

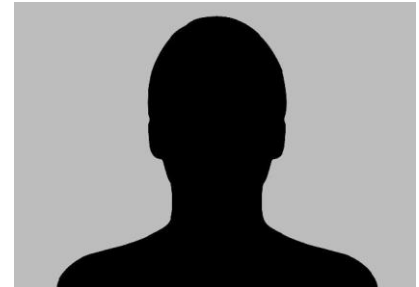
NB-IoT sensor node powered using solar energy

Batteries have a limited life and must be recharged or replaced regularly. Because of these limitations it was essential to find a new solution. With energy harvesting a possible solution was found, which makes it possible to minimize the maintenance effort and thus save costs. With energy harvesting, electrical energy is obtained from the environment, for example with air flow or the help of ambient light. The latter conversion process uses the photovoltaic effect. A further factor is a suitable communication solution that uses as little energy as possible and yet functions reliably.

The only publication available about energy harvesting in combination with narrowband-IoT was from the company u-blox. In that work the goal was to develop a working system that reads sensor data, communicates via NB-IoT to a server and makes the measured data available via a website. The study was not completely successful. For this purpose, a Thingy:91 from Nordic Semiconductor is used, which supports NB-IoT and already has sensors installed. Power measurements should also provide information about the energy requirements of the system.

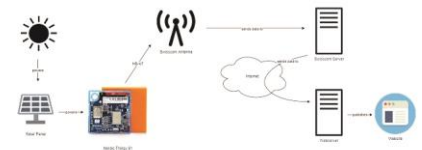
An application was implemented which uses narrowband to transfer the measured data to a server and displays it graphically via a web page. Sensor data is transmitted every 10 minutes. Between the measurements, the Thingy:91 puts itself into energy saving mode.

The energy measurements show promising results that demonstrate that the use of NB-IoT makes sense. The goal to have a functioning system and to make energy measurements from it, was achieved with this work. Future extensions are conceivable, especially in energy saving modes, and additional sensors can be added to the Thingy:91.

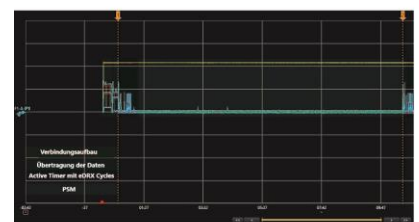


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Setup of the thesis



Measurement of a client using narrowband IoT