Security and the mind: open research directions

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Abstract:
The emergence of increasingly ubiquitous brain technologies brings to attention their security aspects and applications. At COSIC, we are exploring both the security properties of brain technologies and their potential applications in different areas of security. In this talk we give an overview of our ongoing projects. The main one concerns creating dynamic brainprints for predictive access control to sensitive resources. It is a 3-layered biometric that identifies the person, classifies the mental state and predicts future capacity to make sound decisions. The brainprint can be used in different contexts, monitoring either the individual or the collective mind. We study various types of brainprints, from real movement to mindprints. Adjacently, we have several subprojects in order to better formalize the human mind, reasoning and its fractures. We treat the brain as a computer and reasoning as an individual language similar to a programming language.
Another area of interest is the potential use of non-invasive BCI for advanced interrogation. The projects mentioned so far concern non-invasive BCI. However, we also work on the security of brain implants and neural dust, as well as on the potential of using modulated magnetic fields for physical attacks on brainware. We need to mention our brain-to-brain communications and the simulation of BrainNet. Here, we attempt to create an Internet of Humans, where we study access control in a form of blended consciousness. Finally, we are conducting some work on lightweight cryptography for brain technologies, concept decoding and deriving digital signatures from brain signals.

Short Bio:

Violeta Tulceanu is a researcher in Computer Security and Industrial Cryptography (COSIC). She is a cryptographer, neuroscientist, logician and AI expert whose work revolves around the mind. Violeta is multidisciplinary researcher with experience in both academia and industry.