

Artificial systems in multiple diverse fields of applications are evolving from automated to autonomous. Nowadays, there are several points of view on when specific applications will make the leap from semiautonomous to fully autonomous. However, there can be no doubt that industry leaders are working now to bring autonomy to domains ranging from medical to transportation. Typical application areas of autonomous systems include autonomous vehicles, intelligent robots, industrial IoT and autonomous software systems. Automotive manufacturing is a major industry in Europe and autonomous systems are more and more prominent in multiple sectors such as manufacturing, logistics, shipping, mining, and recycling industries. In addition, autonomous software systems are becoming widespread in application areas, such as media, finance, customer service, and healthcare. This course will teach how to understand commonly used (software and hardware) approaches for designing and implementing data driven signal processing modules in real autonomous systems and evaluate their performances and limitations. The course can be considered as a real hands-on experience for the students as it coordinates more lecture-based parts with a continuous practical application of studied concepts on real data and real platforms.

The course is aimed at providing machine learning basic and advanced techniques for data driven signal processing models to be used within autonomous systems design. Specific attention will be devoted to high dimensional data processing on the edge (with real practical examples in Python), showing how deep learning approaches can be adapted and optimized for working with limited computational capabilities.