JOINT CIVIL & DOD CBRN Symposium & Technology Showcase March 11 – 12 2025 / Washington, D.C.

DOK-ING



Presented by: Prof. Zvonko Orehovec, PhD, col (ret) CBRN defense

STRUCTURE OF THE PRESENTATION:



Why is DOK-ING developing UGV's CBRNe?

- a. What is the CBRN threat today?
- b. What is EVZ?
- c. Which is the doctrinal gap according to AJP-3.8 (B)-August 2018?

What is DOK-ING developing?

- a. An approach philosophy: CTC + IFC
- b. UGV MVFD-5
- c. UGV Komodo CBRN
- d. UGV COLDECe
- e. Command & Control CE CCE DFC (C C4ISR CBRNe)

Mission and tasks

- a. What, where, when, and why?
- b. What are the advantages?

INTRODUCTION



The war experience in Ukraine confirms the previous experience of the Homeland War in Croatia

MODERN THREATS:

- Technological disasters
- Modern warfare and weapons like WMDs, drones, high-precision guided missiles
- Industrial facilities, depots and transport as the target of military attacks or terrorism
- CBRNe terrorism
- Hostile environments

CAUSE extreme environmental conditions in which the first response with human teams and crew is limited and even impossible.





WHAT ARE THE NEW CBRNe THREATS?



NUCLEAR WEAPONS	OR/AND	NUCLEAR POWER PLANTS
CHEMICAL WEAPONS	OR/AND	CHEMICAL INDUSTRIES
BIOLOGICAL WEAPONS	OR/AND	BIOLOGICAL PANDEMICS
Warfare CBR Agenst	OR/AND	Toxic Industrial (CBR) Materies
Weapons of Mass Destruction	OR/AND	Weapons of Mass Disruption

WHEN MORE THAN 90 % OF THREATS ARE NOT MILITARY THREATS

THE REALITY



PROBLEMS OF THE CURRENT SOLUTIONS:

- Not able to enter and act in extreme HOT zone (NATO defined HOT as "zone of high risk" further expanded this to EXTREME HOT ZONE)
- Current technological design and choice of sensors, detectors, devices and tools do not offer a comprehensive approach to collecting data on associated CBRN threats

In its Joint Doctrine for the CBRN Defense, NATO emphasizes that CBRN threats pose unique challenges to NATO operations.

AND DEMANDING FAST AND EFFICIENT SOLUTION!

CT & IF CAPABILITIES



A number of CTAs related to emergency response exist, but do not focus on robotics A number of CTAs for futuristic robotic systems exists, but they do not focus on emergency response*

IFAs* provides an understanding of how the proposed robotic tasks may impact the CBRNE response by focusing on the information's path through the system, both how it is used and transformed

- > The CTA identified how the introduction of robots into the CBRNE response will affect the responders' workflow, decision making, and responsibilities.
- The CTA identified what information the robots must acquire; how that information may inform the response system activities; and how human responder roles may change with the introduction of robots.
- The CTA demonstrated the extensive human-centric nature of the current CBRNE response system and how little responders rely on intelligent systems or equipment; thus, incorporating robots will be a fundamental paradigm shift.
- > The identification of bottlenecks is critically important when developing robotic tasks in order to reduce responder workload.
- Teamwork is essential in a CBRNE response and the IFA highlights teamwork as a direct consequence of tying user levels to functions, which is especially useful when identifying how robot-enabled functions may be performed via teamwork.

CURTIS M. HUMPHREY and JULIE A. ADAMS, Department of Electrical Engineering and Computer Science Vanderbilt University, Nashville, TN 37235

DOK-ING UGS > HAZMAT / CBRNe















IF CAPABILITIES

DFC

COLDEC

MVF-5 Firefighting / HAZMAT

UGS CBRNe > MVC-8

UGS CBRNe > MVC-8

UNMANNED TECHNOLOGIES IN DEFENSE AGAINST MODERN CBRN THREATS

MVC-8 KOMODO

NEXT GEN CBRN UNMANNED GROUND SYS

Command & Control

0

Prototyping is in the final stages

Purpose:

 for suction of decontamination solution – emulsion for dry decontamination by vacuuming solid dry aerosols and dust

a unique unmanned ground system that can operate in extreme environmental conditions with chemical, biological, radiological, and nuclear (CBRN) threats.

• Propulsion (hybrid) system: able to operate in extreme conditions such as low oxygen and high temperature

• With passive:

ballistic materials, paints, and coatings, insulating materials, system integration elements resistant to aggressive chemicals,

• and active protection system:

sprinkler system, sensors and detectors, video system, BMS, and control and management hardware and software

• An effectors:

robotic arm and blade & gripper - for performing manual actions in the direction of intervention.

KOMODO CBRNe MISSION TASKS

- Situational awareness mission profile with a wide variety of sensors and detectors and Advanced video system – extended reality
- CBR & TIM decontamination of vertical and horizontal objects, combat and non-combat equipment, as well as partial self-decontamination
- **firefighting tasks** in the direction of intervention under extreme environmental conditions
- combination of simultaneous use of decontamination and firefighting systems in decontamination and firefighting tasks
- Sample collection of vapor, liquid, solid-state and unselected samples

Multipurpose

(for firefighting and civil protection, police, HazMat and CBRNE teams, army) and

OK-ING

Multifunctional •

(for combating CBRN threats and for combating improvised explosive devices and mines, especially those that include RCB charges suspicions).

Modular

with independent tools, accessories, sensors and devices (failure of one component does not affect the operation of others), with the possibility of installing the type, model and manufacturer depending on the wishes of the end user.

- In the zones of primary CBR contamination and zones of high doses of ionizing radiation, high concentrations of warfare agents and biological agents after the use of the CBRN weapons.
- In industrial zones that possess TIM and their warehouses in case of technological accidents or incidents as a result of military and terrorist attacks on said zones.
- In the zones of RCB terrorism or threats thereof, as well as in the zones of conventional terrorism

UGS CBRNe WHERE TO USE IT?

- As a convoy protection system by positioning the RCV-CBRN at the head of the convoy and driving it in front of the convoy in radio range and sending the camera data, sensors, and detectors to TOC in real-time preventing the convoy from entering the CBRN threat zone.
- In maritime, air, and land bases during technical and technological incidents or imminent hostile action.
- In civil, military, and police warehouses of mines and explosives, ammunition, weapons, and equipment, as well as pyrotechnic devices and energy warehouses.
- As well as other situations when the first response members are in danger due to open fire, explosions, collapses and shrapnel threats, high doses and concentrations of RCB agents and TIM, terrorist threats, and the like.

KOMODO CBRNe HOW TO USE IT?

UGS CBRNe HOW TO USE IT?

KOMODO CBRNe HOW TO USE IT?

From the CoC

UGS CBRNe FOR WHAT TO USE IT?

- To removal of physical obstacles and hazardous objects in the lines of action
- For CBRe detection, survey, reconnaissance, medical reconnaissance, monitoring, ambient and spot detection of oxygen, temperature, explosive gases, RC detection
- For sampling for CBRN identification and forensics purposes
- CBR &TIM decontamination and self-decontamination
- Fire extinguishing, prevention of the spread of secondary contamination by neutralizing industrial chemicals and removing the RCB contaminated cloud
- "Real time" collection, processing, and distribution of data to headquarters and command.

UGS CBRNe BENEFITS

- possible because there are no human restrictions on entering the danger zones
- faster during crew preparation for work in NRKB conditions (wearing protective clothing and preparing equipment)
- the possibility of a longer duration because the UGV does not have the time limit that vehicles with human crews have due to wearing protective clothing and equipment
- safer due to the avoidance of direct danger to human crews (from IEN, minefields, high rates of radiation doses and high concentrations of KB agents
- more complete because there is no limiting factor for performing all possible techniques due to human crews
- more versatile due to the use of a wide range of cameras, sensors and detectors with the simultaneous possibility of ambient and point NRKB and IEN and IEN-NRKB detection
- with fewer errors due to cancellation of stress and physical and psychological degradation of personnel
- more efficient due to tools and accessories for removing obstacles in the way of intervention (plow and tongs, firefighting and decontamination system) and prompt reduction or elimination of hazards such as removal of dangerous objects, neutralization and/or immunization of RKB agents, and due to a wide range of different tools for search and research.

UGS CBRNe BENEFITS

- enables the prompt entry into the surveillance zone, which shortens the intervention time and reduces the duration and intensity of the incident
- the workload of the first response members and their psychological and physical degradation, as well as degradation of means and equipment is reduced

OK-ING

- the contamination zone is reduced with the reduction of the duration and intensity of the RCB incident, as well as the need for individual and collective protection, decontamination, relocation of troops and evacuation of civilians, degradation of protective clothing and equipment is reduced
- the number of victims of the incident, the burden on health care and the need to avoid the RCB hazards are reduced
- the logistical burden is reduced
- operational readiness is maintained

JOINT CIVIL & DOD CBRN Symposium & Technology Showcase March 11 – 12 2025 / Washington, D.C.

DOK-ING

Presented by: Prof. Zvonko Orehovec, PhD, col (ret) CBRN defense