PermaSense

LONG LASTING RUNTIME AT VERY LOW TEMPERATURES

PermaSense is a joint research project of the University of Basel, University of Zurich and ETH Zurich to set up a wireless sensor network to measure and monitor steep bedrock permafrost.

For this project a multi sensor interface and communication module was required.

Description
Development of a flexible and ultra-low-power sensor interface board (SIB) based on the Shockfish TinyNode 584, to facilitate the inclusion of a variety of sensors and guarantee stable operation of the sensor nodes.

Challenge
• Run time, from batteries, of over 3 years
• Operating temperature ranges from –40°C to +60°C
• Need for ESD protection for lightning stroke in the vicinity of a sensor node

Solution
Joint development, with the customer, of a detailed requirement specification including a worst-case scenario for all parameters. Design and manufacturing of the device based on the TinyNode module. The only internal power source is a Li/SOCl2 cell.

Advantages
• Sufficient interfaces to attach custom as well as standardized analog and digital sensors
• Additional support for field deployment and for debugging in the lab
• Minimized power-consumption

Device features
• TinyNode 584 module
• System interface board with:
  – Multi-channel AD-converter
  – Environment sensors for temperature and humidity
  – Debugging/Testbed interface
  – UART-based sensor and SDI12 interface
  – Stable sensor power supply under software control
  – Versatile power supply with battery and external feed
  – Precision reference voltage
• Reliable compact enclosure
• Watertight connectors for sensor interface and antenna

Customer
ETH Zurich, Computer Engineering and Networks Laboratory, Zurich, Switzerland
www.tik.ee.ethz.ch

Customer opinion
Working together with Art of Technology has been a success and true pleasure. The professionalism, flexibility and quality standards pursued by AoT make them an optimal partner, even for demanding research projects. The superior function and accuracy of the finished product surpasses even our keenest expectations.

Dr. Jan Beutel,
Senior researcher, group leader wireless sensor networks

Customer specific design

Device features

The sensor deployment site at Matterhorn for studying cryogenic rock movement