras are enough for basic detection, while multispectral sensors can enhance accuracy for larger farms. Precision spraying has already been proven in research, making this solution practical and scalable for Indian farmers.

POTENTIAL CHALLENGES & RISKS

- Operational difficulty: Not all farmers may be comfortable handling drones.
- Weather dependency: Drones cannot operate effectively during rainy or windy seasons.
- Battery & flight limits: Drones have short flight times, restricting coverage in large fields.
- Data accuracy: AI performance may drop if the training dataset doesn’t cover all crop varieties and pest types.
- Initial cost: Farmers may hesitate due to upfront investment.

STRATEGIES TO OVERCOME CHALLENGES

- Autopilot & Easy UI: Make drone flights fully autonomous with pre-set routes and one-touch operation.
- All-weather planning: Encourage scheduled spraying in non-rainy hours; future scope for waterproof drones.
- Swappable batteries: Use multiple batteries and charging docks to extend field coverage.
- Continuous AI training: Improve the model with local crop/pest datasets for higher accuracy.
- Affordable access models: Provide through FPOs (Farmer Producer Organizations), cooperatives, or as a service instead of individual purchase.

CREWSIX

IMPACT AND BENEFITS

SMART INDIA HACKATHON 2025

POTENTIAL IMPACT

Farmers and Agricultural Workers
- Improved crop yield through timely, targeted treatment
- Reduced labor and manual inspection effort
- Lower pesticide costs due to precision spraying

Agricultural Enterprises & Cooperatives
- Scalable deployment across large farms
- Data-driven decision-making for crop health management
- *Integration with smart farming platforms*

Researchers & Agri-Tech Innovators
- Real-world application of AI and embedded systems
- Open-source potential for further development and collaboration

BENEFITS

Social Benefits
- Healthier communities :Less exposure to harmful chemicals
- Empowerment of small farmers: Affordable tech for precision farming
- Education and awareness: Promotes tech literacy in rural areas

Economic Benefits
- Cost savings: Reduced pesticide usage and labor
- Higher productivity: Better crop health leads to increased income
- Market competitiveness: Tech-enabled farms attract premium buyers

Environmental Benefits
- Reduced chemical runoff: Protects soil and water bodies
- Lower carbon footprint: Efficient drone usage vs. traditional machinery
- Sustainable agriculture: Aligns with eco-friendly farming practices

CREWSIX

RESEARCH AND REFERENCES

SMART INDIA HACKATHON 2025

https://invadeagro.com/2025/07/03/common-crop-diseases-india/

https://sciencesensei.com/26-plants-that-see-colors-humans-cant-even-imagine/

https://www.china-sprayers.com/news/the-working-principle-and-components-of-an-electric-sprayer.html

https://agdronecanada.ca/

https://forums.raspberrypi.com/viewtopic.php?t=336219

AI USED - Chatgpt, Gemini, Perplexity

INSIGHTS FROM AGRICULTURE STUDENT