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Azadi Ka Amrit Mahotsav

UNVEILING OF EDGEFORCE ASTRO

INTRODUCTION

On the occasion of 75th Independence Day, Col. P Hani and Mr Ramachandran Andayi from Edgeforce India took upon the initiative to unveil Unmanned Ground Vehicle named “ASTRO” meaning Autonomous Surveillance and Tracking Rover. The ASTRO is a wheeled UGV that works in both teleoperated and autonomous modes for performing surveillance duties. With the ability to integrate various types of surveillance equipment and perform numerous duties in all-weather, semi-amphibious, all-day conditions the ASTRO UGV has been developed keeping in mind the security needs of the country.

The developers of the ASTRO at Edgeforce India believe that the system can deliver optimum performance and help in reducing the workload on our security forces. The team is willing to meet its user requirements by augmenting its capability based on specific service requirements. The ASTRO is equipped with a telescopic mast with the ability to attach payloads like Doppler Radar (in-house with 2km range), Visual Payload with LRF, Jet Gun Etc, based on the user requirement.

The product has been developed keeping in mind the versatile requirements of the armed forces, Central Armed Police Forces (CAPF), National Disaster Relief Force (NDRF), all India police forces, and other agencies and services employed towards the security and welfare of the country. The Edgeforce ASTRO is capable of performing both indoor and outdoor mapping and surveillance duties at manufacturing plants, refineries, OFBs, military bases, and all other sorts of commercial and strategic installations.

A RIGHT STEP TOWARD REALIZING ATMANIRBHAR BHARAT

The UGV is a strategic requirement of India. The UGVs safely and effectively perform a variety of dangerous missions. The ASTRO UGV comes in handy for the land-based surveillance requirements besides assisting the forces to do day-to-day duties with fewer man-in-the-loop scenarios. Experts will agree that the future of the world's security sector will heavily be influenced by an autonomous system like the ASTRO UGV.

It is fascinating to know that Col. P Hani and Mr Ramachandran Andayi at Edgeforce developed this system in just 2 months' time. Keeping in view the larger requirements of the UGV in the forces, the company is working on developing an even bigger UGV in collaboration with ***Advanced Systek Co.***

TECHNICAL DETAILS OF EDGEFORCE ASTRO

- ✓ **Chassis**:
  - **Primarily**: wheeled
  - **Modified**: tracked
- ✓ **Speed**: up to 35 Kmph
- ✓ **Ground Clearance**: at least 300 mm
- ✓ ***Gradient***: at least 25º
- ✓ **Vertical Step Crossing**: at least 200 mm
- ✓ **Trench Crossing**: at least 250 mm
- ✓ **Fording capability**: ford through water up to a depth of at least 500mm

1. Materials and Methods Proposed for Fabrication

- Optional built-in bilge pumps and an IP rating of 65
- Rugged, lightweight steel and aluminum build gives it low ground pressure and traction

2. Operating Temperatures and Altitude

I. Plain and Desert Terrain

- ➢ **Minimum Operating Temperature**: Between 0° to 5° Celsius.
- ➢ **Maximum Operating Temperature**: Between 40° to 45° Celsius

II. High Altitude & Mountain Terrain

- **Minimum Operating Temperature**: Between (-)20° to (-)10° Celsius.
- **Maximum Operating Temperature**: 40° Celsius

III. **Operating Altitude**: Up to 4500 meters

3. Duties

- Automated surveillance using the mounted Doppler Radar with inbuilt
- automated AI-based classification and tracking of targets using EFDACT- Edgeforce Doppler Augmentation and Classification Technology
- Geofencing of a particular zone/target area based on the mode selected
- Day and night surveillance
- Indoor navigation and mapping

4. Power and Payload Capacity

- 15 bhp engine with 25° Gradient
- 100 Kg load carrying capacity

5. Modules

- Surround Light Detection and Ranging (LIDAR) for determining ranges
- Doppler Radar
- Stereo Camera - RGB/Thermal
- Single shot 360° Camera for surveillance
- 6 Hr. battery life in autonomous mode

6. Modes

I. Teleoperated (or remote operation)
II. Semi-autonomous (Geofencing)
III. Autonomous (through GPS, VPS, GALILEO)

7. Advancements

- Integration with Defence Series Maps (DSMs)
- Custom Intelligent Mission Planning Framework
- Distributed Sensor Fusion Architecture

AN ALL-ROUND SURVEILLANCE SOLUTION: FEATURES OF EDGEFORCE ASTRO

✓ Versatile

The *Edgeforce* ASTRO is engineered to go where no other UGV can. Its rugged, lightweight steel and aluminium build gives it low ground pressure and traction to **tackle all types of difficult terrains** including steep grades and soft soils. The ASTRO chassis can be customly built as wheeled or tracked

✓ High Performance

The *Edgeforce* ASTRO's powerful drive-train is **capable of moving 100kg of payload** and can reach speeds up to 35 Km/hr on land. With the optional power generator, Moose is capable of operating for up to 6 Hr.

✓ Rugged Yet Reliable

With optional built-in bilge pumps and an IP rating of 65, *Edgeforce* ASTRO is **partially amphibious**, capable of moving through waterways at speeds up to 5 km/hr.

✓ Precision Control

The *Edgeforce* ASTRO has very **high-resolution encoders** that deliver improved state estimation and dead reckoning capabilities. A finely tuned, yet user-adjustable controller, offers **incredibly smooth motion profiles** even at slow speeds and with **excellent disturbance rejection**.

✓ Customizable

The company provides all sorts of suitable customizable payload configurations with the ASTRO UGV based on the client's specification.

MEETING CUSTOMER REQUIREMENTS: SCOPE FOR FURTHER MODIFICATIONS

The *Edgeforce* Team is committed to meet its customer requirements. The company employs autonomous vehicle experts which can help the client services to select and integrate payloads and configurations based on their requirements. The *Edgeforce* ASTRO team is plug-and-play compatible with their wide range of UGV accessories and system integrators to deliver a fully integrated turn-key UGV. Hence, the company does extensive filed-study for providing a full-fledged surveillance solution.

The *Edgeforce* ASTRO comes with a basic wheeled chassis. For ASTRO chassis can be custom built as wheeled/Tracked based on the field study the company team does for assessing surveillance requirements.

As an advancement for the AI surveillance system implemented by Indian army, recently, the Edgeforce ASTRO being a fully wheeled system act as a force multiplier for accurate tracking requirements of the forces.

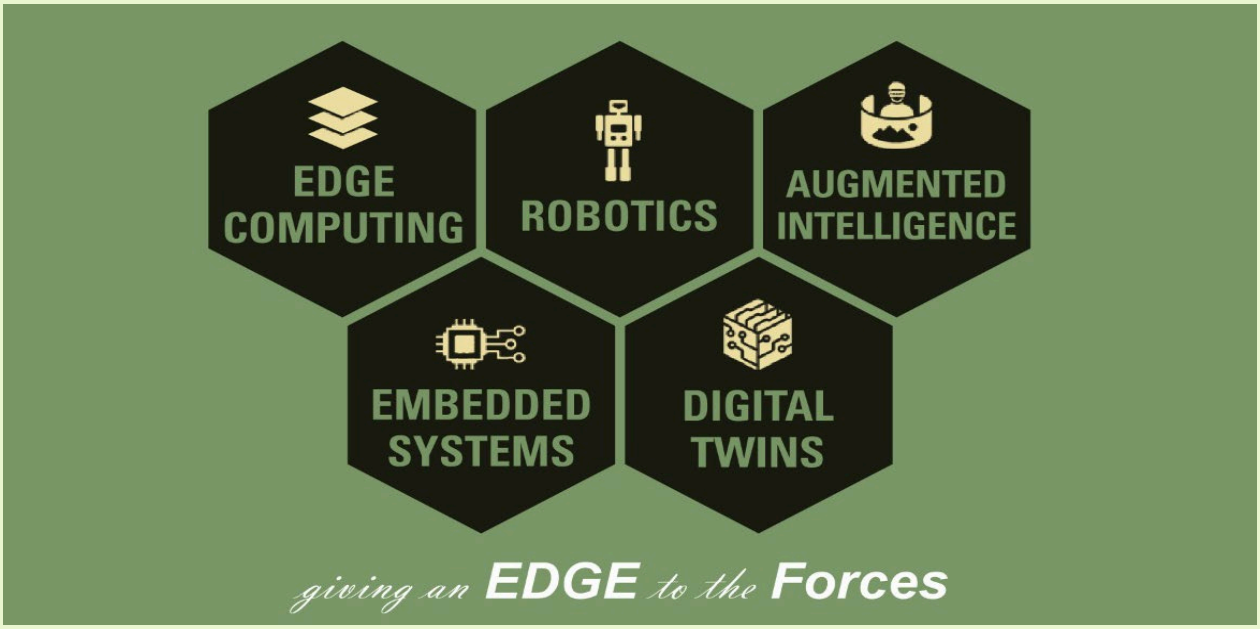
The *Esdgeforce* ASTRO is a medium-sized UGV. Its large payload capacity and power systems accommodate an extensive variety of payloads, customised to meet research needs which include stereo cameras, LIDAR, GPS, IMUs, manipulators and more can be added to the UGV by the company integration experts. The *Edgeforce* ASTRO's rugged construction and high-torque drivetrain give it an edge over other such systems in the market.

TOWARDS ASTRO MK 2

Col. P Hani and Mr Ramachandran Andayi, the developers of ASTRO UGV at the Edgeforce are now developing an even bigger version of this UGV in collaboration with Advanced Systek Co. The ASTRO Mk 2 will be developed using Mil A46100 High-Hardness Armour (HHA) plate. The UGV will be the largest all-terrain Unmanned Ground Vehicle by the company which would be even more rugged and capable of operating in all sorts of environments with its rugged build, low ground pressure, and traction tires, which allow effortless mobility through soft soils, vegetation, thick muds, and steep grades.

EDGEFORCE

SOLUTIONS



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