Bachelor/Master/Diploma Theses

“Internet of Things (IoT)”

The Internet of Things (IoT) is covering a wide range of new applications and has brought many research challenges, especially in the embedded design domain. In CES, we are working on the IoT from different perspectives including efficient embedded hardware and software design, novel computation and communication schemes, hardware prototyping, etc. Our main application is healthcare monitoring (but not restricted to it). Our research currently focuses on these three main topics:

**Design and develop:**
We have designed and developed several IoT-based prototypes for wearable healthcare monitoring applications. These devices capture signals, perform feature extractions, like heart beat detection, and then transmit the compressed data to the smartphone via Bluetooth Low Energy. Some examples:

- **ECG Monitoring device**
- **Smart Shoe Activity Monitor**
- **EEG Monitoring device**

**Embedded Software Applications:**
The captured data from the IoT devices need to be processed. The embedded software shall be developed in C or C++ to be implemented on the microcontroller. The processing is usually involved with basic signal processing operations and machine learning (classification).

**System-level resource management:**
It includes modeling of IoT systems (as IoT edge nodes connected to the gateways), modeling the IoT applications and then proposing efficient methods for Edge Computing, computation offloading and resource allocation. For more details check out our recent papers: [http://ces.itec.kit.edu/21_samie.php](http://ces.itec.kit.edu/21_samie.php)

There are several thesis topics for Bachelor, Master and Diploma students who are interested in one of these domains or have any of these skills:
- C or C++ programming
- Machine learning
- Signal processing
- Microcontrollers
- Verilog/VHDL
- Hardware design and prototyping
- ECG processing
- EEG processing

For more information please contact us:

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[http://ces.itec.kit.edu/24.php#Anker3](http://ces.itec.kit.edu/24.php#Anker3)