



Anveshana Prototype Competition: 2024-25

National Level Innovation Challenge

BMS Innovation Cell and Entrepreneurship Part (BICEP)

BMSIT&M, Doddaballapura Main Road, Avalahalli, Yelahanka Bengaluru - 560064



PROPOSAL 2024-25			
Title of your proposition		AI-Powered Firefighter Drone	
Name(s)Maximum of four (4) members per team			
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Name of the Mentor	-	Email & Phone	-
Description of the Proposition			
<p><i>A brief overview of your proposition (max 1000 words). You can include details like</i></p> <p><i>(a) Details of proposed solutions</i></p> <p><i>The AI-Powered Firefighter Drone is a self-driving aerial system to detect, analyze, and act upon firebreaks in real-time. It has thermal imaging cameras, AI-powered fire detection algorithms, GPS, and a water/foam spraying system. It can work in places where human firefighters are at extreme risk, e.g., forest fires, high-rise buildings, and industrial areas. Some of the key components of the proposed solution are:</i></p> <ol style="list-style-type: none"> <i>1. Fire detection & Real-Time Monitoring</i> <i>2. High-Pressure Water Spray System</i> <i>3. Solar-powered charging stations</i> <i>4. Autonomous Flight & Navigation</i> 			

(b) What problem does the proposition address?

Fire results in extensive damage to life, property, and the environment. Conventional fire-fighting strategies tend to use delayed response, high-risk exposure to human personnel, and limited access to areas of fire. Some of the key challenges are:

- 1. Delayed Fire Detection*
- 2. Risk to Fire-fighters*
- 3. Limited access in remote areas*
- 4. Inefficient Resource Utilisation*

(c) Why is the proposition unique and required?

- 1. First-Response Autonomous Fire-fighting System: In contrast to conventional approaches, this drone serves as a first responder, arriving on the scene before fire-fighters.*
- 2. Prevents Escalation of Fires: Early warning facilitates rapid containment of minor fires before they can develop into massive catastrophes.*
- 3. Reduces Human Risk: Fire-fighters are no longer required to venture into dangerous settings straight away—they can analyse and plan from a distance.*
- 4. Flexible & Scalable: The system is deployable in single-drone units or a fleet of drones for extensive fire-fighting activities.*
- 5. Eco-Friendly & Resource-Efficient: Rather than massive water usage, drones strike at fires precisely, wasting less.*

(d) What is the target audience / Market?

- 1. Fire Departments & Emergency Services*
- 2. Government Agencies & Municipalities*
- 3. Industrial & Chemical Plants*
- 4. Defence & Military Applications*

Development Status

Brief overview (maximum 1000 words) with data such as:

a) What is the current state of proposition?

The project is at the development stage where all the necessary elements have been bought. The focus at the moment is on coding and code optimization, adding sensors, and circuit connection. The prototype is being built and tested for main functions like fire detection, self-flight, and water spraying.

b) Do you have a prototype of service/product ready?

There is a working prototype underway. Finalization of hardware setup and active development of software integration is underway. The first aim is to test individual components, such as:

- 1. Fire detection sensors.*
- 2. Navigation and obstacle avoidance sensors.*
- 3. Water spraying mechanism etc.*

After completion of component-level testing, the complete system will be integrated and tested in controlled environments.

c) Do you have a proof of concept ready?

Yes, the proof of concept (PoC) is in progress.

d) What is the estimated time to bring your product to market (time to market)?

A small-scale commercial launch would be possible within 12-18 months, pending regulatory clearances.

e) What is the time frame for testing and certification? In case required

1. Internal Testing (3-4 months)

2. Field Testing (2-3 months)

3. Certification & Compliance (4-6 months, if applicable):

- If commercialized, the drone might require aviation and fire safety approvals.*
- DGCA (India) and Fire Department regulations will be checked for compliance.*

f) Literature survey/patent search

- Such firefighting drones already exist, with the primary purpose being thermal imaging and fire monitoring. Our project, however, stands apart as it brings real-time AI-driven fire extinguishing, GPS coordination with the firefighters. Most of the available drones can only sense fires, while our drone takes action against them, rendering it a more sophisticated and viable option and patenting possibilities will be pursued after validating the prototype.*

g) Is your Idea/Concept/Product has been Patented (Give details, if any)

The project is presently not patented, but the novel AI-powered fire detection and drone control system may be eligible for patent filing when the proof of concept is established. Proof-of-concept testing will be followed by a patent search to pursue intellectual property protection.

h) Discuss Market feasibility studies /reports for proposed product.

Some studies point towards imminent demand for AI-based firefighting solutions:

- Global market for fire safety equipment is likely to be \$114 billion in 2028.*
- Firefighting drones are becoming increasingly popular due to increased response time, reduced human exposure, and improved fire tracking.*
- Government departments and industries are looking for automation of firefighting and are keenly interested in such a project, rendering this project highly marketable.*
- Target customers would be fire departments, municipal bodies, forest protection divisions, and industrial safety units.*

Executive Summary

Maximum 1000 words detailing:

a) Objectives – Specific Statements

- To Create a fully operational prototype that can autonomously detect and suppress fires.
- To Provide smooth AI integration for real-time fire detection, navigation, and firefighting.
- To Make the hardware and software components efficient and cost-effective.
- To Perform field tests in simulated fire environments to confirm performance.
- To Secure potential industry partners for large-scale deployment.

b) Responsibilities of your Core Team members

Sl No	Member Name	Role and Responsibilities
1.	Shaurya	AI & Fire Detection Algorithm Development
2.	Shijin	Drone Hardware & Flight Control System
3.	Shravani	Water/Foam Spraying Mechanism & Power Management
4.	Shivani	Market Research, Testing & Documentation

c) Indicate investment requirements for first two years

Total Investment for a Large scale working plan is estimated to be around ₹25,00,000

d) Discuss the promotional/advertisement plans for your products/services?

At present, we are mainly focusing on creating a small-scale prototype for the Anveshana competition. We have not yet chalked out any promotional or advertising strategies at this point, since our main goal is to provide successful implementation of the prototype. After the development and testing of the prototype in full, we will look forward to future promotion strategies, such as industry tie-ups, web marketing, and associations with fire-fighting groups. A comprehensive promotional plan will be developed once the project's feasibility and scalability are assessed.

Any other information relevant to the proposition / project that you wish to express

Anything that you feel may have an impact on the evaluating jury.

- *Impact on Disaster Management: The project is in line with national and international initiatives for automating disaster response, and hence it is a **priority innovation**.*
- *Scalability & Versatility: The **drone can be modified for various fire situations**, ranging from city buildings to forest fire management.*
- *Potential for AI-Driven Expansion: Upgrades **in the future can involve machine learning** for predictive fire analysis, further strengthening preventive actions.*
- *Social and Environmental Advantages: The drone assists in minimizing human losses in fire accidents and **encourages green firefighting practices**.*

Bibliography

1. International Fire Safety Standards (IFSS). (2022). *Drone Technology for Firefighting and Emergency Response*. Retrieved from www.ifssglobal.org
2. Government of India, Ministry of Home Affairs. (2021). *Fire Safety and Disaster Management Policies*.
3. Fire Engineering Magazine. (2023). *Autonomous Firefighting: The Future of Emergency Response*. Retrieved from www.fireengineering.com
4. Technavio. (2025). *Fire Protection System Market to Grow* <https://www.prnewswire.com/news-releases/fire-protection-system-market-to-grow-by-usd-14-58-billion-2024-2028-boosted-by-iot--big-data-integration-with-smoke-detectors-with-ai-driving-market-transformation---technavio-302364763.html>
5. ArXiv. (2024). *A Comprehensive Survey of Research towards AI-Enabled Unmanned Aerial Systems for Firefighting and Prevention*. Retrieved from <https://arxiv.org/html/2401.02456v1>

We declare that, to the best of our knowledge and belief, the information provided herein is true, correct and complete.

Name of the member	Signature	Date
Shaurya Bohra		23-02-2025
Shijin John Mathew		23-02-2025
Shravani H. S.		23-02-2025
Shivani Shivshankar Wale		23-02-2025