

Demonstration for hyper-dense meteorological observation using low-cost wireless sensor network

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Recent climate changes can increase severe weather events, such as a heavy rainfall, thunderstorm, and a gusty wind. Techniques for monitoring and predicting those are very important to reduce the hazards in disaster-prone areas. To monitor the local severe weather of several km², however, remains a challenge. Moreover, most of the disaster-prone areas are located at developing countries. Thus, it is needed for a low-cost and hyper-dense meteorological monitoring system at a spatial resolution better than ~250m. Here, we have developed hyper-dense meteorological observation system (50-100m intervals) using low-cost wireless sensor network, demonstrating it for cross-country skiing course. Hyper-dense meteorological observation in the cross-country skiing can help us to select a suitable glide wax, which work as a reduction of the friction between skiing and snow surface. We must select the wax judged from meteorological conditions, such as temperature, humidity, illuminance, etc. in the whole course. We have measured those using the sensor sets of temperature, humidity, and illuminance at ~30 observation points placed on the interval of 50-100m on the actual cross-country skiing course (Hokkaido). Observed meteorological data were recorded by PC through the wireless sensor network (XBee). We have succeeded in multi-point meteorological observation for the actual of cross-country skiing course. This observation system can not only use in developing country to monitor the local severe weather events, but also provide a basic data to forecast those.

Keywords: Wireless sensor network, Hyper-dense meteorological observation, Cross-country skiing