MSc. thesis topic:

Embedded cyber physical systems with asynchrone communication mechanism

Abstract – Embedded cyber physical systems very often include several geographically separated embedded subsystems, such as smart sensors, smart actuators and coordinator linked through a wireless communication network. Examples of these cyber physical systems are automated irrigation network, smart power grid, fleets of autonomous vehicles, etc. Embedded subsystems in these cyber physical systems must collaborate with each other via constant communication with each other in order to complete a complex task. For reliable real-time communication between distributed embedded subsystems, it is customary to use synchrone communication. That is, the clock of each distributed embedded subsystem (e.g., smart sensors, smart actuators) are frequently syncs with the clock of coordinator; and a specific time slot is allocated to each subsystem for reliable communication with coordinator and other embedded subsystems. Although this synchrone communication mechanism works well for small scale cyber physical systems, for large scale systems it does not work due to large communication delays in exchanging data between distributed embedded sub-systems.

The objective of this MSc. thesis is to find asynchrone communication mechanisms that result in fast and reliable exchange of data in large scale embedded cyber physical systems. Human brain is a natural large scale embedded cyber physical system with asynchrone communication mechanism. By studying human brain, we can find suitable asynchrone mechanisms for man-made embedded cyber physical systems. Conceptual design for the implementation of suitable asynchrone mechanisms using the available information technology infrastructures, such as XBee Digi, LoRa and Sigfox is another objective of this MSc. thesis.