

## MSME Idea Hackathon 3.0

(For Women Innovators & Women owned MSMEs)

### Proforma for submission of Idea Hackathon 3.0 (Women)

#### Funding Project Proposal

##### Details of Idea

**1. Title of proposed idea / innovation:**

Development of Industrial Drone painting system

**2. Whether the idea involves use of existing intellectual property or not, give brief detail there of:**

Patent Application Number	Date of Granted (DD-MM-YYYY)	Name of the Inventor	Title of the Invention	STATUS (Filed / Published / Granted/ Licensed)	If Published, Issue No., Page No., and date
AUS2020103342 (Australian Patent)	24.12.2020	Meivel Sadasivam	Design of Self-Supervisory Target Painting Drone SSTPD	Granted [Patent no – 2020103342]	10.11.2020

##### **2.1 Brief detail:**

Disclosed herein is a Building Art system with an integrated sensor arrangement for detecting Building Art position and Painting colour of a Wall size. The system includes Colour sensor that comprises different sensors for detecting the various parameters. An analog to digital converter converts the detected analog parameters into digital value and an IoT controller calculates the Wall paint range. The calculated Wall painting x\*y\*z co-ordination is displayed in the Drone system through a display unit. The determined Strength of building construction value is used for taking further actions by implementing a remote drone system.

### **2.1.1 Sprayer module**

Sprayer is used for the spray the paint in the tallest building from the tank. The paint controller from the actuator. The Rf receiver and transmitter is important for the spray system. Tank is used for the store the paint of the spray system. The tank has the storage level of the level is 2000gm. It spray the full level of the paint of the system. Nozzle is also important for the sprayer module. This is look like wire of the system. Nozzle has the control from the transmitter and receiver of the tank and sprayer of the module. Vehicle piloted UAV's are navigated with the aid of a small onboard Global Navigation Satellite System/ inertial navigation system unit. The main additives of the navigation unit are gyroscopes for measuring roll, nick and gear angles of the platform, air stress sensor, magnetometer and accelerometer. In ground station, the planning of mission is prepared and the path of flight, flying height, velocity and trigger to be defined. The planned mission runs in auto piloted mode, in between we can track the flight and can change the plan of flight.

### **2.1.2 Background**

- i. Building Architecture or Trained person can be use for floors painting.
- ii. The painting sprayer module spray painting or gems in wall using Drone.
- iii. The potential markets are paint Industries and manufacturers. They are only capable of selling this product.
- iv. unique features of Paint Sprayer are small, less weight upto 500grams, compactness and Aluminum coated materials.
- v. Demand of the product is specified based drone frame materials, Aluminum coated Sprayer tank, usage of 48v DC pump motor and paint mixer unit.
- vi. Customers can afford and use the product while handling the drone.
- vii. This product can be use this product upto 20<sup>th</sup> floor for paint or Gem powder spraying. Drone designed based on payload 20kg paint.
- viii. Students and Paint dealers is motivated for smart work of painting when marketing the product.

### **3. Briefly explain newness/uniqueness of the innovation:**

The proposed system design of paint spraying system for metal , Wall, wood ,and plastic using Drone Automation work.

Industrial robots first painted. Several spray pattern techniques have been proposed for complicated surfaces. The all painters were an early trajectory planner for spray painting. The iterative technique considers object geometry, coating uniformity, and painting time. Planar surfaces exemplify the method. An enhanced trajectory generation framework for spray painting considers tool model, paint distribution, and coating uniformity. Curved surfaces have validated the method.

Photorealistic Gray-scale images on large planar surfaces can be achieved. To avoid oversaturation, a timing algorithm calculates tool speed at each path point after image segmentation. The handheld sprayers deliver paint automatically. These systems utilised industrial manipulators in organised environments for automotive covering coating. Precision agriculture uses UAVs for pesticide spraying. DJI MG-1S1 is a commercial pesticide delivery system, and research is underway. Painting with UAVs is novel. Quadrotor UAVs can make stippling prints. Their solution only utilised an external motion capturing equipment on planar canvas for limited flight durations. The UAV must refill its ink by dabbing on a sponge because no painting supply method was proposed. This proposed system to create complicated spray patterns on 3D surfaces for extended periods without motion recording.

### 3.1 New Concept

Drone sprayer didn't launch in india due to too much cost while using other country product. 3D module and autonomous vehicle used for reducing painting time and avoiding wastage of Painting. One Mechanism designed that Spray gun mounted on a Pan-Tilt Unit.

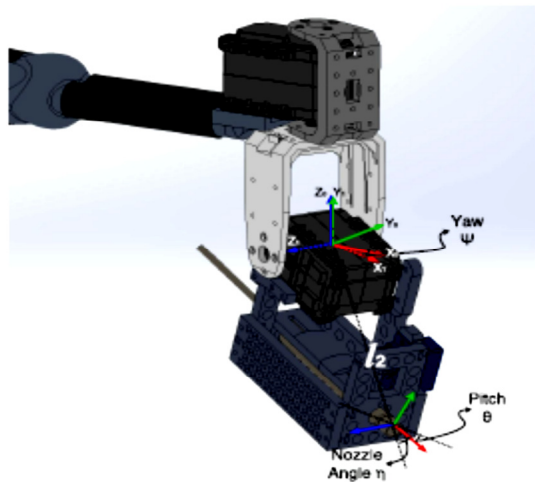


Fig 1. PTU

Modules involved in self sustaining flight are completed on the Intel UP board. The S360 motive force module provides the grayscale photographs and IMU facts from the S360 camera. ROVIO performs visible-inertial nation estimation - inertial measurements from the IMU are used for filter propagation whilst multi-stage feature patches within the image are tracked for performing filter out updates.

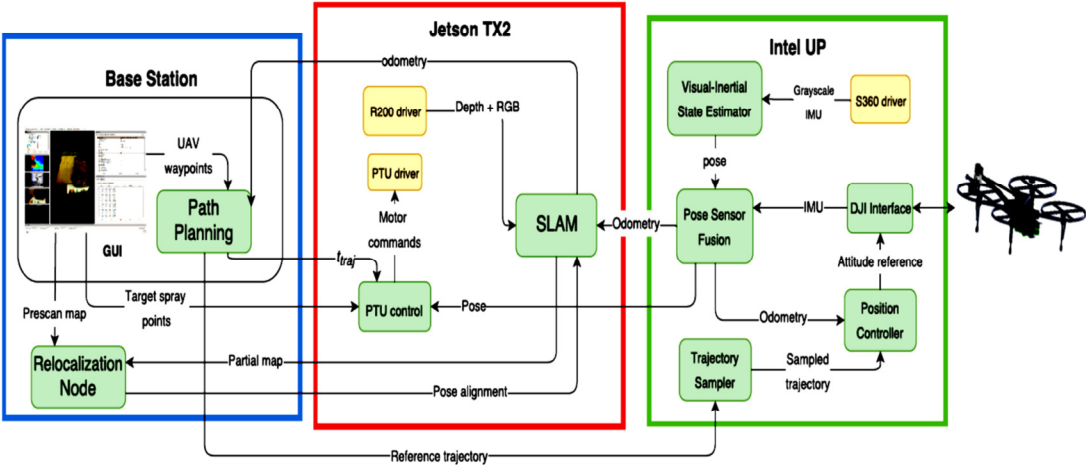


Fig 2. Flowchart for product design

The Pose Sensor Fusion module makes use of an Extended Kalman filter (EKF) to in addition fuse the pose estimates from ROVIO with the UAV's IMU records, to present high frequency odometry estimates. A ROS interface for the DJI platform gives an interface for the onboard autopilot developed through the manufacturer. The position Controller is based totally on a non-linear version predictive manage and makes use of the odometry data together with position commands to provide attitude commands to the DJI autopilot.

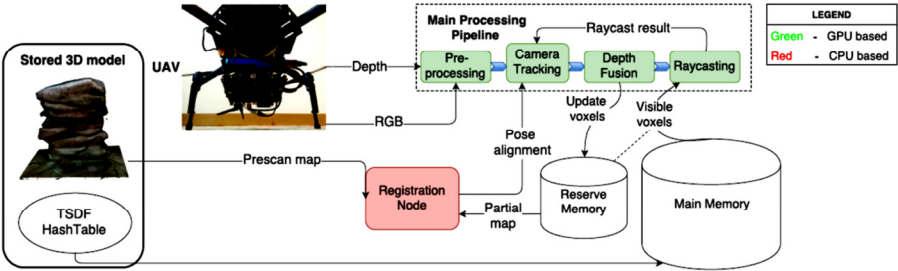
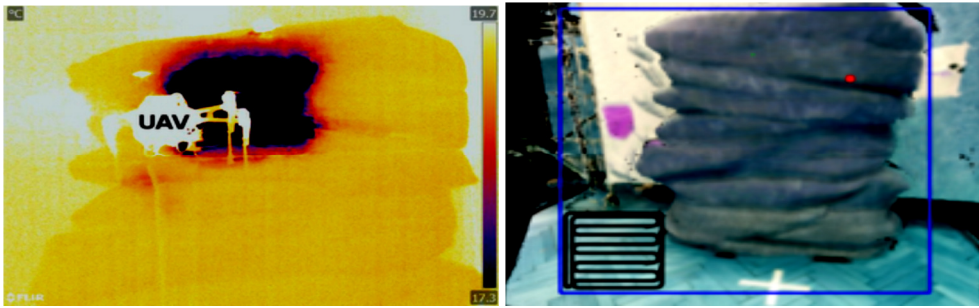


Fig 3 . Flow Chart for software modules



<b>Kind of competition</b>	:To Challenge on Recent Drone technology
<b>Company Offering</b>	:Customers Ready to buy the product, when Reduced cost, less weight and flexibility of the product.
<b>Product of service</b>	:Service is possibility of Product Troubleshooting error of Arduino pilot controller.
<b>Selling choices</b>	:This product designed based on use and through module, while increase the manufacturing of the product.
<b>Repeat purchases</b>	:Customers canbe use so many times per day for spraying paint, because Quality life of the product are increased. So purchasing of the product canbe increased.
<b>Risk Factors</b>	:This product is no complexity and risk factors.
<b>Idea execution time</b>	:Reprogrammable pilot controller used. So, Idea execution time based on Programming time + Devices Assembling time.
<b>Estimated time</b>	:12 months for design and implementation
<b>Break-even point and estimated time-frame</b>	:Payload 10kg lift out to spray and spraying time is 30minutes
<b>Why are you the best suited person to execute this idea?</b>	: Have 3 years Experienced in Design of R&D level. Five journals and one patent published.
<b>Known Technical knowledge</b>	: Handled IoT Texas and Raspberry pi board. Trained and completed course Embedded C & Python language.

#### 4. **Objective :** To Develop the Industrial Drone painting system.

**Concept:** Paint by Drone uses construction site facades as enormous canvases for art. Paint by Drone uses one-meter-wide UAVs. Drones have sensors and spraying tanks. Each drone paints vertical surfaces using CMYK, like traditional printing. Drone operations are managed centrally.

Advanced monitoring controls painting and flight operations. This surveillance system locates the UAV. A scaffolding cover net creates a drone-safe zone. Crowdsourced platforms provide drone art. Most cities have empty vertical areas or advertising posters. Paint by Drone lets any facade display new collaborative art. Industrial UAV spray painting is a pan-tilt quadrotor with an arm and spray gun. An external university supplies power and paint for long industrial painting deployments. The Paint Copter is a pan-tilt quadrotor with an arm and spray gun. Long industrial painting deployments use external power and paint. This project provides 3D building painting and texture customization. An offline component takes a 3D model of the target surface, designs the painted surface, and provides robotic painting instructions. A live system sprays. UAV hardware is a DJI Matrice 100 with a custom arm and spray gun on a PTU. The arm has three triangular carbon fibre tubes with 3D-printed aluminium mounts. Two Dynamixel 3AX-12A servo motors control PTU spray cannon yaw 90° and pitch 45°. A separate servo releases spray. The spray gun's spring protects the painted surface.

##### **5. Specify the potential areas of application in industry/market in brief:**

- Paint Industries and manufacturers.
- Design of Building Architecture using different Colours of painting.
- The system's potential to deliver precise and fast painting results drives the task.

The system's potential to deliver precise and fast painting results drives the task. The PaintCopter is a modified quadrotor with an arm and spray gun on a pan-tilt gear. Power and paint are supplied by external lines for long industrial painting deployment times. Spray painting systems must paint walls in one hue. This work covers more complex processes including painting on 3D structures and achieving a desired texture. An offline component captures a 3D model of the target surface, an offline component designs the painted surface appearance and generates robotic painting orders, and a live system spray paints. The UAV autonomously sprays area fill and adaptable line painting on 3D surfaces in experiments.

Painting a structure system includes a computer vision processing system that obtains images of a target structure and generates first instruction signals for real-time communication to an unmanned aerial vehicle (UAV) with a paint fluid dispensing system; a control device at the UAV that controls real-time navigation of the UAV to a location at the target structure; and the computer vision processing system. This system's promise of accurate and fast painting pushed development. The PaintCopter is a pan-tilt quadrotor with an arm and spray gun. Long industrial painting deployments use external power and paint. Spray systems paint walls one colour. This work contains complex

processes including painting 3D structures and desired texture looks. An offline component takes a 3D model of the target surface, designs the painted surface appearance, and provides robotic painting instructions. A live system sprays. The UAV sprays area fill and adaptive line painting on 3D surfaces autonomously in experiments.

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## 6. Briefly provide the market data for the potential idea/ innovation:

<b>Market Size</b>	<ul style="list-style-type: none"> <li>i. Defining the market,</li> <li>ii. determining approach,</li> <li>iii. area Selection using GPS,</li> <li>iv. Sensor Testing and Data analysis</li> </ul>
<b>Market growth rate</b>	<ul style="list-style-type: none"> <li>a) Painting cost Rs.150/Sqfeet and</li> <li>b) Marketing Price -Approximate Rs.250 rated from second floor to tenth floor. We have increase cost depends upon place and time.</li> </ul>
<b>Profitability</b>	Profit Rs.200/sqfeet except Paint Cost Rs.50/sqfeet

<b>Product and Consumer type</b>	Portable Wi-Fi paint Sprayer
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**7. Current Development Status of innovation:**

- ✓ Less manual power
- ✓ Unmanned System
- ✓ Wall paint up to 10<sup>th</sup> floor

**8. Expected time of completion of idea: 6 months**

**9. Financial Requirements:**

Sl.No	Drone Tasks	Business plan		Economics	Requested Funding in Rupees
		Seeding	Development to commercialization		
1	GPS Mapping	GPS Receiver	Capture Land Location	The economic implications for commercial drone use are undeniable. A recent study estimates over the 10-year span from 2015 to 2025. Drone integration within national air space will account for \$82.1 billion in job creation and economic growth.	15000
2	IMAGE SENSING	Multispectral Camera	Image Analysis for Agricultural / Building Land		160000
3	Small Flying (F-B-T-B)	BLDC MOTORS (8)	Flexible work & user friendly		100000
4	Small Flying (F-B-T-B)	Propellers (8)			20000
5	Small Flying (F-B-T-B)	Butterfly Frame			10000
6	Long-time fly	thin-film flexible waterproof solar panel cell (0.5w 1.5v)	Power distribution		22000
7	Remote sensing	2.6Ghz RF transceiver	Manual purpose	10000	



8	video stabilization	6 axis MEMs gyro	Acceleration of motors		10000
9	Government approval	Pilot Training & Licence	important for pilot licencing to fly up to 500m		100000
10	Power source	Light weight battery with as150 connector	Power Consumption		30000
11	Controlling Application	Ardupiot controller	Command to fly		40000
12	Four Students Working Progress	Stipend	6000/student/month		288000
13	Output of the System	wireless monitor	Displaying unit		30000
14	Assembling & testing purpose	Accessories	Commercial - cutting & Fitting		25000
15	Package with paint sprayer	Light weight paint tank	Sprayer tank		40000
<b>Recruitment Expenses</b>					<b>9,00,000</b>

#### **Income (Profit)**

Cost Details	Single unit cost	Total Cost in Rupees
Design and implementation of Drone Cost	9,00,000	9,00,000
Servicing, program and Testing Cost	2,00,000	2,00,000
Total cost		11,00,000
Recruitment Expenses and travelling Expenses		10,00,000
<b>INCOME</b>		<b>1,00,000/ month</b>

**Income plan over the next 5 years after start**

<b>Description</b>	<b>2023-2024</b>	<b>2024-2025 Target</b>	<b>2025-2026 Target</b>	<b>2027-2028 Target</b>	<b>2029-2030 Target</b>
Drone & Servicing, program and Testing Cost	Testing	11,00,000	7,60,000	5,60,000	3,60,000
Income per month	Testing	1,00,000	2,50,000	4,00,000	5,00,000

**Activity-Wise Break-Up:**

<b>Particular / Items</b>	<b>Total Idea project cost (Rs. In lakh)</b>	<b>Amount GOI assistance (Rs. In lakh)</b>	<b>Incubatee share (Rs. In lakh)</b>
Technology related Expenditure towards machine usage charges etc., Electricity charges, Procurement of raw material , testing/Calibration charges, other charges essential for development of idea Max (10.00) lakh.	9	9	0
Charges for mentor/handholding supporting team Max (3.00) lakh.	1	1	0
Travelling Expenses or any other item not covered as above may be allowed as per need for development of the idea , Max (2.00) lakh.	1	1	0
Total Cost	11	11	0