**ΤΗΛΕΠΙΚΟΙΝΩΝΙΑΚΑ ΣΥΣΤΗΜΑΤΑ ΙΙ**

**Εργασία Έρευνας** 2021

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**3η Εργασία: Blind Modulation Classification**

Modulation classification, recognized as the intermediate step between signal detection and demodulation, is widely deployed in several modern wireless communication systems. It allows blindly identifying the modulation fashion of an incoming radio signal at the receiver, while it is fundamentally regarded as a multi-class decision making task. Accurately classifying advanced modulations under harmful transmission conditions, such as multipath fading and additive noise, remains an open topic which is attracting much interest from signal processing and communication communities [1].

[1] Doan, Van-Sang, et al. "Learning Constellation Map with Deep CNN for Accurate Modulation Recognition." *arXiv preprint arXiv:2009.02026* (2020).

**Tasks**

1. Perform literature review for modulation classification methods. Collect and categorize the existing methods.
2. Generate the following constellations: QPSK, M-PAM, M-QAM, M-APSK, etc. (via simulations in MATLAB). During the dataset generation, the additive white Gaussian noise (AWGN) has to be considered. Various values of the Signal-to-Noise ratio (SNR) should be tested, as described in the paper.
3. Try to apply any of the available methods for the modulation classification task. An example could be the use of clustering techniques.
4. Come up with new modulation classification ideas. We are interested in finding novel methods, which accurately recognize the modulation class, especially in the low-SNR regime. Compare the proposed method with the existing ones, in terms of classification accuracy.