Bosch BoostYourTools Hackathon

Documentation Group 1

# Idea

The main idea of our project is to upgrade the screw driver with a sensor box, i.e. a small, easy-to-add box including many sensors that can be attached to the screw driver in order to add features. From a commercial point of view, this so-called “boost box” could be sold separately to let the customer decide if they want to upgrade their tool.

With the boost box, a variety of different functions are imaginable, for example the control of the drilling angle, auto torque levelling or the detection of electric wires in the wall. A part of the idea is that the functions do not need to be fixed and could be changed or extended with software updates provided by the manufacturer. In addition, the user should be able to connect their smartphone to the boost box via Bluetooth to get access to even more features, readouts and settings. However, the key functions of the box should be usable without a smartphone.

# Implementation

## Mechanical design

## Sensors and electronics

In our implementation, the boost box contains the following sensors:

* BNO055
  + Accelerometer
  + Gyroscope
  + Absolute orientation sensor based on magnetic field
* Set-up to measure motor voltage
* Set-up to measure motor current
* Set-up to measure if the trigger of the screw driver is pushed

As a microcontroller board, we use the Arduino Nano 33 IoT. Furthermore, the box has a button attached to the outside to enable user inputs. Five LEDs that point to the user, arranged as a cross, are installed to give feedback to the user and a sixth LED serves as a status indicator.

In addition, the electronics of the screw driver was changed in order to enable the Arduino to control the motor’s speed. In detail, a MOSFET was added between the motor and the trigger.

In the following, the schematics of the different set-ups and how the sensors are connected are shown and described.

BNO055

This 9-axis acceleration and orientation sensor was

## Software for the Arduino

## Software for Android

# Structure