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SensorScope: on-line urban environmental monitoring network

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The SensorScope project (http://sensorscope.epfl.ch) is an interdisciplinary collaborative effort at Ecole Polytechnique Fédérale de Lausanne (EPFL) that aims at better understanding urban atmospheric environment. SensorScope consists of a Wireless Sensor Network (WSN) of 100 nodes (weather stations) deployed at the university campus of EPFL along with deployment of sodar, rass, fast response turbulence sensors and scintillometers. This network measures key environmental quantities at high spatial and time resolution for the purpose of understanding and modeling the influence of ground heterogeneity on meteorological parameters at the local scale.

The primary environmental data are gathered from a complete weather sensing unit specifically developed for the project to meet the following requirements: inexpensive and manageable instruments, simple installation, energy autonomy, high-quality data, water resistant, and data available in real-time.

The sensing unit is centered around a wireless sensor node consisting mainly of a small microprocessor and a radio. Around the core module we have designed a solar energy subsystem, giving the stations energy autonomy for long-term outdoor operation. The weather station can also accommodate seven external sensors, which makes the station capable of measuring nine different data inputs: air temperature and humidity, surface temperature, incoming solar radiation, wind speed and direction, precipitation, soil moisture and pressure at ground level.

The weather stations periodically sample their sensors every 30 seconds and transmit the readings through the network to a central base-station. This base-station collects all the information generated by the network and stores it in a central database. Users can retrieve this information trough the Web server using one of the modules of the SensorScope web page. The are three main modules that allow the user to view, download or plot the available data online.

The data collected from the SensorScope weather stations are currently available online and being used in various atmospheric and environmental modeling projects.