



A 868MHz-based wireless sensor network for ground truthing of soil moisture for a hyperspectral remote sensing campaign - design and preliminary results

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Soil moisture and plant available water are important environmental parameters that affect plant growth and crop yield. Hence, they are significant parameters for vegetation monitoring and precision agriculture.

However, validation through ground-based soil moisture measurements is necessary for accessing soil moisture, plant canopy temperature, soil temperature and soil roughness with airborne hyperspectral imaging systems in a corresponding hyperspectral imaging campaign as a part of the INTERREG IV A-Project SMART INSPECTORS. At this point, commercially available sensors for matric potential, plant available water and volumetric water content are utilized for automated measurements with smart sensor nodes which are developed on the basis of open-source 868MHz radio modules, featuring a full-scale microcontroller unit that allows an autarkic operation of the sensor nodes on batteries in the field. The generated data from each of these sensor nodes is transferred wirelessly with an open-source protocol to a central node, the so-called "gateway". This gateway collects, interprets and buffers the sensor readings and, eventually, pushes the data-time series onto a server-based database. The entire data processing chain from the sensor reading to the final storage of data-time series on a server is realized with open-source hardware and software in such a way that the recorded data can be accessed from anywhere through the internet.

It will be presented how this open-source based wireless sensor network is developed and specified for the application of ground truthing. In addition, the system's perspectives and potentials with respect to usability and applicability for vegetation monitoring and precision agriculture shall be pointed out. Regarding the corresponding hyperspectral imaging campaign, results from ground measurements will be discussed in terms of their contributing aspects to the remote sensing system. Finally, the significance of the wireless sensor network for the application of ground truthing shall be determined.