# KETCube – the Prototyping and Educational Platform for IoT

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## Abstract

The IoT (Internet of Things) devices continue to penetrate into new areas of our daily lives as well as industry. The evolution of IoT devices comes with the necessity of operation in heterogeneous environments. This evolution brings new challenges in the areas of R&D and education. We identify important features beneficial for R&D engineers as well as for educationalists and students and we propose a novel open platform for rapid development of IoT nodes. This platform is easy to employ in the educational process at the same time.

## 2 Motivation

The continuous and fast movement in the application area stimulates the progress in many fields – IoT LPWAN (Low Power Wide Area Network) standardization efforts [1], infrastructure efforts like LoRaWAN, Sigfox, NB-IoT and many more [1, 2].

As the IoT field in general is very heterogeneous [1], developers of physical devices face many challenges coming from this heterogeneity. An example of a significant challenge for IoT nodes is the (in)ability to gain the profit coming from overlapping networks based on different communication standards [2].

Another challenge coming from the developing area of IoT is connected with the technical education [3]. Educationalists all-around the world face the problem how to introduce students to IoT world without missing any important technology while providing detailed technical insight at the same time.

## 3 KETCube Platform

Based on the IoT design and educational experience of our team, we decided to release our newly developed prototyping and educational platform supporting our R&D process as well as our educational activities under the non-restrictive University of Illinois/NCSA Open Source License [4]. We call our platform KETCube [5]. The name of the platform – KETCube – consists of the abbreviated name of the institution of its origin (Department of Technologies and Measurement, University of West Bohemia in Pilsen) and the shape of the basic sensor node – a cube – see Figure 1.

The current release of the KETCube platform includes the main board, battery board, datasheet, three application notes and firmware (v0.1). All the mentioned project parts allow the out-of-the-box use of KETCube as an Relative Humidity and Temperature sensor node in LoRaWAN or proprietary

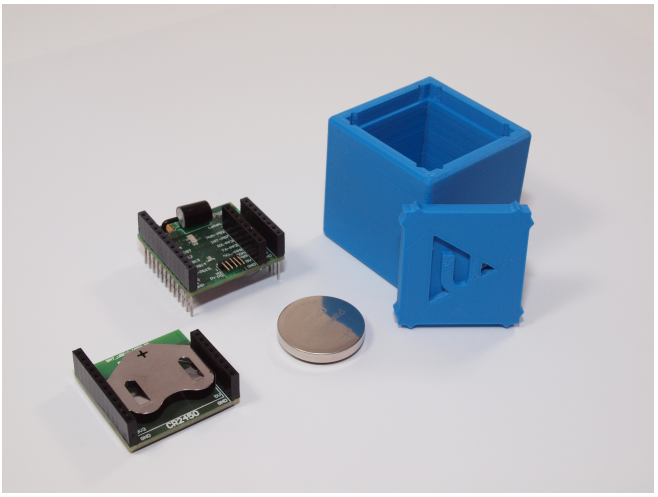

Figure 1: KETCube platform hardware: the main board with a bulk antenna, box, battery board and CR-2450 battery

network. Included documents serve for quick start with prototyping, while providing deep insight to released KETCube parts. Documentation is written in an industry-standard style and such a way serves as a handy guide for in-education deployment at the same time.

The platform has already been used in certain projects and educational activities including the *Object Presence Sensing Demonstrator* and *Enviromental LoRaWAN Sensor Prototype*. Materials related to KETCube are available online on GitHub[1].

## 4 Conclusions

We identified challenges coming from a heterogeneous and fast growing area of IoT related to the sensor node development. Based on our experience in R&D and educational process, we proposed a novel KETCube platform intended to support of both R&D and educational activities.

## References


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[1] `https://github.com/SmartCAMPUSZCU/KETCube-docs`