ACAMS II – An Adaptive Camouflage Soldier System

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ABSTRACT

The ACAMSII (Adaptive Camouflage for the Soldier II) project is implemented under the Preparatory Action on Defence Research (PADR), as a grant for the Research Action call on the topic of Force protection and advanced soldier systems beyond current programmes, on subtopic Adaptive Camouflage. The project led by Totalförsvarets forskningsinstitut (FOI) – Sweden has a consortium that encompasses 6 other participants from 5 countries, namely, CITEVE and DAMEL (Portugal), IOSB (Germany), FTMC (Lithuania), TNO (The Netherlands) and SAFRAN (France).

The project envisages to develop adaptive camouflage for soldier protection in future military conflicts occurring in a multinational context in various environments including dynamic changes. An advanced opponent might operate sensors in several wavelength bands and use sensor data fusion in order to extract further information. This new threat situation creates a strong need for multispectral adaptive camouflage for the soldier.

INTRODUCTION

ACAMSII aims to integrate several active and passive adaptation mechanisms into a textile-based soldier camouflage system. It will address several wavelengths bands, such as visual, near infrared, short wave infrared, thermal infrared and radar. Military needs on sensing, fire power, mobility and endurance are considered.

The reduction in detection range and hence the increase in survivability will be assessed using both well-established methods and new methods to capture the adaptive properties. The dialogue with military end-users will start early in the project to set requirements and continue throughout the project to ensure relevance.

The activities of this project include:

- Survey of present and future advanced threat sensors and sensor systems in military relevant bands of the electromagnetic spectrum (visible, near infrared, short wave infrared, thermal infrared and radar);
- Study of relevant missions for EU military forces;
- Research and development of advanced materials, structures, mechanisms, methods and components for adaptive and passive camouflage;

- Verification of the adaptive camouflage performance by lab measurements;
- Development of a camouflage concept in the lab and validation in a relevant environment;
- Dissemination of the results to a military, academic and industrial audience;
- Exploitation of information to national military equipment procurement agencies and armed forces.

RESULTS AND CONCLUSIONS

The ambition of the project is to reduce the soldier signature and hence increase the survivability and operability. To achieve the goal, specific technologies are applied in the prototypes:

- Adaptation in several wavelengths bands by combining active components in several wavelength ranges;

- Researching combination of IR signature reduction and radar absorption of conductive polymer structures;

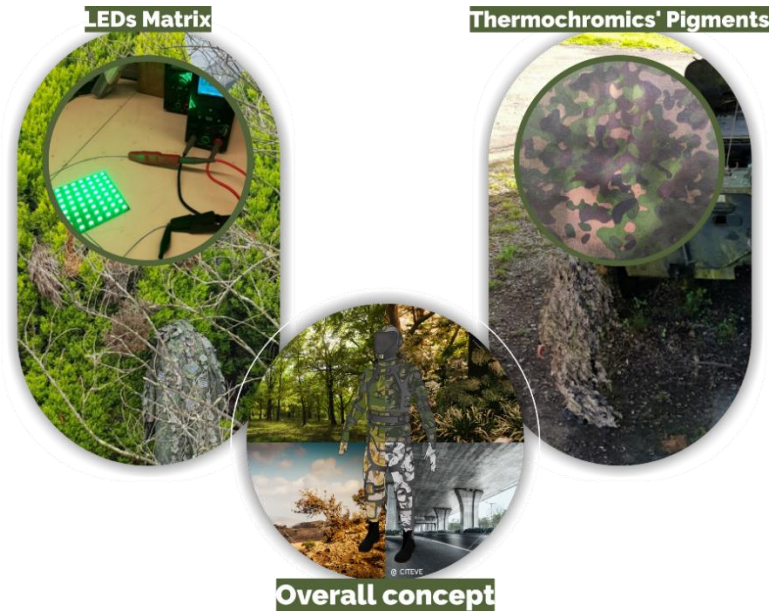
- Integrating VIS and NIR diodes (multiband camouflage) into a clothing system;

- Using a pattern generation algorithm to get adaption to e. g. an urban environment;

- Considering radar camouflage for soldiers, which has not been done before, despite the escalation of battlefield radar employment, usually operating at approximately 8-40 GHz. A threat evaluation of such radar systems will be performed.

From several proposed architecture approaches, two were selected, comprising adaptive camouflage mechanisms, namely thermochromics, LEDs and PCMs, among others to achieve multispectral signature management. A tri-layer system was conceived and is comprised by inner layer (underwear), middle layer (combat uniform) and outer layer (adaptive camouflage system). ACAMSII overall concept in different environments and adaptation mechanisms are presented in Figure 1.

Fig. 1 ACAMSII overall concept in different environments and adaptation mechanisms



Research and development studies were performed using end-users centred design methodology. Several designs were materialized in proofs of concept, where in each iteration feedback from military users (PT army) provided inputs that served as bases for enhancements and improvements towards the final solutions.

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