Research Program 5/6
Unmanned Mobile Systems

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Unmanned systems will fundamentally change the field in which security forces operate.
There is a wide range of potential applications, extending from information gathering, monitoring, protection, disruption, deception and explosive ordnance disposal to logistic tasks. Unmanned systems significantly reduce the potential risks to which people are exposed and are thus ideally suited to carrying out missions in hostile environments.
The aim of the research program is to safeguard technical and scientific expertise for assessing the operational use of unmanned systems on the ground and in the air. Operational opportunities and risks will also be demonstrated.
Ultimately, the program also aims to support Swiss security policy in matters relating to ethics, international law and arms control in conjunction with unmanned systems.

In recent years, there has been a constant increase in the number of unmanned mobile systems in both the civilian and military spheres. Whereas their widespread use by civilians is currently mainly attributable to leisure applications, unmanned systems have already assumed a key role in the global military environment. Nonetheless, unmanned systems possess a huge potential which has yet to be exploited. It is assumed that the capabilities of security forces can be massively enhanced in almost all areas by employing unmanned systems.
However, the main current application is in the air, mostly in zones used for purely military purposes, and at present virtually every aircraft is remotely-controlled by a pilot specifically assigned to that task.

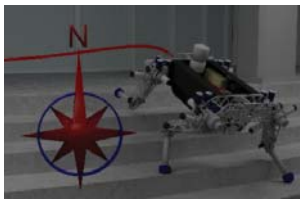
Advances in the areas of sensors, navigation systems, data processing, drive technologies and control engineering will allow unmanned systems to operate largely autonomously, leaving the human operator to concentrate on those tasks for which his abilities are indispensable. In addition, new methods of motion control and large-scale miniaturization will allow reconnaissance of areas which are not accessible with current equipment. An aircraft's agility and responsiveness allows it to penetrate areas which humans cannot because of the limits to their physiological abilities. Examples are high acceleration forces and long-term missions over extended periods of time.

As part of the ‚Unmanned Mobile Systems' research program, expertise will be developed using technology monitoring studies, market analyses, research projects and demonstrators and will be assisted by a multi-lateral collaborative network.

Areas of expertise

Alternative locomotion concepts

Today's robotics are opening up new locomotion concepts that are fundamentally different from the drive technologies employed in classical vehicle construction. New ‚intelligent' mechanical designs and advanced control algorithms are being investigated in order to improve movement behavior and patterns as regards agility, energy efficiency and versatility.

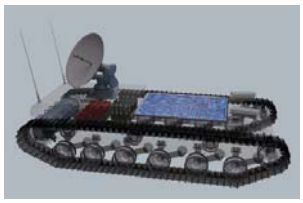


Navigation

Advances in localization, mapping and path planning are needed if unmanned systems are to operate very reliably in unknown challenging areas, largely without human support. The program will examine solutions which will function without external navigation aids (e.g. GPS) and regardless of communication failures.

People, Technology, Environment

Unmanned mobile systems open up major potential benefits but they also pose risks and dangers to humans and the environment. In addition to topics such as intuitive man-machine interfaces and interfaces between machines operating in parallel, studies into protecting humans and the environment against threats from unmanned systems are of vital importance.



Enabling technologies

The development of enabling technologies for sensor systems, drive and control engineering, data processing, energy conversion and storage, and communications will advance unmanned systems significantly. This process will be driven by civilian markets, allowing the relevant components to be adapted to military needs for integrating into an overall system.

Tactical applications

The potential for employing unmanned systems is diverse, extending from intelligence gathering missions (SIGINT, COMINT, RADINT, IMINT, ELINT), surveillance, communication, disruption and deception and explosive ordnance disposal to transporting people and goods. The research program will investigate unarmed applications, mainly in the area of information acquisition and logistics.

Networks

The requisite professional skills build on a broad network of partners from business, universities (including universities of applied science) and other research units in Switzerland and abroad. To ensure that these skills are properly developed, there is close contact and an ongoing exchange of information with users and with planning, procurement and testing units within the DDPS.

State partners / federal government

- TNO, Rijswijk, NL
- WTD-61, WTD 81, Wehrt. Dienststellen, DEU
- U.S. Army Engineering R&D Center, USA
- Defence R&D Canada, CAN
- DDPS
- NATO/PfP STO und MCDC
- ABC-KAMIR Komp Z, Spiez
- Forensic Science Institute Zurich
- armasuisse - Procurement

Universities, universities of applied sciences/industry

- ETH Zurich & Lausanne
- BFH Biel
- University of Zurich
- ZHAW, Winterthur
- RUAG Schweiz AG, Bern
- Airbus Defence & Space, DEU
- Aurora Flight Sciences, USA
- Universität der Bundeswehr, München, DEU
- South-West Research Institute, USA