Demonstration of a Platform Architecture That Enables Ultra-Low Power IoT Applications

Jacob R. Stevens, Hrishikesh Jayakumar, and Vijay Raghunathan
School of Electrical and Computer Engineering, Purdue University

ABSTRACT

The coming years will see a surge of billions more devices connected in an "Internet of Things" (IoT) that aim to improve the day to day life of humans by sensing relevant physical phenomena and using the data to make intelligent decisions and predictions. But with current devices, this surge will result in billions more batteries needing to be used and changed regularly. The need for batteries—and its impact—can be mitigated through low power devices that harvest ambient energy (e.g. solar, vibrational, thermoelectric, radio wave), but energy harvesting devices require the ability to continue computations across power cycles, a paradigm known as transiently powered computing. The Embedded Systems Lab has designed the QUBE embedded hardware platform to meet this need. The QUBE's capabilities have been demonstrated in the lab, but the QUBE has never been used in a real world application. The QUBE is paired to a smartphone via Bluetooth and data received from its environmental sensors is transmitted in real-time. Power is turned on and off to simulate power cycling.

KEYWORDS

Internet of Things, Embedded Systems, Low Power, Energy Harvesting