

Dr. Doina Bein (Computer Science)

Situation Assessment of Cognitive Autonomous Systems

Description:

Situation assessment, as part of fusing the data from different sensors, can be seen as a “snapshot of the present” that needs to be analyzed in order to better prepare for the future. While autonomous decision-making provides a high degree of autonomy, human participation remains an essential element for making critical decisions in a timely manner. This places tremendous demands on human operators, who must make rapid command and control decisions regarding multiple remotely controlled systems, while their emotions greatly affect their cognitive processes. The project deals with the multi-facet aspect of real-time situation assessment using remote wireless sensors to support human operators and autonomous systems tasked with making decisions.

What is expected of the students:

Designing software agents for wearable sensors that make decisions based on previous knowledge and are able to learn from new experiences using cognitive models (inspired from human behavior). The research students will collect data from various types of wearable sensors in various external contexts, analyze the data and compare it with the ground truth to decide its fidelity. Alternatively, use existing models of the environmental conditions that have significant influence over the sensor data and have a periodicity, and derive more complex decision models that are deterministic and consolidate the sensor data from multiple modalities, to overcome possible data shortages. The research students will collect data from various types of external sensors that have orthogonal features to significantly increase the probability of detection with low false alarm rate.