

EBEC 2017 – FIT

Augmented reality (AR) has an enormous potential in industry; it can help to guide the users through complex procedures (e.g. installation, assembly, or repair) by highlighting and animating proper components; help them locate another person or tool; or turn their world into an interactive board, just to name a few.

To achieve this, an AR application needs to be aware of its surroundings. This is usually done by using a camera and computer vision algorithms. However, there are many limitations such as complex 3D shapes of components or poor lighting conditions. It may be interesting to look for a different approach that does not rely on computer vision. This is what you will be doing today.

Your task is to create an Android application that will use smartphone internal sensors (any sensors except GPS) and location information from 8 Bluetooth beacons to determine its position and orientation in space. Then, based on this information, the application will augment live video stream from camera with the messages being streamed from the beacons. In the video stream, this information will be attached to each beacon visible in the video stream; the precision of alignment will be the main evaluation criterion.

Each Bluetooth beacon implements an adjusted iBeacon protocol:

```
Byte 3: Length: 0x1a
Byte 4: Type: 0xff (Custom Manufacturer Packet)
Byte 5-6: Manufacturer ID : 0x4c00 (Apple)
Byte 7: SubType: 0x2 (iBeacon)
Byte 8: SubType Length: 0x15
Byte 9-24: Proximity UUID
Byte 25-26: Major
Byte 27-28: Minor
Byte 29: Signal Power
```

Important part of the message is **Proximity UUID** which continuously (approx. each second) streams the message in format **[XX,YY]MSG**, where **[XX,YY]** is the beacons relative position in meters from Beacon 1. This position is fixed for each beacon.

Please note, that this message not the standard iBeacon message, therefore additional information such as Major, Minor, or Signal Power are not being used.

Happy coding! ☺

Evaluation criteria:

Every team can get up to 100 points in the following sub criteria:

- Precision of augmenting the additional information to real world (40 points)
- Graphical User Interface and overall user experience (30 points)
- Innovatory approach and functionality (30 points)