

Tutorial: IoT Retrofit

Accompanying material to the tutorial "IoT Retrofit of an old Bosch IXO Screwdriver with an ESP32 Microcontroller"

Link: <https://mschoeffler.com/2021/01/07/tutorial-iot-retrofit-of-an-old-bosch-ixo-screwdriver-with-an-esp32-microcontroller/>

Written Article

- Written article available on my website: <https://mschoeffler.com>
→ <https://mschoeffler.com/2021/01/07/tutorial-iot-retrofit-of-an-old-bosch-ixo-screwdriver-with-an-esp32-microcontroller/>

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Tutorials ESP8266/ESP32 Internet of Things (IoT)

Tutorial | IoT Retrofit of an old Bosch IXO Screwdriver with an ESP32 Microcontroller

January 7, 2021

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Internet of Things (IoT)

- What is **IoT**? (→ the obvious: an abbreviation for **Internet of Things!**)
- **Many definitions** for Internet of Things (IoT) **exist!**
 - Common ground is that IoT is a **network for things**
- **Things** are **physical objects**
 - Examples: cars, washing machines, surveillance cameras, assembly lines or screwdrivers
- **Things** are **communicating** and exchange data over a **network**
 - The network needs not to be the Internet!
 - IoT includes that things communicate over private networks.
- Also **humans are included** in IoT!
 - They can access IoT networks by Human-Machine-Interfaces (HMIs) to exchange data with the connected devices

IoT Requirements

- To take part in IoT applications, things must fulfill some requirements!
 1. Things require a connectivity function to be able to join a network and exchange data with other things
 2. In order to communicate with the other things, they must support a communication protocol that is understood in the network
 - Often, devices support very different protocols (e.g. HTTP/REST, MQTT, AMQP,...)
 - middleware or gateway software is utilized to translate between things within a network
- The majority of “old” devices does not fulfill the requirements!
 - Often, they do not feature any connectivity function at all!
 - For example, the IXO screwdriver has only a button and a switch for humans to interact with it



IoT Retrofit

- **IoT Retrofitting** means to upgrade or enhance “old” devices in order that they fulfill requirements for IoT applications
- Different approaches, e.g.:
 - If the hardware is ready for IoT applications, it might be sufficient to apply a software update → **Software-based IoT Retrofit!**
 - Sometimes, additional hardware must be wired to the device, especially if the device does not have any physical network interface → **Hardware-based IoT Retrofit**
- What needs to be done during a retrofit depends very much on the specific use case
 - There is no standard that describes common requirements on IoT devices
 - Instead, there exist a wide range of different IoT applications with different IoT network infrastructures, IoT protocols, etc.

IoT Application of Tutorial



- A user shall be able to monitor the IXO's states (is running + direction)
 - States are provided by a website
 - Website is served by IXO
 - Website is accessible in a private Wi-Fi network

Learning contents

- Integrate an ESP32 to the IXO
- Reading the states
- Publish a website that presents the states
- Use the existing IXO power source to power the ESP32

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