

INDIAN ARMY - SIDM UGV EXPERIMENT 2021 COMPENDIUM OF EXHIBITS



Army Design Bureau

The Army Design Bureau (ADB) functions as a single point of contact for the Industry, Start-Ups, Research Organisations, Innovators and Academia, in providing the User requirements and problem statements for facilitating development of indigenous solutions. Not only is it mandated to strive for facilitating indigenous design, development and manufacturing but also to seek out capabilities and support research for developing technologies of the future.

Since its creation, the ADB has reached out to an ever increasing number of Defence industries, MSMEs and Start-Ups for collaboration towards realising the needs of the Service, in conjunction with the national goal of Aatmanirbharta. It has also established an intimate connect with academic scholars and various technical institutes to benefit from their vast technological know-how. With the recent restructuring of the Army Headquarters, the Army Design Bureau is now an independent Directorate functioning directly under the Deputy Chief of Army Staff (Capability Development & Sustenance).

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PREFACE

In the quest for induction of niche technologies into the Indian Army, unmanned autonomous systems has been identified as one of the key areas. While unmanned aerial platforms have proliferated, the development of Unmanned Ground Vehicles (UGVs) technology has been slow. The main challenge is the lack of awareness of the User about the capabilities of developers and the developers' knowledge gap with regards to the User requirements. With the aim of addressing both foregoing issues and expediting the development of tangible Use Cases and subsequent induction, the Indian Army decided to conduct an UGV Experiment involving the User, Industry, Start-Ups, Innovators & R&D establishments, in collaboration with the Society of Indian Defence Manufacturers (SIDM).

The 'Indian Army UGV Experiment 2021' is being conducted from 09 Dec to 14 Dec 21, at Babina Ranges with the aim of bringing the Users' requirements and the developers' capabilities on a common platform and facilitate field exploitation of the prototypes developed to evolve definite Use Cases. Over 30 types of Unmanned Ground Vehicles will be showcased by the developers which will be embedded with sub-units for tactical exploitation. These UGVs are meant for a variety of applications viz Surveillance, Recce, Intelligence, Kinetic Effect, Logistics, Casualty Evacuation etc.

This Compendium has a brief overview of the UGVs which shall be demonstrated during this Experiment.





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01 I-HUB FOR ROBOTICS AND AUTONOMOUS SYSTEMS INNOVATION FOUNDATION (ARTPARK)



About the Company:

ARTPARK is a unique Not-for-Profit Foundation set up by the Indian Institute of Science, Bengaluru with support from AI foundry in a public-private model with seed grant from DST (Department of Science & Technology), Govt. of India and Govt. of Karnataka.

ARTPARK is a unique experiment to promote the creation of a new foundation for innovation and commercialization of global cutting-edge research for unique problems by creating an “idea to impact” innovation network under NM-ICPS Mission of DST. ARTPARK will promote technology innovations in AI & Robotics by identifying and executing ambitious mission mode technology moonshots focusing on problems unique to India.

ARTPARK has rolled out the ARTPARK Innovation Program to bring together the startup ecosystem in AI & Robotics space to seed and support unique companies that will closely work with ARTPARK’s goals and objectives. ARTPARK is also creating one of its kind \$100mn venture fund focused on supporting leapfrog AI & Robotics companies in India.

Website: www.artpark.in

Year of Founding: 2020

Nature of Company Ownership: Section-8 Not-for-Profit company seed funded by Govt of India through DST

PoC Details:

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Scan the QR Code to view the Company Brochure.

STOCH-3 LEGGED ROBOT

An autonomous walking robot platform for navigation under extreme environments.

1. A first of its kind walking robot developed in the country.
2. Features: Camera mount, thermal imaging. Data can be streamed continuously to the remote user. Modular sensors can be fitted for mine or explosive detection.
3. More than 75% percent of the robot is indigenously built. Major components include the actuators, sensors and the software stack for the walking control.



The robot can be enabled to capture videos, LIDAR and other critical information about its surroundings. By using a perception map, the robot identifies optimal routes around obstacles and traverse these paths autonomously. The walking controller robustly handles terrain variations, slippery conditions, and also recover in case of any tripping or falling.

Technical Specifications:

- Dimensions (L*B*H) in cm: 70 * 40* 60
- Weight: 25 Kgs
- Battery Capacity: 200 Wh
- Payload Capacity: 5 Kgs
- Duration: 60 min
- Walking speed: 0.6 m/s
- Max slope: 25 deg
- Operating temp: -20 to 30 deg C
- Rating IP54

Niche Technologies/ Distinguishing Factors:

- It is an innovation.
- This is the first of its kind developed indigenously in India.

Possible Use Cases:

- Recce and Surveillance for Counter-insurgency and counter-terrorism operations.
- Carry a weight/ explosive upto 5 kgs for destruction.
- Modular sensors can be fitted for mine or explosive detection.
- AI based detection of enemy intrusion and automated scanning for any suspicious activity

With requisite R&D investment, Stoch 3 would be able to walk robustly on outdoor terrains that are prevalent on high altitudes and stony/undulating surfaces with broken ground. It will have partial autonomy, i.e., a remote-control device is used to pass high level commands. Functionalities include communication relay between soldier and the robot, independent operation on a pre-fed route in mountains, lasing, and execution of basic commands for navigation along desirable directions. This may be used for surveillance in sensitive areas and cross-border autonomous operations. Higher payloads up to 50 kg can also be explored, conditioned on provisioning of sufficient funding and time.



WHEELED UGV

- Unmanned Ground Vehicles for Defence Modular EV platforms for varied defense applications
 - Material movement/ Logistic Support for last mile
 - Recce and Surveillance
 - Bomb diffusion
- Can be retrofitted as weapon platform
- Custom-built vehicle for specific defence needs
- TRL-7 hardware stack: Drive-train, Battery pack, BMS
- TRL-9 autonomy, perception and control software
- State-of-art sensors to aid all-terrain navigation



- Optical encoders, Mil-grade IMUs
- Low-vision sensors
- 32-beam Lidar
- mm Wave Radar
- Long-range RF communications module

Technical Specifications:

Micro UGV

- Dimensions: 860mm x 760mm x 590mm
- Payload: 35 Kg
- Swappable battery with 3 hours runtime
- Zero-turning radius

Heavy UGV

- Dimensions: 1.7m x 0.9m x 0.9m
- Payload: 1 ton tow capacity / 250 Kgs carrying
- Swappable battery with 8 hours runtime
- Zero infrastructure setup. Natural navigation
- All-terrain capability
- Civilian variant piloted/deployed in over 50 factory locations in India and Middle East

Niche Technologies/ Distinguishing Factors:

Out-of-box support for Teleoperations, Waypoint-based autonomy, "follow-me" modes Secure & Reliable multi-RAT Communications module Novel Machine learning algorithms for perception Comprehensive sensor suite.

Possible Use Cases:

- Material movement/ Logistic Support for last mile
- Recce and Surveillance
- Bomb diffusion
- Can be retrofitted as weapon platform



About the Company:

Kalyani Group is one of the prominent private sector names in the Indian Defence and Aerospace industry. The multinational conglomerate with a market-leading presence across critical sectors such as Engineering Steel, Automotive, Industrial, Renewable Energy, Urban Infrastructure and Specialty Chemicals, is slowly and steadily becoming a reckoning force in this high profile sector. The fulcrum supporting this progression is the group's flagship engineering and manufacturing behemoth, Bharat Forge Limited (BFL).

The group has world-class defence manufacturing infrastructures at Pune, Hyderabad, Satara and Mysore. Over a period of 10 years, the Group has created a considerable portfolio, which spans Artillery Guns, Protected Vehicles, Air Defence Solutions, Ammunition, Small Arms and Defence Electronics. The group has also invested in creating specialized defence technology centres – two in Pune, one in Bangalore and one in Hyderabad. At Pune is Kalyani Centre for Technological Innovation (KCTI) and Kalyani Centre for Manufacturing Innovation (KCMI). These two cut across the complete portfolio for Kalyani group companies.

Website: www.bharatforge.com

Year of Founding: 1961

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

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Scan the QR Code to view the Company Brochure.

ECARS (4X4 & 6X6)

The ECARS will be active in a variety of terrain and climate, the ECARS will provide effective security to facilities including routine patrols and regular observation, over the fence driving along the narrow paved path beside the fence, clear of obstacles (width about 3 meters and Length about 4-5 km) covered by Line of Sight antenna.

The equipped ECARS should operationally be driving autonomous about 5-8 Kmph and at Teleoperation driving up to 16-20 Kmph. The ECARS will operate in rain, mud, sand, storms, and fog. The ECARS will operate continuously 24X7 while maintaining a high level of safety and avoiding obstacles and accidents.

Independent operating capability (autonomous) – The ECARS should act independently according to routine layout tasks in predefined security missions. Likewise, it must be able to identify obstacles, analyze them, make decisions and execute an appropriate response.

Remote control capability - If necessary, the ECARS will be allowed to remote control by a single operator from the control center to the reinforcement of existing security systems, and the ECARS enable the ability to run by a close mobile control system.

Chassis structure and steering capabilities - The ECARS will serve as a platform for carrying security means such as audio systems, lighting systems, and a variety of tear gas and sensitive sensors. The ECARS structure should be optimized for tough terrain and severe weather and allow remote operation is efficient, fast, and safe. The steering of the ECARS should allow high and precise maneuverability, autonomously and remotely controlled, Major technological challenges.

ECARS 4x4

Technical Specifications:

- Weight- 800Kg
- Payload- 350Kg
- Max Speed- 16-20kmph
- Ground Clearance- 200 mm
- Dimensions- 2x1.8x1.8 meter

Niche Technologies/ Distinguishing Factors:

- Autonomous navigation
- Collision avoidance
- Surveillance & reconnaissance
- Close combat operations
- Towing payload 5000N



Possible Use Cases:

The vehicle is intended to provide support for dismounted troops by serving as surveillance, infantry support, transport platform, casualty evacuation, remote weapon station, IED detection, and disposal unit, and much more.

The UGV is having multi-mission capability much needed on the modern battlefield.

ECARS (6x6)

Technical Specifications:

- Weight- 1500Kg
- Payload- 400Kg
- Max Speed- 16-20kmph
- Ground Clearance- 340 mm
- Dimensions- 3 x 2.2 x 2.2 meter



Niche Technologies/ Distinguishing Factors:

- Autonomous navigation
- Collision avoidance
- Surveillance & reconnaissance
- Top speed of 16 kmph with 400kg payload
- Independent suspension
- All-terrain UGV
- Weatherproof storage space
- Towing Payload 14000N



Possible Use Cases:

The vehicle is intended to provide support for dismounted troops by serving as surveillance, infantry support, transport platform, casualty evacuation, remote weapon station, IED detection, and disposal unit, and much more.

The UGV is having multi-mission capability much needed on the modern battlefield.

About the Company:

Collaborative Intelligence is deep-tech start-up focused in the area of Artificial Intelligence and Robotics. We specialise in vision based embedded systems. Our products range from Intelligence Traffic Management System to Anomaly detection software. These can be easily embedded into our uniquely designed modular robotic platforms to layer in intelligence to support human action.

Website: www.collabint.com

Year of Founding: 2017

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

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Scan the QR Code to view the Company Brochure.

CIRAKSHAKBOT

Tactical Unmanned ground vehicle with a mobile articulated track, ciRakshakBOT is designed to solve some of the most compelling challenges. Search & rescue operations, close tactical support during operations, mine detection, carrying hazardous payload and remotely offloading are just a few of the functionalities that the core platform can support. Its multi-purpose platform with excellent mobility and manoeuvrability can also handle stair-climbing with ease, manage obstacles and uneven and difficult terrains. It has been designed specifically to aid our forces and become a force multiplier. It is equipped with leading edge sensors and communication system for users to visualize situations and make informed decisions. Its patented articulated tracks can offer access to multi-storey buildings.

Technical Specifications:

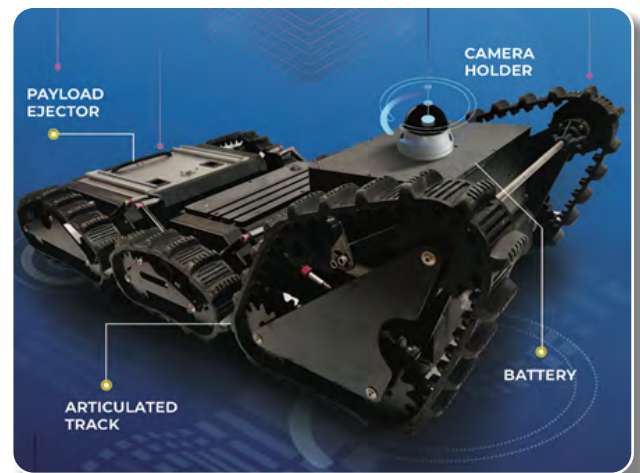
- Height: 12"; Width: 18.5"; Length: 31.7"
- Weight: 15 Kg
- Surveillance: 180 degree or 360 Degree
- Video transmission Upto 800 mts
- Endurance: Up to 2 hours
- Max Payload - Up to 30kg

Niche Technologies/ Distinguishing Factors:

- Multi-purpose platform
- Ease of stair-climbing by simply driving
- Range upto 800m

Possible Use Cases:

- Search & Rescue
- Tactical Operations
- Mine Detection
- Robotic Mule to support soldiers
- Disposing hazardous objects

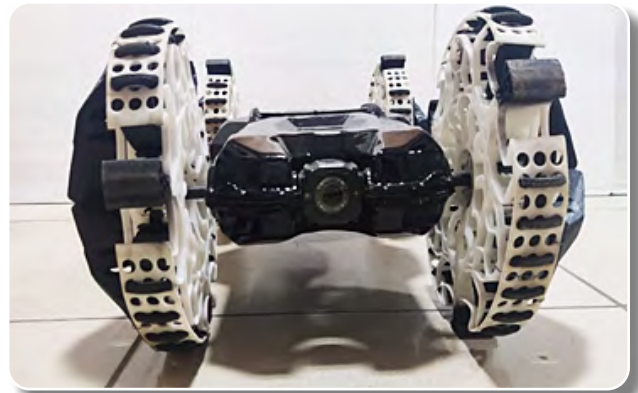


CIRAKSHAKMINI

The ciRakshakMINI is a light-weight Surveillance robot with a specialized hybrid wheel assembly for exceptional maneuverability and all terrain mobility including stair-climbing. From search & rescue operations to close tactical support for house intervention. It can flip and conveniently self-right to provide real-time. This variant of the UGV a NUC and i5 system that can provide simultaneous feeds from 4-5 cameras. Its powerful control system can provide an extended range of video transmission. It can also operate in a beyond LoS areas and can transmit information on multiple devices including, tablet, mobile or a computer.

Technical Specifications:

- 4-Wheel Drive System
- Shock absorbing wheels
- Front and Rear Camera for driving
- Left and right facing cameras
- Field swappable battery
- Stair Climbing without reconfiguring wheels
- Self righting video – there is no “upside down”
- 360° environment views
- Endurance 1-2 hours
- Water fording up to 20m
- Range 500mtrs and beyond LoS



Niche Technologies/ Distinguishing:

Multi-camera feed at the same time, can operations

- Simultaneous Multi-camera feed at the same time
- Powerful control system providing beyond LoS transmission
- Hybrid wheel assembly- provide operations equivalent to wheel and track without changing.

Possible Use Cases:

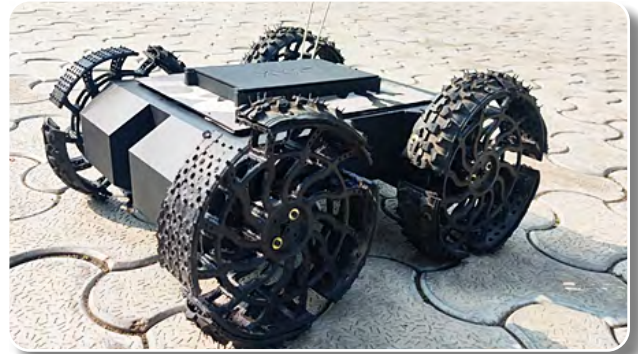
- House Intervention
- Tactical Operations
- Search & Rescue

CILYNX

A mini -light-weight tactical robot for reconnaissance and surveillance and close combat operations. This UGV is specifically designed to complement drones with the last mile operation. This is a noiseless and agile UGV that can maneuver difficult terrains with ease. It has a stealth payload option that can be remotely offloaded or self-destruct itself. The LYNX comes in 2 variants, based on the operations that it is supporting. It can be used effectively in crowd control with a flame thrower.

Technical Specifications:

- Ease of house entry
- Teaming with drones for last mile support
- Carry both lethal and non-lethal payload, automatic self-destruct mode
- Shock absorbing wheels
- Noiseless under 70db
- Agile 15km per hour
- Front and top-mounted 360-degree cameras
- Can carry up to 1.2kg of payload
- Weapon mode
- Endurance 1-2 hours
- Range 500mtrs-1km
- Self-destruct mode
- Physical Dimensions: Height: 8.5"; Width: 14"; Length: 15.2"
- Weight: ~4Kg
- Camera: Front + 180-degree surveillance w/option to mount camera 360 degree IR camera
- Battery / Power - 50 volt (6s) 5.2Ah Lipo
- Illumination - Front Lit



Niche Technologies/ Distinguishing Factors:

- Agile and Noiseless
- Stealth Mode payload
- Flame thrower
- Variant 2 equipped movable tracks
- Possible Use Cases:
 - Crowd Control
 - Stealth tactical operations
 - Search & Rescue
 - Hazardous task such as lighting or diffusing fire



04 COMBAT ROBOTICS



About the Company:

We are Defense Robotics Company with a vision to enable the armed forces with combat ready unmanned systems.

Website: www.combatroboticsindia.com

Year of Founding: 2015

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

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Scan the QR Code to view the Company Brochure.

ARISTA MINI CHASSIS LESS UGV PLATFORM

- It is considerably compact, light, and robust that soldier can carry them on their back. The four-wheel drive makes it best suited for harsh terrain.
- It is a cost-effective battery-operated ground vehicle, which is designed to travel in rough terrains.
- Arishta Mark 1 has a flexible chassis which help it to overcome many obstacles.

Technical Specifications:

- Weight: <13 Kg without accessories
- Top Speed: 0-4km/h on straight road
- Max Inclination: 35 degree (operatable)
- Agility: Zero Radius Turn
- Camera: VGA
- Charging Time: 2.0 Hrs
- Operation Time Up to 2.0 Hrs of runtime
- Battery Type: Li-ion (16.8V 8 Ah)
- Operating Range: 150 m (in Los)
- Temperature Range: 0 to +55°C
- Controller Customized Pad
- Video Link: RF 5.8 GHz/2.4 GHz



Niche Technologies/ Distinguishing Factors:

- Chassis Less Multiutility Platform
- High maneuverability in all terrains
- Modular plug and play design
- Scalable as per Application
- Portable and easily deployable
- Fast charging
- Endurance up-to 3 hours
- Live streaming
- 10-15 kg payload capacity

Possible Use Cases:

- Border Surveillance
- Covert Applications
- Logistic Operations
- Offensive Gun Mounted Application
- Rescue Operations

TOTA SPHERICAL ROBOT POC

- It is considerably compact, light, and robust that soldier.
- It is a cost-effective battery-operated spherical robot, which is designed to travel in rough terrains.

Technical Specifications:

- Dimensions (L x W x H): Spherical robot of 90 to 100 mm
- Military Standards POC 3d Printed
- Weight: 800 Grams
- Speed: 1.5 km/h
- Communication: Secure digital encrypted WiFi (2.4Ghz)
- Operating Range: 40 to 50 m LOS
- Power Supply DC 5-volt input
- Working Time: 1 to 2 hours
- Video & Cameras: 1 integrated camera for real-time
- Camera Tilt Module: 360 degrees of freedom of movement
- Illumination Module: NIR LED
- Operational Temperature: 0°C to 60°C
- Drop test Not Applicable in POC
- Terrain: only on plane surface
- Control: Through Web App



Niche Technologies/ Distinguishing Factors:

- Chassis Less Multiutility Platform
- Manual throw at 10m of distance
- Weight 800 grams
- Endurance up-to 1 hours
- Microphone based event reporting
- Live streaming with Intelligent Mobile
- Personnel robot for each soldier
- Portable and easily deployable
- Fast charging

Possible Use Cases:

- Anti-terror Operations
- Covert Applications
- Logistic Operations
- Offensive Gun Mounted Application
- Rescue Operations

05 HI-TECH ROBOTIC SYSTEMZ



About the Company:

The Hi-Tech Robotic Systemz Limited (THRSL) is India's first unmanned systems and Robotics Company. Our products are developed under "Make in India". THRSL develops and deploys leading edge robotics, computer vision and artificial intelligence solutions. We committed towards the development of cutting edge products & solutions in areas like:

- Unmanned Systems like UGV, UAV, ROV, Mobile Robots used for Surveillance, Reconnaissance & Combat Missions
- Robotics & Artificial Intelligence Solutions
- Computer Vision Solutions
- System Integrator for Defense Projects
- Military Grade Strategic Electronics and Embedded Systems
- Industrial automation and Material Handling
- Velodyne product line

Website: www.hitechroboticsystemz.com

Year of Founding: 2004

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

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Scan the QR Code to view the Company Brochure.

VIDEO SURVEILLANCE BALL



Features:

- 360 Audio and Video Coverage
- Night Vision Capability
- Audio/Video Transmission
- Speed of Sensor Rotation
- Ability to Detect Human Voice
- Day/Night Operation
- Operation up to 2 hours*
- Throwable
- Stand by Option
- No Physical On/Off Switch
- Recording Optional
- Interface with Commandor Kit
- Battery Charging Time : 2 Hrs
- Battery Charge Input : 180-240V, 50 Hz AC
- Night Operation Capab ili ty : Provide vision in pitch dark room
- Temperature Capability-20 to +55 degree C
- Number of Cameras: 2 Stabilization and Motion
- Battery Operation Capacity : 2* Hrs

Technical Specifications:

- Dimensions: < 90 mm Diameter
- Weight: < 590 gm
- Quick Stabilization
- Rechargeable Battery : Lithium ion Battery
- Operating Range:
 - LOS 90M
 - NLOS 25M

Niche Technologies/ Distinguishing Factors:

Manufactured under Make in India, currently used by Indian Army, NSG and other elite forces.

Possible Use Cases:

- Raids and Entry Teams
- Search & Rescue Operations
- Surveillance Operations
- SWAT Operations
- Hard to reach area Investigation & Clearing
- Deployable through Pole, Rope/Wire

CONFINED SPACE REMOTELY OPERATED VEHICLE



Technical Specifications:

- Dimensions
 - Full Extended Hipper: 1150 x 750 x 440 mm
 - Folded Hipper: 600 x 750 x 440 mm
- Weight: 90 kg
- Endurance: 2 Hrs
- Rechargeable Battery : Yes
- Operating Range:
 - LOS: 200 M
 - NOS: 100 M
- Battery Charging Time: 4 Hrs
- Battery Charge Input : 24V, 18 Amp / hr
- Night Operation Capability: Yes
- Operating Temperature Range: -20 to +55 degree
- No. of Camera: 5

Niche Technologies/ Distinguishing Factors:

- Manipulator - 2.5 m vertical
- Stair Climbing - Yes
- Mobility - All terrain
- Real Time Video & Audio
- Payloads -X Ray, Water jet disrupter, Laser pointer, Shotgun
- Carry Explosives
- Lifting Capability - 8 Kg
- Portable Master Command & Control Unit

Possible Use Cases:

- Inside Aircraft
- Inside Train
- Within Buildings
- Urban Environment
- Passenger Terminals
- On Ferries & Ship

About the Company:

Janyu Technologies Pvt. Ltd. is engaged in design, development, manufacture, supply, installation and commissioning of Robotic solutions & Industrial Automation systems in various industrial sectors of economy i.e. Pharma, Healthcare, F&B, FMCG, Engineering, Automotive, Defence, Aerospace, Frozen Foods, E - commerce industries etc.

We believe that technology when customized as per client's need and made affordable with a concern for human beings will result in sustainable growth and healthy ecosystem. With the pandemic playing havoc with wellbeing and lives of our people, acquiring semi-skilled labour in the non-core areas like packaging, palletization and warehousing has become a challenge for most industries. Janyutech specialized in automating these manual non-core activities and taking your daily struggle.

Website: www.janyutech.com

Year of Founding: 2016

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

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Scan the QR Code to view the Company Brochure.

VARAHA ROVER

Varaha Rover is responsible for identifying threats in land, Soil, Carry humans, weapons, load and allows GPS Tracking.

Technical Specifications:

➤ Rover Control

A 32-bit ARM Cortex M3-based STM32F103 microcontroller is used to achieve precise and accurate control of the rover.

➤ Core Electronics

After several iterations on Solidworks Electrical 3D, the team came up with a design ensuring judicious usage of available space for placement and wiring of components, easy and swift servicing of rover parts, and painless debugging by optimizing the connections.

➤ Communication

The rover operates on 2.4GHz and 5.8GHz frequency bands with a combination of omnidirectional and directional antennas that adhere to the FCC standards and regulations.

➤ Camera Feed

A total of five cameras, 1 IP and 4 analogues are strategically mounted on the rover to obtain a complete view of the immediate surroundings.



Niche Technologies/ Distinguishing Factors:

The task simulation consisted of traversal over rocky fields with a maximum obstacle height of 60cm, soft and rough sandy areas, vertical drops of 1m with a 90° slope, steep slopes of 50-60°, and hill-like terrain while carrying a payload of 8kg. The base station team has been trained to operate the rover remotely using only the feedback obtained from the onboard cameras. Live GPS plotting of the rover allows the driver to direct the rover towards the locations given in the task.

Possible Use Cases:

- Rugged & Mission Ready
- Great Load carrying capacity
- Intelligent surveillance
- Remotely Operated
- Bomb Disposal

VARAHA THROWBOT

The Varaha Throwbot robot is a throwable micro-robot platform that enables operators to obtain instantaneous video and audio reconnaissance within indoor or outdoor environments.

Technical Specifications:

- Weight: 6 KG
- Dimensions: 533 x 266 x 296
- Power and Endurance:
 - o Battery: Li-ion Battery Pack
 - o Endurance: 3 hrs on continuous operation
- Traversing Capability:
 - o Max Speed: 9 km/hr
 - o Max Inclination: 60 deg
 - o Terrain: Mud, stones, creeks, Stairs
- Sensors:
 - o Navigation Camera: 1 High resolution camera for Navigation
 - o 1 High resolution Arm camera
 - o Explosive detection: Integrated metal detector



Niche Technologies/ Distinguishing Factors:

Varaha Throwbot is a portable mobile platform with multi mission flexibility and unlimited customization.

- Man-portable Troop Leader Robot (≈ 8 kg)
 - o All weather, Cross-country, surface deployed
 - o Stairs & Slopes (< 45 deg)
 - o Endurance 2 hrs@ Speed of 6 km/hr
- Platform modular to fit multiple explosive-Detection sensors
 - o Deep search Metal Detector
 - o Ground Penetration Radar
 - o Thermal Camera
 - o 360 deg Camera
- Robotic Arm with modular end-effector (≈ 9 kg)

- o Digger-dig soil to expose IEDs
- o Gripper-can lift up to 15 kg
- o Cutter-cut barbed wires
- ➔ User Assists Package
 - o Autonomous path retrace using GPS, IMU & Odometry
 - o Autonomous configuration recovery
 - o Autonomous waypoint navigation
 - o 360 deg fix view
- ➔ Touch Screen based UI on a Smartphone/ Tablet
- ➔ Optional Live tracking & Monitoring feature

Possible Use Cases:

- ➔ Mobile portable robot 24 x 7 mission ready
- ➔ Wide variety of interchangeable payload that can be configured on-field as demanded by the mission and operator's preference.
- ➔ Portable gamepad controller with touch interface. Powered with Janyu software and user-assist.
- ➔ Relays live video to the gamepad controller along with vital sensor data for analytics as per the requirements. The analytics help the troops to predict, plan, prepare and perform better.
- ➔ A group of Varahas (Swarm) working in mutually coordinated groups controlled by the user helps secure larger areas and offers endless possibilities.

VARAHA ROV

Varaha ROV Robotic arm is designed to detect and dispose a bomb which is located around the range of 100m with safety and to provide a security for the bomb disposal squad against risks.

Technical Specifications:

- Weight: 18 KG
- Dimensions: 60 x 45 x 18 (in cms)
- Power and Endurance:
 - Battery: Li-ion Battery Pack
 - Endurance: 4 hrs on continuous operation
- Traversing Capability:
 - Max Speed: 8 Kph
 - Max Inclination: 60 deg
 - Terrain: Mud, stones, creeks, Stairs
- Sensors:
 - Navigation Camera: 1 High resolution camera for Navigation
 - 1 High resolution Arm camera
 - Explosive detection: Integrated metal detector



Niche Technologies/ Distinguishing Factors:

- Localization: Multi Sensor Fused enhanced relative positioning
- Retro-Traversal: Communication failure, low battery, User Commanded (Retrace a path)
- Heading Hold: The robot maintains a constant heading set by the User, automatically adjusting

Possible Use Cases:

- Surveillance & Reconnaissance
- Bomb Disposal/ EOD
- Explosive Detection/ Mine Mapping

About the Company:

L&T Defence division is principally engaged in the realization of advanced technology systems, products and services for the Armed Forces. A leading supplier to the defence forces for more than 3 decades, L&T had undertaken the challenge of mastering unmanned ground technologies.

Through sustained in-house development, partnerships, L&T Defence has brought together talent and knowledge from across domains, to create a portfolio of indigenized unmanned systems to meet the mission needs. L&T has proven expertise to design & deliver unmanned ground systems with Artificial Intelligence, machine learning & collaborative (human – robot, robot – robot) capabilities. Our efforts in the unmanned domain is driven by a vision to act as a force multiplier on the battle field while saving precious lives in high risk scenarios.

Website: www.larsentoubro.com

Year of Founding: 1938

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

Name	Jerald Melwin
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Phone Number	+91 9632665226



Scan the QR Code to view the Company Brochure.

WHEELED UGV

A skid steered wheeled UGV is intended for outdoor operations with capability to interface modular payload for multiple mission needs.

Technical Specifications:

- Weight: 50 Kg
- Endurance: 2 Hours
- Speed: 7 Kmph
- Slope Climbing: 15 Degrees

Niche Technologies/ Distinguishing Factors:

Mil Qualified

Possible Use Cases:

- ISR
- Pick & Place with Robotic Arm
- Autonomous Mapping with LiDAR Payload



TRACKED ATUGV

Tracked ATUGV can operate in multiple terrain conditions. The open architecture design can accommodate different payloads to cater to mission requirements.

Technical Specifications:

- Weight: 60 Kg
- Endurance: 2 Hours
- Speed: 4 Kmph
- Stair Climbing: 45 Degrees

Possible Use Cases:

- ISR
- Mine Detection with GPR Payload
- Pick & Place with Robotic Arm
- Autonomous Mapping with LiDAR Payload

Niche Technologies/ Distinguishing Factors:

Mil Qualified



MANPACK ROBOT

Manpack is a light weight, compact, human portable UGV for recce operations.

Technical Specifications:

- Weight: 15 Kg
- Endurance: 2 Hours
- Speed: 7 Kmph
- Slope Climbing: 15 Degrees

Niche Technologies/ Distinguishing Factors:

Mil Qualified

Possible Use Cases:

ISR



About the Company:

Mistral is a technology design and systems engineering company providing end-to-end solutions for product design and application deployment. Mistral focuses in three business domains: Product Engineering Services, Aerospace Defense & Homeland Security. Mistral provides total solutions for a given requirement, which may include hardware board design, embedded software development, FPGA design, systems integration and customized turnkey solutions. Mistral's strategic partnerships with leading technology companies help provide customers with a comprehensive package of end-to-end solutions.

Website: www.mistralsolutions.com

Year of Founding: 1997

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

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Scan the QR Code to view the Company Brochure.

UNMANNED GROUND VEHICLE (UGV)

The Unmanned Ground Vehicle (UGV) jointly developed by Centre for Artificial Intelligence & Robotics (CAIR), DRDO and Mistral is a rugged all-terrain all-weather autonomous platform that operates without an on-board human operator. The UGV is ideal for various demanding applications like Military, Industrial, Reconnaissance and surveillance missions among others.



UGV Chassis: Built on an advanced ATV chassis, the UGV is uniquely engineered for extreme durability, exceptional dependability, and high functionalities during tougher missions in harsh environments. The ATV chassis offers high ground clearance, low centre of gravity and rugged suspensions - making it an all-terrain platform. The platform is customised with a powerful electric powertrain to offer noiseless, yet powerful functional features.

Remote Operator Console (ROC): The UGV comes with a lightweight, easily portable Operator Console that functions like a mini command and control centre. The operator console is designed to remotely operate the vehicle and control the surveillance payloads. The console receives and displays surveillance footages streamed by the UGV, providing real-time situational awareness to the user.

Technical Specifications:

- Drive by wire technology
- Powered by Robot Operating System (ROS)
- Navigational and visual algorithms
- Web application to remotely configure and tele-operate the vehicle
- Web based GIS system for defining the route maps, roads and building
- Three modes of operation - Manual, Autonomous, Tele-operation (Remote Operation)
- Remote command and control console
- Passengers: Up to 2
- Ground Clearance: 10 inches
- Payload: Tested for 400 kg
- Engine Type: Electric (low noise, minimal heat signature & optimized power utilization)
- Frame: Armoured cocoon with High-grade steel
- Drivetrain: 2 WD, can be customized with 4WD
- Suspension: 4 Wheel Independent Heavy-duty Suspension
- Tyres: ATV Tyres, can be customized for specific terrains
- Chassis Dimension: 9'4"x5'8"x5'7" / 290cmx180cmx175cm (LxWxH)
- Dashboard: 10" LCD displaying Vehicle parameters and maps
- Communication: Two-way audio communication with remote console
- Range: 80kms or 8 hours of operation
- Speed: Tested for 40kms/hr.

➔ Sensors Integrated

- o LiDAR
- o RADAR
- o Ultrasonic
- o Ambient light
- o Search lights
- o Real-time 360 View Camera
- o PTZ Camera
- o Thermal Camera
- o Day & Night Vision (IR) Camera
- o GPS-INS sensor
- o RTK base-station for centimeter level precision
- o Laser / LED illumination of targets (Optional)
- o 1000m LOS communication with the remote operator console (can be extended as per specific requirement)
- o Motion Detection Sensors (Optional)
- o Satellite Communication (Optional)

Niche Technologies/ Distinguishing Factors:

The vehicle is designed using drive-by-wire technology. It uses a wide range of sensors along with Machine Vision to perceive and comprehend its environment, while drive-by-wire actuators and motors facilitate autonomous operations. The vehicle direction and acceleration commands are generated by the vision & navigation algorithms in lieu of a human operator.

The rugged all-terrain vehicle offers seamless video surveillance capability, which makes the platform ideal for perimeter surveillance, 24x7 patrolling of vital installations, deployment as the first response vehicle in a hostile environment or a lead convoy vehicle during various security and surveillance missions.

Possible Use Cases:

- ➔ Reconnaissance & Surveillance (ISR)
- ➔ Logistics Delivery
- ➔ Perimeter Surveillance
- ➔ First Response Vehicle
- ➔ Lead Convoy Vehicle
- ➔ Combat Platform*
- ➔ Emergency Evacuation



About the Company:

Founded in June 2020, NHANCE Dynamics is a start-up created by industry professionals to develop high-end robotics products for 'Defense' and 'Industrial' applications. With a collective industry experience of 100+ years, the promoters strive to elevate the standards of the defense and manufacturing industries in India and to provide impetus to the 'Make-in-India' and 'AatmaNirbhar Bharat' movement started by the Hon'ble Prime Minister; by developing high-tech indigenous products in India, for India.

Primary focus of the company is in the development of Autonomous Systems with Advanced Robotic capabilities; augmented with Artificial Intelligence. In terms of research, the company is focused on uniquely developing and patenting algorithms for Geo-tagging, Mapping, Localization, Autonomous navigation and post-processing of surveillance feeds with AI. Key products include Autonomous Ground and Aerial Vehicles for Intelligence gathering, Surveillance & Reconnaissance (ISR) and Logistics Support for Land, Air and Marine Defense and Homeland Security. For industrial applications, our Smart Mobility products with load carrying capacities from 50Kgs to 2000Kgs navigating autonomously through complex industrial environments for sensitive material movement. Our smart mobility products and applications cater to industries like Defence, Automotive and Warehousing.

Website: www.nhancedynamics.com

Year of Founding: 2020

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

Name	Nishit Pandya
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Phone Number	+91 7600800375



Scan the QR Code to view the Company Brochure.

SPECTOR – MK1

SPECTOR is an Unmanned Ground Robot designed specifically for Intelligence Gathering, Surveillance and Reconnaissance (ISR) operations. It is a ruggedized 6 wheeled multi-terrain robot with HD camera and long range encrypted video link ideal for manned as well as unmanned surveillance operations. Its small form factor makes it easy to carry, deploy and operate in highly constrained areas. It can be used in remote-controlled as well as autonomous mode which allows operators to successfully complete any tactical mission from a safe stand-off distance, reducing exposure to hazards and threats. Designed to support units engaged in Counter-Terrorist, Counter-Intelligence, Reconnaissance, Public Safety and Law Enforcement Operations, SPECTOR can easily manoeuvre into small-confined spaces and provide vital information in real time



Technical Specifications:

- Ruggedized, Light-Weight Surveillance Platform
- Suitable for both extreme indoors as well as outdoors urban warfare
- Full HD Video Colour Camera (optional: IR-based night vision) with +/-45° tilt
- Long range (2KM) Secure, Encrypted IP Video & Telemetry Data-link
- Interface for Laser Range Finder (LRF), High-Power Light, & Microphone
- Multi-terrain operation with traction for Sand, Mud, Pebble capability
- Remotely operated using a hand-held with integrated screen & joystick
- Provides GPS-based location data to geo-tag the mission log
- Can be operated in Autonomous as well as Remote-controlled mode
- Can create a multi-hop, mesh network (IP) for range extension
- Mesh IP network can provide multi-viewer facilities within designated range
- Range: 2 km (LOS), Endurance: 1 - 1.5 Hours

Niche Technologies/ Distinguishing Factors:

- Multi-terrain operation with traction for Sand, Mud, Pebble capability
- Can be operated in Autonomous, Semi-Autonomous as well as Remote-controlled mode
- Can create a multi-hop, mesh network (IP) for range extension to cover larger distances
- Mesh IP network can provide multi-viewer facilities within designated range
- Fully customisable to add any payload types

Possible Use Cases:

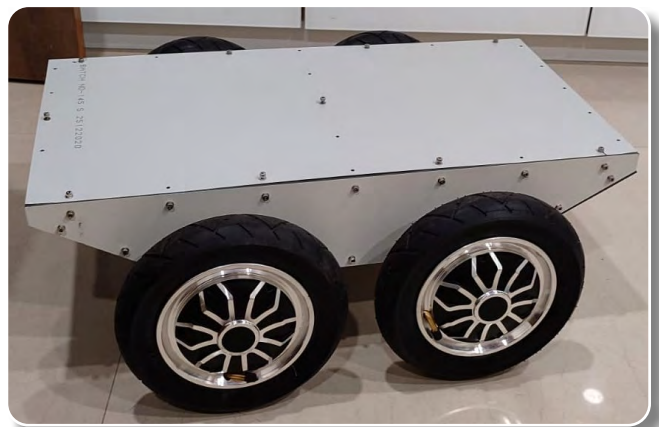
SPECTOR is suitable for missions like:

- Intelligence gathering, Surveillance and Reconnaissance (ISR) operations
- Counter-Intelligence and Counter Terrorism (CI/CT) operations
- Tactical military operations
- SWAT operations
- Urban warfare
- Law enforcement operations
- Public safety operations
- Subterranean and culvert inspection



MARSHALL - MK1

MARSHALL is an Unmanned Ground Robot designed for Intelligence Gathering, Surveillance and Reconnaissance (ISR) as well as Logistics operations. It is a small ruggedized 4 wheeled robot with long range and high endurance operations. It has a flat payload plate that can be used to mount any sensor like Full HD cameras, IR Camera, Laser Range Finder, High-Power Lights, Microphone, Smoke Sensor, Motion Sensor or any other kind of sensor. It can also be mounted with a secure enclosure box that can be used to transfer sensitive and/or hazardous materials autonomously from point A to B. Encrypted video/data link makes it ideal for manned as well as unmanned surveillance operations. Its small form factor makes it easy to carry, deploy and operate in highly constrained areas. It can be used in remote-controlled, semi-autonomous as well as fully autonomous mode which allows operators to successfully complete any tactical mission from a safe stand-off distance, reducing exposure to hazards and threats. Designed to support units engaged in Counter-Terrorist, Counter-Intelligence, Reconnaissance, Public Safety and Law Enforcement Operations, MARSHALL can easily manoeuvre into small-confined spaces and provide vital information in real time or deliver sensitive materials in war-zones



Technical Specifications:

- Ruggedized, Light-Weight Surveillance as well as Logistics Platform
- Weight carrying capacity of 50 Kg with a speed of 30Kms/Hour
- Suitable for both extreme indoors as well as outdoors urban warfare

- Video, Sensor data and Material handling capabilities
- Long range (2KM) Secure, Encrypted IP Video & Telemetry Data-link
- Interface for Laser Range Finder(LRF), High-Power Light, & Microphone
- Remotely operated using a hand-held or laptop
- Provides GPS-based location data to geo-tag the mission log
- Can be operated in Autonomous as well as Remote-controlled mode
- Can create a multi-hop, mesh network (IP) for range extension
- Mesh IP network can provide multi-viewer facilities within designated range
- Range: 2 km (LOS), Endurance: 2 - 1.5 Hours

Niche Technologies/ Distinguishing Factors:

- Multi-terrain operation with a combination of agility and speed
- Weight capacity up to 50 Kg with a speed of 30Kms/Hour
- Can be equipped with a Robotic Arm for Hazmat handling
- Can be operated in Autonomous, Semi-Autonomous as well as Remote-controlled mode
- Can create a multi-hop, mesh network (IP) for range extension to cover larger distances
- Mesh IP network can provide multi-viewer facilities within designated range
- Fully customisable to add any payload and sensor types

Possible Use Cases:

MARSHALL is suitable for missions like:

- Intelligence gathering, Surveillance and Reconnaissance (ISR) operations
- Medical Equipment movement
- Sensitive and Hazardous material movement
- Counter-Intelligence and Counter Terrorism (CI/CT) operations
- Tactical military operations
- SWAT operations
- Urban warfare
- Law enforcement operations
- Public safety operations
- Subterranean and culvert inspection





About the Company:

Uma robotics makes Autonomous and person following logistics robots with heavy load carrying capacity in outdoor as well as indoors. Working in uneven surfaces and not just smooth factory floors.

Fast, affordable, easy to deploy solutions with highest quality autonomous indoor as well as outdoor navigation solutions.

Our robots can be used for logistics, surveillance, shuttle service and grass cutting applications.

Website: www.umarobotics.com

Year of Founding: 2021

Nature of Company Ownership: Fully Owned Indian Company

PoC Details:

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Phone Number	+91 9634377728



Scan the QR Code to view the Company Brochure.

UGV01

Technical Specifications

- Payload: 150 kg. Single charge: runs for 8 hours, 22 kilometers.
- Electric/solar hybrid and derives 50% of energy from solar power. It has very less noise than engines and is fuel efficient.
- Runs on uneven terrain.
- ROS compatible chassis
- Battery capacity 24V/60Ah, lead acid/gel based
- Ideal for carrying payload, customized mounts
- ROS installed on an onboard computer
- Interface to ROS drivers for sensors and chassis
- Wifi interface and USB
- Ideal for SLAM based free navigation
- Size: 1300mm x 750mm
- Customizable Size: 80cm x 130cm



Niche Technologies/ Distinguishing Factors:

- Solar charged
- Fully autonomous indoors and semi-autonomous outdoor
- Person following mode, line following and remote controlled mode

Possible Use Cases:

Logistics, Surveillance, Parameter Guarding, Grass Cutting



Technical Specifications

- 150 kg payload
- 4X4 chassis, robust for outdoors
- Battery capacity 60Ah, can be increased and swapped.
- Mounting area for payload, machinery, etc
- Ideal for carrying loads, customized mounts, building custom applications
- Optional Wifi interface possible
- Remote controlled upto 300 meters
- Ideal for human controlled navigation, line following, person following
- Semi-autonomous and autonomous navigation outdoors.
- Size 900mm x 900mm, also customizable



Niche Technologies/ Distinguishing Factors:

- Fully autonomous indoors and semi-autonomous outdoor
- Person following mode, line following and remote controlled mode

Possible Use Cases:

Logistics, Surveillance, Parameter Guarding, Grass Cutting



Technical Specifications

Small compact robot with autonomous navigation indoors and outdoors and remote control with camera, laser scanner, IMU and GPS. It's a modular robot that can carry 3- 25 kg payload on its tabletop. It can be used for surveillance, recce, first response into an unknown closed building. It can make map the environment and show it to user for planning purpose.

Technical Specifications

- ➔ Customizable size, 6 inch by 12 inch

Niche Technologies/ Distinguishing Factors:

- ➔ Fully autonomous indoors and semi-autonomous outdoor

Possible Use Cases:

Surveillance, First Response, Spying



SIDM

SOCIETY OF INDIAN DEFENCE MANUFACTURERS

Since 2017, the Society of Indian Defence Manufacturers (SIDM) has grown and established itself as India's apex Defence Industry association and, today plays a proactive role as an advocate, catalyst, and facilitator for the growth and capability building of the defence industry in India.

The Society represents the entire spectrum of Defence and Aerospace manufacturers in India covering both the Public and the Private Sector. Its membership constitutes Large companies, MSMEs, FOEMs, Academic Institutions and Think Tanks which are spread across all states and regions of the country.

SIDM stands as the 'Voice of the Industry' and works closely with the Government to shape a conducive policy environment for the growth of the defence Industry in India. Through its MoUs with the Army, the Air Force and the Navy, SIDM provides a platform for interface with the Services and enables the Industry to serve the emerging requirement of the forces.

SIDM acts as a facilitator between the Defence Research & Development Organisation (DRDO), academic Institutions, innovators and the user to create a strong foundation for nurturing new-age defence technologies.

To build capacity and capability of the Indian Industry, SIDM provides technical support through subject-matter experts and conducts workshops, short courses on procedures and regulatory affairs, such as its flagship Defence Acquisition Management Course (DAMC), in the Defence and Aerospace sector.

As India expands its global presence, SIDM has emerged as the single reference point for countries looking to engage with the Indian Industry and has organized numerous bilateral interactions to strengthen India's defence industrial ties.

SIDM is committed to make India Aatmanirbhar in Defence Production and is "Proud to Arm the Nation".

Society of Indian Defence Manufacturers

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