

In this paper the usage of Wireless Sensor Networks (WSN) in smart agriculture applications was analyzed. The main focus of the paper is on the power consumption of the various WSN components, on the both levels, physical and functional. The analysis, from the energy efficiency aspect, includes a comparative review and discussion of the most commonly used protocols on the physical, data link and network layers. The analysis outcome provides a precise identification of the main power consumers, the magnitude of their consumption, and a deep understanding of the key mechanisms that should be applied in order to improve the energy efficiency in a WSN. The analysis also includes simulation of a WSN operation in a smart agriculture application. The simulation scenario and the measured values of the average power consumption and the average time of activity of the radio component of each network node provide a confirmation of the key points of the previously performed analysis and detailed insights into the possible directions of the strategy for energy efficiency improvement. Additionally, the simulation results reveal the magnitude of the energy savings that can be accomplished by deploying the duty cycle mechanisms within the WSNs. Finally, the paper includes a discussion about various factors and the way they impact the level of energy efficiency, which have to be addressed within the requirements gathering, comprehensive analysis and the design phases of a WSN life cycle implementation.