MILREM ROBOTICS

ROBOTICS SOLUTIONS FOR CHALLENGING ENVIRONMENTS

PRODUCT BROCHURE

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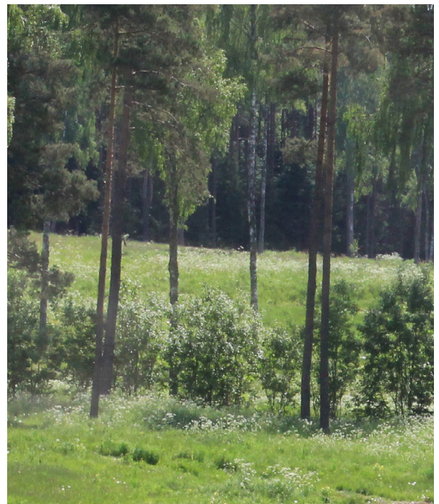
ABOUT US

MILREM ROBOTICS was established in 2013. Our mission is to provide innovative robotics solutions for challenging environments. We believe that our cutting-edge robotics solutions fulfil a higher purpose – enabling more meaningful lives.

Respect for the value of human life is our top priority, and we aim to retrieve people from dangerous areas and liberate them from dirty, dull and dangerous tasks. Through our products and services, we seek to increase human safety and labour efficiency in a number of targeted industries, particularly in defence, agriculture, forestry, municipal services, rescue and mining.

By sparing and protecting human lives via innovative technology, we promote the idea of people dedicating time to realizing their true potential. We treasure lives lived to their fullest.



STRATEGIC SHAREHOLDERS

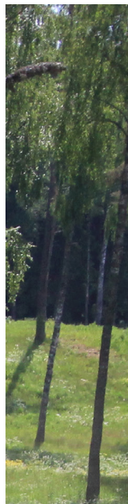
KMW A COMPANY OF KNDS

EDGE

CUSTOMERS

AU EE FR DE IN ID IT NL NO ES TH

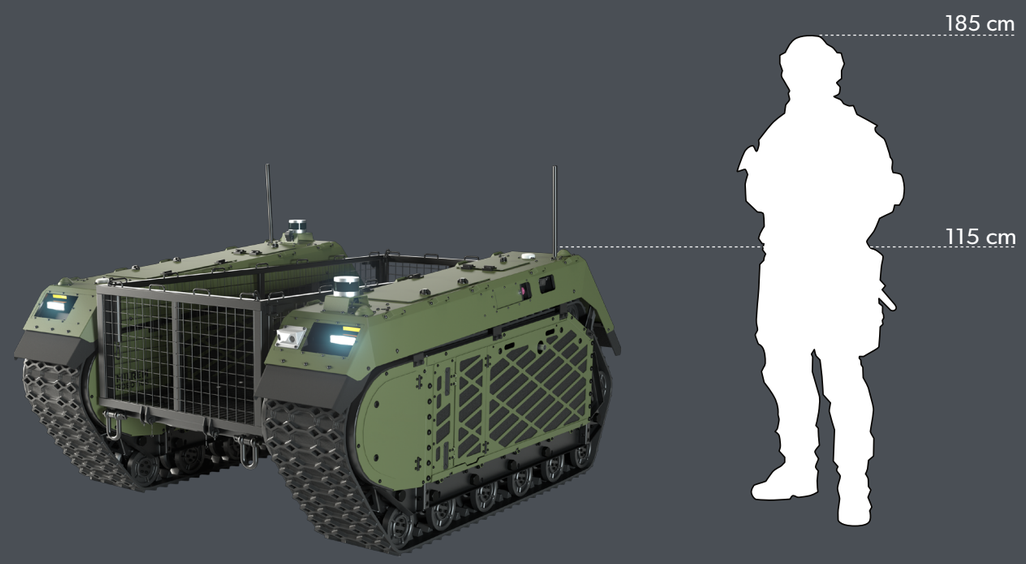
GB US UA SA UD



ABOUT THE THeMIS UGV

THEMIS UNMANNED GROUND VEHICLE

The THeMIS is an operationally proven multi-role UGV with an open architecture that enables it to be rapidly configured from having a transport function to being weaponized, performing ordnance disposal, or supporting intelligence operations according to the nature of the mission. The THeMIS is intended to reduce the number of troops on the battlefield and assist or replace personnel that must work in high-risk and dangerous environments.



TECHNICAL SPECIFICATIONS

DIMENSIONS	
Measurements	240 x (182 - 220) x 115 cm
Weight	1650 kg

PAYLOAD	
Payload Weight (rated)	750 kg
Payload Weight (max)	1200 kg

PERFORMANCE AND MOBILITY	
Max. speed	20 km/h
Ground clearance	60 cm
Max. grade	31 deg / 60 %
Fording depth	60 cm
Pull force	15 000 N
Run time (hybrid, full internal tank)	up to 15 h
Run time (full load, silent mode)	up to 1,5 h
Control range	up to 10 km
Turning radius	0 m

RF COMMUNICATION	
IP radio	4W, 2,4Ghz MIMO Mesh
Encryption	AES256

360 DEG SENSORICS AND LIGHTS	
Sensors	LiDARs
Cameras	1080p
Lights	LED

TRANSPORTABILITY	
On ground transport	Towing / Trailer
Air transportability	Designed according to STANAG 3542

THeMIS USECASES/VERSIONS

CARGO
CASEVAC
Supply and resupply
Air transportable

COMBAT
Force multiplier
Direct and facilitate fire support
Anti-tank

OBSERVE
Situational awareness
Low visual, thermal and noise signature
Increased operational capability

SUPPORT
Standoff distance
Breach and bypass obstacles
IED mine detection and clearance

THeMIS CARGO

LOGISTICS SUPPORT SYSTEM

Carrying supplies and equipment in combat is often difficult for dismounted units. Due to the soldier's physical limitations, the weight of additional equipment and heavy weapons often restrict what the soldier can take in to battle. The purpose of the THeMIS Cargo is to reduce the cognitive load of soldiers and provide a means to carry and utilize extra gear and firepower. The THeMIS Cargo will increase the mobility of dismounted units and make them more effective against the adversary.

The THeMIS Cargo can also be used to support on-base logistical activities and for last-mile resupply.

MORTAR CARRIER

The THeMIS Mortar carrier has been adjusted to accommodate a mortar up to 81 mm. The Cargo platform is equipped with a specially designed suspension system for safe transportation and utilization of the mortar, extra equipment and ammunition, making it rapidly deployable on harsh terrain.
The main purpose of this system is to enable logistical support and indirect fire for manoeuvre forces.

CASEVAC

The purpose of the CASEVAC platform is to provide rapid evacuation for urgent casualties from the point of injury to higher-level medical facilities. It reduces the need for manpower usually used for casualty evacuation.

The vehicle facilitates most NATO stretchers used in the armed forces.

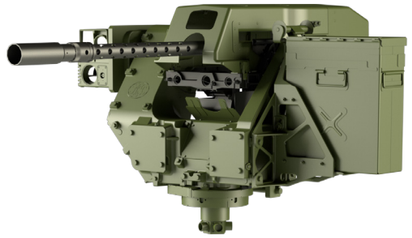
THeMIS COMBAT

FIRE SUPPORT SYSTEMS
(5.56 MM - 12.7 MM RWS)

PROTECTOR RS4
by KONGSBERG

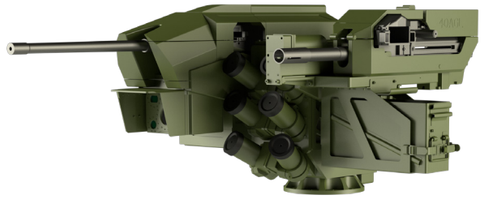
The THeMIS Combat fire support systems provide direct fire support for manoeuvre units acting as a force multiplier. With an integrated self-stabilizing remote-controlled weapon system (RWS), they provide high precision over wide areas, day and night, increasing stand-off distance, force protection and force survivability.

The THeMIS Combat can be equipped with light (5.56 mm and 7.62 mm) or heavy machine guns (12.7 mm) and 40 mm automatic grenade launchers (AGL). The system can be equipped with a single RWS or with a combination of two RWSs (12.7 mm and ATGM, 7.62 mm RWS and 40 mm AGL, etc.).



deFNder® MEDIUM
by FN HERSTAL

GUARDIAN 2.0
by EM&E



ADDER
by ST Engineering

TERRAHAWK
by MSI-DS

THeMIS COMBAT

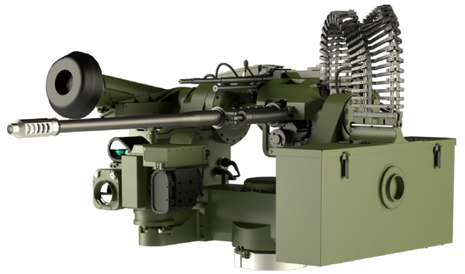
HEAVY FIRE SUPPORT SYSTEMS
(20 MM – 30 MM AUTOMATIC CANNON)

R400 30MM
by EOS

The THeMIS Combat heavy fire support system is meant to provide heavy direct fire support for units. The system can operate with dismounted units, providing them additional means to fight adversary armoured units. It can also be a wingman for armoured units acting as an advance force taking up an over-watch position at vulnerable points or providing flank protection during movement.

With advanced sensors, collaborative targeting software and Intelligent Functions, the THeMIS Combat becomes an asset that provides better situational awareness, can act in higher-risk situations and due to that, decreases loss of life and increases units' survivability.

ARX20
by Nexter



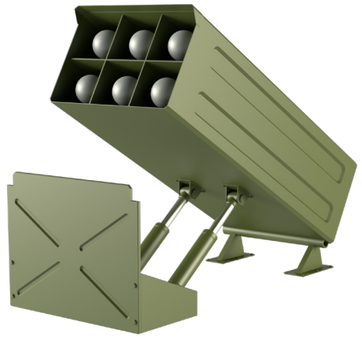
PROTECTOR RS6
by KONGSBERG

THeMIS COMBAT

ANTI-TANK GUIDED MISSILE SYSTEMS (ATGM)

HERO-120
by UVision

The THeMIS Combat equipped with anti-tank guided missile systems (ATGM) offers a range of capabilities and operational possibilities for dismounted units to the battlefield. Using the THeMIS Combat ATGM with Intelligent Functions increases stand-off distance and supports stealth movement, which will increase the success rate of the mission. Due to the small physical size and low heat signature, the THeMIS Combat ATGM is hard to detect on the battlefield and is a considerable threat to adversary armoured units.



BRIMSTONE
by MBDA

FGM-148 JAVELIN
by Raytheon and Lockheed Martin

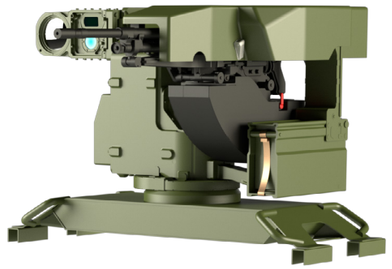
IMPACT
by MBDA

THeMIS COMBAT SUPPORT

COMBAT SUPPORT SYSTEMS

THEMIS SUPPORT UGV

The main purpose of the THeMIS Support is to assist military infantry or special intervention police units in high threat, riot control and counterterrorist (CT) urban environment scenarios. The THeMIS Support includes a stretcher, a bumper kit, equipment storage boxes and attachments for extra equipment on the fenders that can be adjusted according to the nature of the mission. It can also be equipped with light remote weapon systems to increase firepower in addition to easing the workload of combatants.



deFNder® LIGHT
by FN HERSTAL

COBHAM AND KRAFT

ROUTE CLEARING UNMANNED SYSTEM (ROCUS)
by CNIM

THeMIS OBSERVE

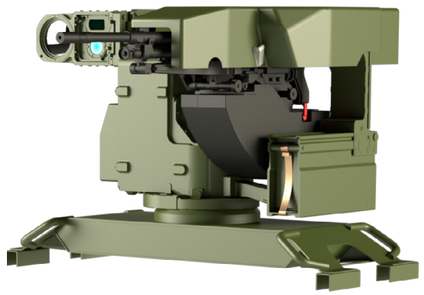
INTELLIGENCE, SURVEILLANCE AND RECONNAISSANCE SYSTEMS

THeMIS OBSERVE

The main purpose of THeMIS Observe is to increase situational awareness (SA) and provide improved intelligence, surveillance, and reconnaissance (ISR) over wide areas or disaster relief and emergency support capability. Depending on the payload configuration, it can effectively enhance the work of dismounted infantry units, law enforcement agencies or emergency first responders to collect and process raw information to decrease the reaction time for commanders and to deliver a kinetic effect on to the battlefield.

The THeMIS Observe can also be used as a radio communications relay, electronic warfare (EW) and electronic countermeasure (ECM) system as well as a battlefield radar.

KX4 DRONE SYSTEM
by Threod Systems



deFNder® LIGHT
by FN HERSTAL

THeMIS INTELLIGENT FUNCTIONS

INTELLIGENT FUNCTIONS CHARACTERISTICS

THeMIS UGVs can be equipped with Milrem's Intelligent Functions (MIFiK) which enable the vehicles to execute on- and off-road missions independently. MIFiK's intuitive mission planner can be integrated into Battle Management and C2 systems and operated from different control stations.

MIFIK ALLOWS THE OPERATOR TO

- Plan missions using waypoint navigation.
- Set vehicle behaviours based on location or event.
- Edit planned routes during mission execution.
- Create multiple routes.
- Plan multiple missions.
- Upload open source or other preferred maps.

MIFIK ENABLES THE VEHICLE TO

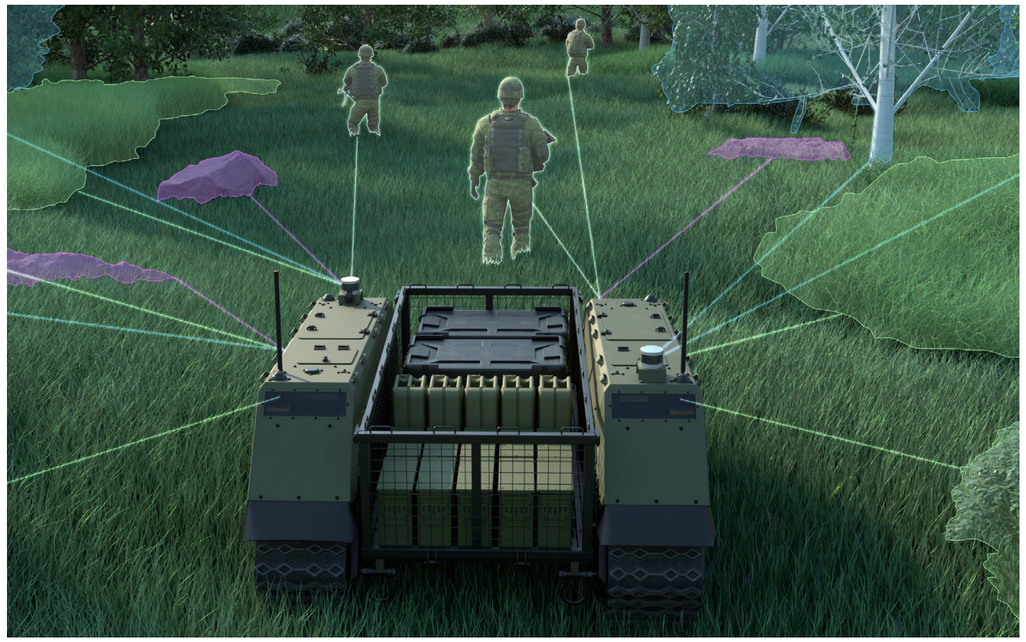
- Detect and avoid obstacles.
- Loop patrol, backtrack and return home.
- Avoid predetermined areas.
- Solve "stuck" situations.
- Follow the operator or convoy.
- Monitor internal safety.
- Operate in a GNSS denied environment.

INTELLIGENT FUNCTIONS ARE SUPPORTED BY

- An intuitive User Interface.
- 2D/3D mapping.
- Advanced sensor fusion.
- Deep learning algorithms.

INDEPENDENT MISSIONS CAN BE USED FOR

- Supply transport on patrol.
- Autonomous resupply.
- Perimeter or border patrol.
- Reconnaissance and intelligence gathering.
- Etc.



ABOUT THE TYPE-X RCV

TYPE-X ROBOTIC COMBAT VEHICLE

The Type-X RCVs are intended to support mechanized units by acting as a wingman to main battle tanks, infantry fighting vehicles or armoured personnel carriers. The vehicle provides equal or overmatching firepower and tactical usage compared to traditional Infantry Fighting Vehicles. The RCV can be equipped with a main armament of a 30 mm to 50 mm automatic cannon and utilized to localize and engage targets and provide flanking support.

The Type-X considerably raises troop survivability and lowers lethality risks by increasing standoff distance from enemy units. It is a rapidly deployable and dependable unit, able to autonomously navigate the battlefield and perform tasks, keeping the operator in the loop with real-time Situational Awareness.

The Type-X is designed to have low maintenance costs and its modular design allows it to be easily upgradable. It is designed for operations encompassing the entire spectrum of conflict from permissive to denied environments, fighting effectively in both conventional and non-conventional conflicts.

TECHNICAL SPECIFICATIONS

DIMENSIONS	
Measurements	6 x 2,9 x 2,2 m
Weight	12 t

PAYLOAD	
Payload Weight (max)	4,1 t

MOBILITY	
Transmission	Hybrid Electric Drive
Steering	Cross-Drive torque transfer
Max. road speed	80 km/h
Max. terrain speed	50 km/h
Speed in reverse	80 km/h
Ground clearance	50 cm
Max. grade	45 deg / 100%
Fording depth	1,5 m
Turning radius	0 m

SURVIVABILITY AND LETHALITY (Dependent on payload and mission)	
Main armament	30-50 mm automatic cannon
Optional	Smoke grenades
	AT guided missiles
Kinetic energy protection	STANAG 4569 (L4)
Artillery protection	STANAG 4569 (L4)
Mine protecton	STANAG 4569 (L1)

TYPE-X RCV

TYPE-X RCV WITH PEARSON SELF PROTECTION ROLLER

Pearson Engineering's Self Protection Rollers provide protection against live pressure initiated Improvised Explosive Devices across the track width of the vehicle.

KEY FEATURES

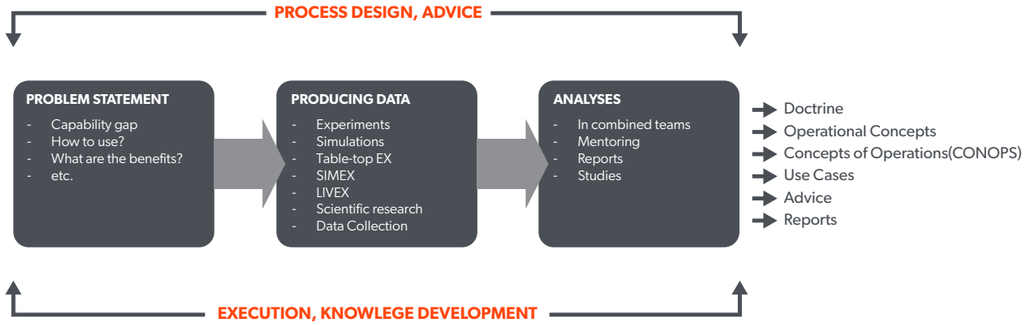
- Verifies the presence of pressure-fused IEDs on a route
- Stand-off ahead of the vehicle increases survivability
- Jettison capability ensures that a blast damaged roller does not serve as an obstacle for further mobility
- Configurable suite of threat detection capabilities provides tactical flexibility and a scalable approach
- Interchangeable with other vehicle Front End Equipment to provide a comprehensive mobility, counter-mobility and survivability set

TYPE-X RCV WITH UVISION LOITERING MUNITION SYSTEM

The Type-X with a Multi Canister Launcher can be equipped with two of UVision's already operational Loitering Munition Systems: The Hero-120, with its anti-tank warhead and up to one hour of flight time, and the Hero-400EC, capable of destroying fortified targets, with up to two operational hours. The Type-X can be equipped with a 40 km range communication antenna, located on a telescopic rising mast, improving the operator's control of the system.

RAS-SE

ROBOTICS AND AUTONOMOUS SYSTEMS CD&E SUPPORT SERVICE (RAS-SE)



The RAS domain has two main challenges: the technology itself and how to use it. Often, the latter is the most challenging. What is the operational benefit? How can RAS be employed in the best manner? What should be considered capability development-wise when contemplating integrating RAS?

This requires thorough and rigorous analyses, unique expertise and experience, which is often not available for Defence Forces in a given time or in the desired amount.

Milrem Robotics' RAS CD&E service supports customers from initial planning to full execution and post-execution analyses with (NATO standard) concept development and experimentation methodologies and a team with experience from the scientific world and RAS experimentation and implementation.

REQUIREMENTS ANALYSIS

- Capability gap analysis (CONOPS).
- Initial system requirements identification (system configuration).
- Implementation process planning (tests, trials, simulations, exercises).
- Possible partner identification.

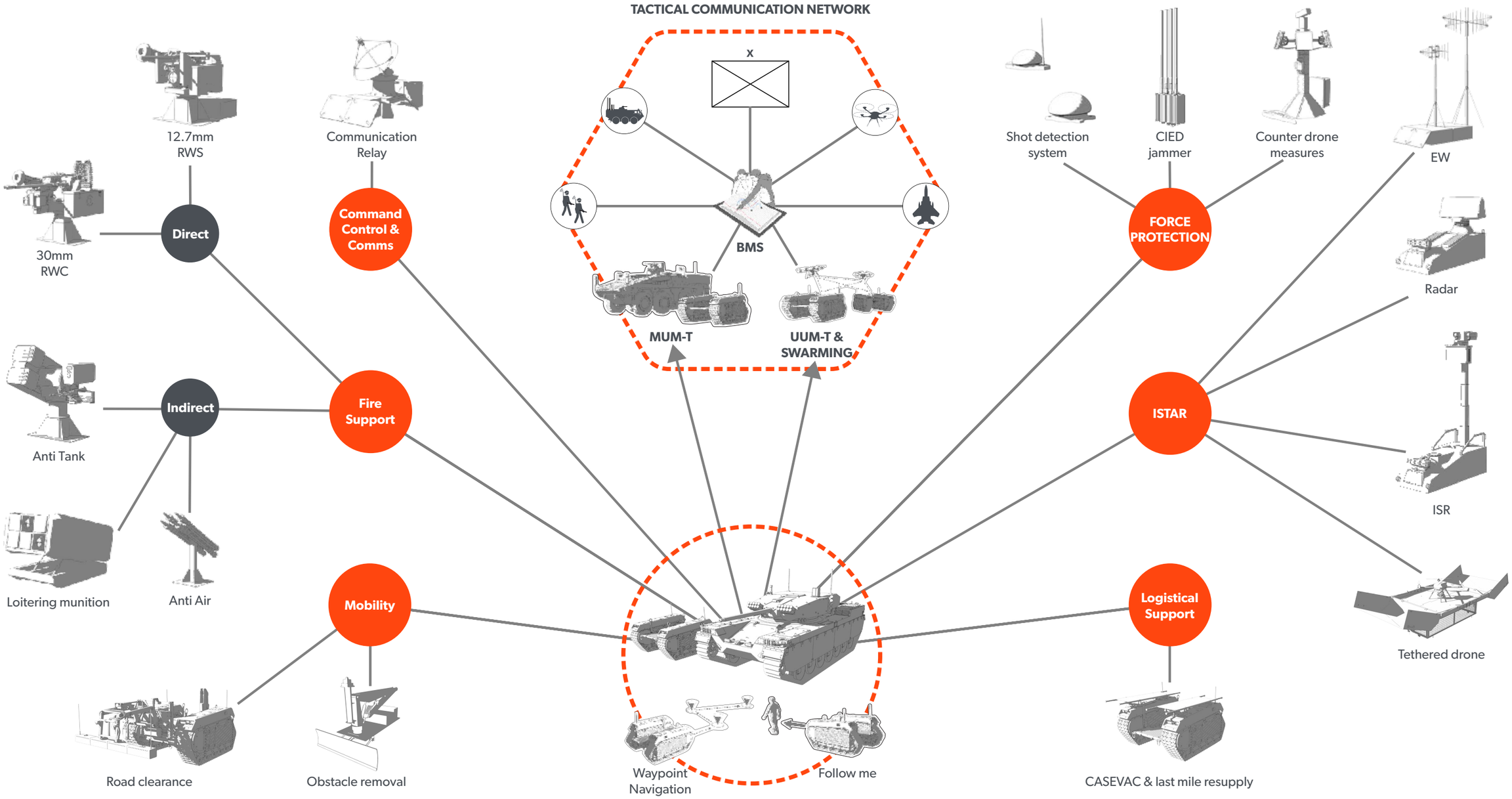
IMPLEMENTATION

- Development of doctrine and operational concept.
- System and technology integration.
- Test and trials of systems.
- Experimentation and simulation.
- System implementation during military exercises.

EVALUATION AND REPORTING

- Capability- and effect-focused research and analysis.
- Prognosis and longitude analyses of effects.
- Cost effectiveness analysis of using intelligent assets.
- Socioeconomic analysis of effects and influence including ethics, social acceptance, etc.
- A written audit, certificate and report for recommendations.

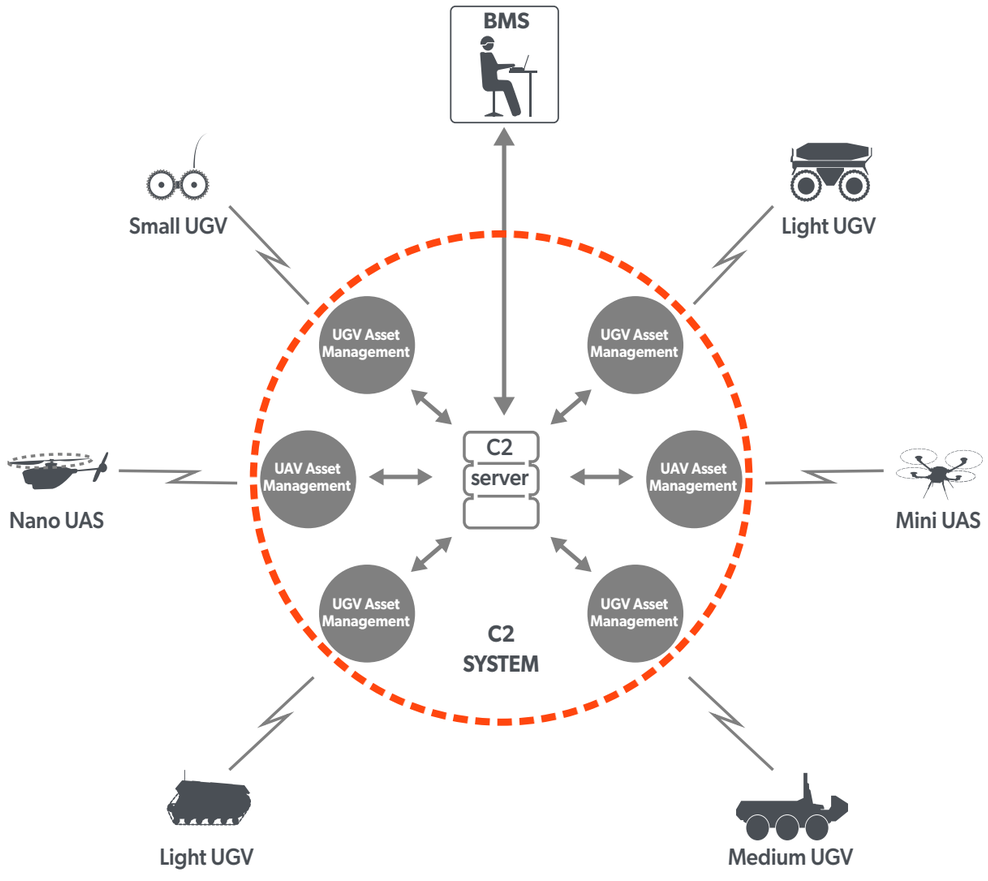
RAS-SE


TACTICAL COMMUNICATION NETWORK
X
BMS
MUM-T
UUM-T & SWARMING
12.7mm RWS
Communication Relay
30mm RWC
Direct
Command Control & Comms
Shot detection system
CIED jammer
Counter drone measures
EW
FORCE PROTECTION
Radar
Anti Tank
Indirect
Fire Support
ISTAR
ISR
Loitering munition
Anti Air
Mobility
Logistical Support
Tethered drone
Road clearance
Obstacle removal
Waypoint Navigation
Follow me
CASEVAC & last mile resupply

COMMAND AND CONTROL (C2)

C2 FOR AUTONOMOUS SYSTEMS (UXV)

MILREM ROBOTICS' C2 system integrates multiple dissimilar unmanned aerial and ground assets (UxV) into a composite command and control system and merges sensor and effector data from multiple payloads.



C2 MAIN FUNCTIONALITIES

- Direct communication with Unmanned Vehicles (UxV).
- Acquiring and fusing of UxV sensor and effector data.
- Monitoring of UxV most important variables:
  - Energy status.
  - Fault conditions.
  - Operating parameters.
  - Built-in diagnostic tests.
  - Initialisation.
  - Configurations.
- Integrating multiple dissimilar vehicles into a composite C2 system.
- Merging of information from multiple payloads from a wide range of UxVs.
- Respecting the principles of open architectures with compatibility towards a certain number of vehicles and respective payloads on the market.

C2 AUTONOMY ENGINE

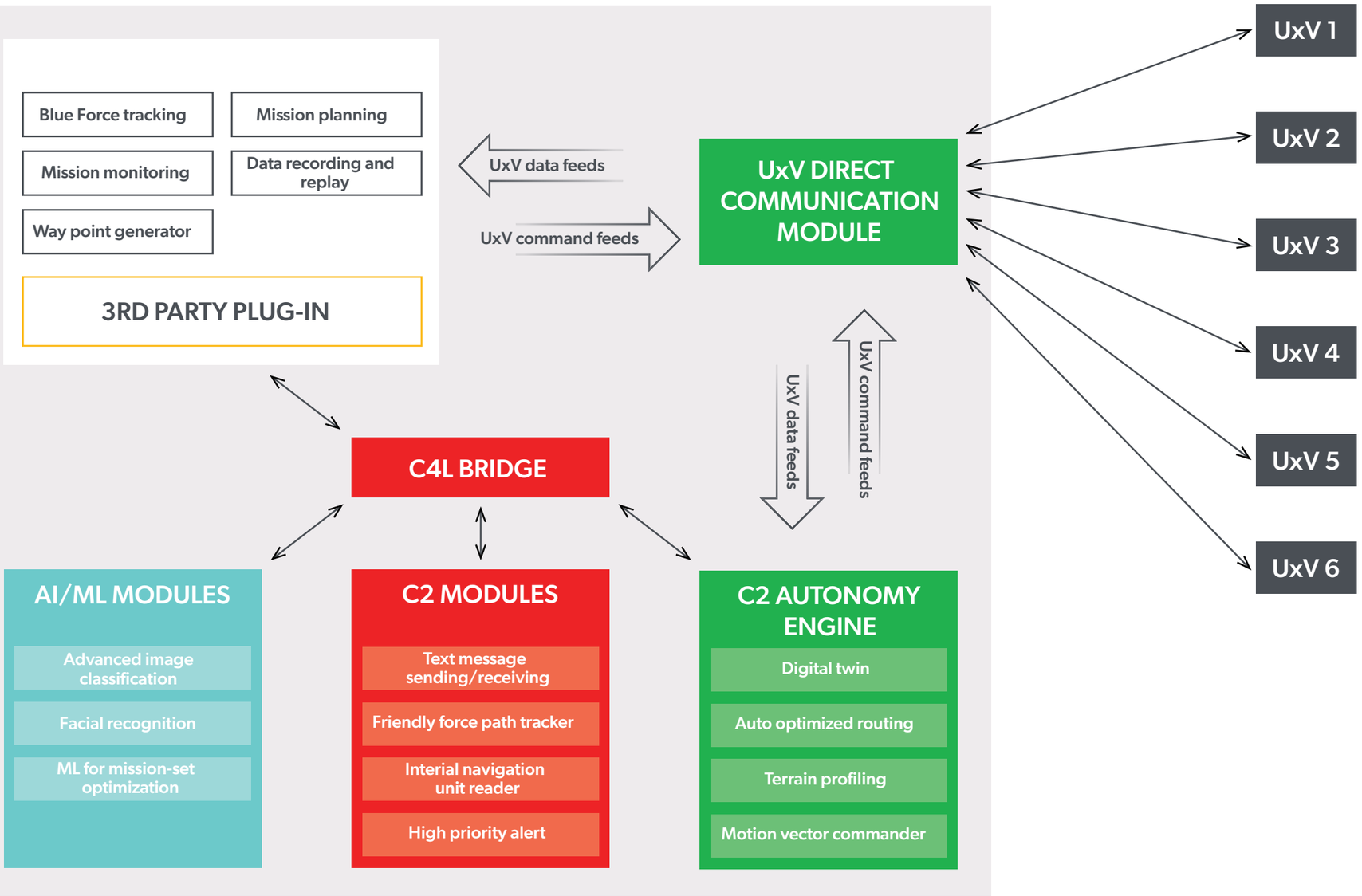
- Capable of remotely navigating and controlling the position and motion vectors of the UxV's and/or other integrated RAS components.
- Supports user-defined autonomous missions and behaviour sets.
- Delivers an ALFUS Contextual Autonomy Capability level of 4+ for the following behaviours related to autonomous navigation:
  - Route planning.
  - Object avoidance.
  - Geo-mapping.
- Provides many autonomous functions:
  - Flight control.
  - ISR missions.
  - Target detection.
  - Automatic optimized routing.
- Autonomously create routes against pre-determined mission sets such as search, intercept, shadow etc, considering the selected vehicles mobility & intelligence characteristics.

COMMAND AND CONTROL (C2)

OPERATIONS ROOM

- Asset 'XYZ' Command and status
- Mission orders and tasking
- Sensor data and video display
- Map and common tactical picture
- Media player and image view

MILREM C2 SYSTEM ARCHITECTURE



HYBRIDIZATION

HYBRID PROPULSION SYSTEMS

MILREM ROBOTICS offers propulsion system hybridization for third party manned and unmanned ground vehicles based on MILREM's serial Hybrid Electrical Drive (HED).

Serial Hybrid Drive topology offers good benefits when loads are intermittent and vary significantly. It allows downsizing of the Internal Combustion Engine (ICE) as traction power peaks no longer is a dimensioning factor. Hence reducing consumption during idling and low load.

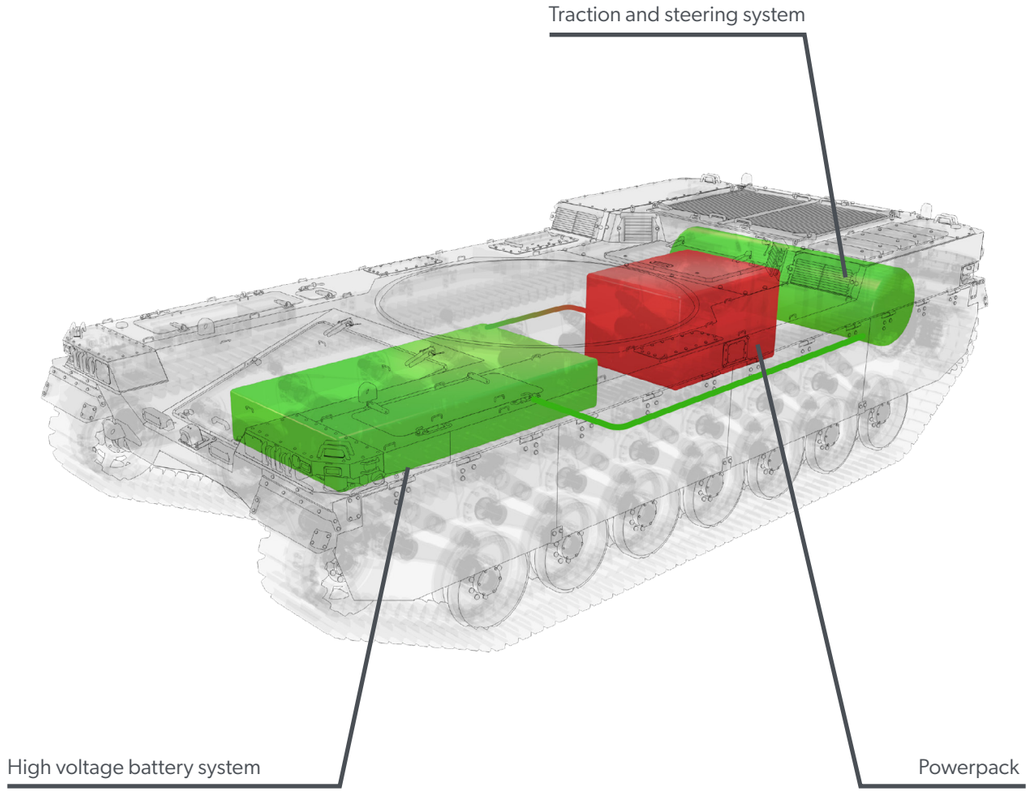
PROS OF SERIAL HYBRID DRIVE:

- ICE can work in most optimum point in terms of efficiency and emissions.
- ICE can be turned off to enable silent drive.
- Nearly ideal torque-speed characteristics of electric motor means less gear sets are necessary.

SERVICES INCLUDED ARE:

- Initial Requirement analysis.
- Component Requirements analysis.
- Initial Volume & Weight assessment.
- Detailed system performance conclusion, proposal and analysis.

HYBRID PROPULSION SYSTEM (TYPE-X EXAMPLE)



MIFIK

THE MILREM INTELLIGENT FUNCTION INTEGRATION KIT (MIFIK)

Milrem's Intelligent Functions (MIFIK) kit adds autonomous operation capabilities to manned and unmanned ground vehicles, including legacy assets. This reduces the cognitive burden on drivers and operators and opens new ways of using ground vehicles to ensure mission success. MIFIK enables combining dissimilar ground assets to operate and perform tasks in a swarm.

WITH MIFIK COMMANDERS CAN SET THEIR VEHICLES TO EXECUTE ON- AND OFF-ROAD MISSIONS INDEPENDENTLY USING WAYPOINT NAVIGATION, INCLUDING:

- Autonomous resupply.
- Perimeter or border patrol.
- Follow mechanized or dismounted units.
- Reconnaissance and intelligence gathering.

MIFIK'S SAFETY IS ENSURED WITH:

- Obstacle detection and avoidance.
- Pre-determined area avoidance.
- Solving "stuck" situations.
- Internal safety and maintenance monitoring.

INTELLIGENT FUNCTIONS ARE SUPPORTED BY:

- An intuitive User Interface.
- 2D/3D mapping.
- Advanced sensor fusion.
- Deep learning algorithms.

MULTISCOPE RESCUE

RESCUE SYSTEMS

MULTISCOPE RESCUE WITH HYDRA
by INNOVFOAM

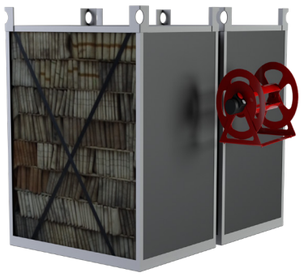
The Multiscope Rescue Systems were designed to provide a durable and flexible platform with rescue-specific plug-and-play payloads for various rescue missions. The modular platform is able to withstand harsh conditions and can go places that are difficult to reach with larger vehicles or too dangerous for firefighters and rescue services. The functionality of the Multiscope can be modified onsite, which widens the use of the platform.

InnoVfoam's modular foam and/or water monitor has a flow rate of 3000 LPM and is fully customizable. The combined system is designed to be used for industrial, warehouse, tunnel and wildfire extinguishing. It has four pressurized water hose lines running behind it to ensure maximum efficiency for extinguishing. The vehicle and fire monitors can be controlled separately, making it a powerful set that works as an extension for firefighters.

NARWHAL
by INNOVFOAM

InnoVfoam's Narwhal fire monitor has a flowrate of 2000 LPM and a maximum throw length of 62 meters. The Narwhal has two fire hose compartments and an additional equipment department.

The skid unit has two sprinklers mounted in front to provide cooling in order to protect the vehicle from high temperatures.



HOSE CARTRIDGE

Intended for laying out long fire hoses in areas that are unreachable with bigger vehicles, the Multiscope Rescue with an integrated hose cartridge helps conserve the time and energy of firefighters.

KX4 TETHERED DRONE
by THREOD SYSTEMS

The multirotor drone is powered directly from the Multiscope and can therefore be used for identifying fire sources and hot spots and/or detecting humans, animals, and toxic substances during longer missions.

SKID UNIT/WATER TANK

Capable of carrying 500 to 800 litres of water, this system is intended for reacting to initial fire starters located in hard-to-reach danger zones. Possible to integrate with fire monitors and CAFS.

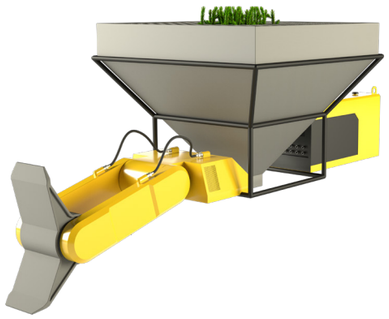
MULTISCOPE FORESTER

ROBOTIC FORESTER SYSTEM

MULTISCOPE FORESTER WITH BRUSH CUTTER

The Robotic Forester is a system designed to automate the most crucial part of forest management – forest regeneration. Specific capabilities include planting, cleaning and pre-commercial thinning. The Robotic Forester Planter saves the planted tree coordinates into a database and when it is time for the cleaning operation, the Robotic Forester brush cutter already knows where the trees are planted and is able to avoid them.

The Robotic Forester Brush cutter was designed to be rugged and long-lasting in challenging environments like clear-cut areas. The system includes the Multiscope platform equipped with a hydraulic power unit (Max. pressure: 250 bar, Oil flow: 70 l/min), brush cutting tool (d < 10 cm) and necessary sensors for tool movement. The same system can be used with other applications for electricity line maintenance, road-side maintenance and so on.



FORESTER PLANTER

The Robotic Forester Planter is based on the Multiscope platform and is equipped with a modular planting payload with a capacity of 380 seedlings. Its planting speed is around 5–6.5 hours per hectare depending on the tree species and terrain. The system is designed for a temperate climate zone.

MULTISCOPE CITY

STREET CLEANING SYSTEMS

MULTISCOPE CITY WITH SNOWSTRIKER 1650-2400 VUTV
by Hilltip

The Multiscope City has been developed for municipal services and can be used for street cleaning, snow plowing, ice management (de-icing/anti-icing) and green area maintenance (mowing, fertilizing, etc.).

The Hilltip Snowstriker 1650-2400 VUTV features a curved, powder-coated snow blade made of high-strength steel with an adjustable cutting edge.

SPRAYSTRIKER 500-2000 DISINFECTION
by Hilltip

The Multiscope City with Hilltip's SprayStriker™ sprayer can be used for disinfection of city centres, shopping malls, buses, and train stations, etc. as well as hard-to-reach areas. The nozzles on the spray bar produces small droplets of less than 140 microns that cover the necessary areas with sufficient disinfectant.

ICESTRIKER TM 550-1100 POLY
by Hilltip

The Hilltip IceStriker™ salt spreader can be used to treat icy roads and walkways. The integrated tank in the double walled hopper body holds up to 450 l of liquid.

PARTNERS

DEFENCE DEVELOPMENT AND MARKETING

apsa a. paukner s.a.
ARQUUS DEFENSE · MOBILITY · SYSTEMS
BSS DEFENCE AND SECURITY SOLUTIONS
CNIM
DIEHL Defence
EM&E ESCRIBANO MECHANICAL & ENGINEERING
EnLog Strategic Services
EOS
FN HERSTAL
GENERAL DYNAMICS European Land Systems
John Cockerill
KMW A COMPANY OF KNDS
KONGSBERG
LEONARDO
LOCKHEED MARTIN
MBDA MISSILE SYSTEMS
MSI MSI-Defence Systems Ltd
nexter A COMPANY OF KNDS
PEARSON ENGINEERING
QINETIQ
Raytheon Technologies
ROBOTICS CENTRE
SAFRAN
SILVUS TECHNOLOGIES
ST Engineering
THALES
THREOD SYSTEMS
UVision Smart Loitering Systems
SAAB

PARTNERS

COMMERCIAL DEVELOPMENT AND MARKETING

graanul invest
Hilltip
INNOVFOAM FOAM FIREFIGHTING INNOVATIONS
TÄNAVAPUHASTUSE AS

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