4. 10 Signal chane sensitivity

BLE technology, when used for IPS is sensitive on the changing radio conditions. Just the presence of humans in the room can change drastically the signal perception in different positions in the room. For this reason to obtain good localization and signal perception when installing the beacons the line of sight is sought when possible between the receiver and the beacon, typically placing the beacons above head height (Steczkiewicz, 2015).

Various surfaces can cause interference with Bluetooth signals, including glass and metal. Additional beacons can be used to counter any interference in the room (Estimote, 2017).

Wi-fi signal can also be blocked by household electronics, bluetooth devices, physical barriers or humans (Bertolucci, 2011).

Indoor magnetic field contains location information but this information is interfered in by hard/soft-iron effect, hand quiver, and electronic noise. These interferences decrease the distinguishability of location fingerprints in magnetic field based localization systems (Wenhua Shao et al., 2016.)

VLC technology is sensitive in a sense that everything that interferes with visual line of sight of LED light is directly interfering in functioning of the indoor positioning technology.

5. DISCUSSION OF THE ANALYSIS RESULTS

Table 1 shows aggregated data of the analysis of the technologies for IPS.

Table 1. Technologies and their features

	BLE	Wi-Fi	Magnetic	VLC
Location precision	2 m	5 m	2 m	**5 cm**
Battery life	5-8 years	**No**	**No**	5,7 years/0-24h
Maintenance	average	average	**Easy**	**Easy**
Safety	**high****	average	**High**	**High**
Installation costs	Average	High	**Low**	Average
Mapping method	Device management	Mapping/ fingerprinting	**Environment**	Mapping
Programming environment	**Android/iOS**	Android*	**Android/iOS**	**Android/iOS**
Push notifications	**Supported**	Not supported	Not supported	Not supported
Blue dot navigation	**Supported**	**Supported**	**Supported**	**Supported**
Signal change sensitivity	**Sensitive**	**Sensitive**	**Sensitive**	**Sensitive**

*iOS does not support Wi-Fi scanning

**Technology features with an advantage in relation to another under a certain entry are marked in bold

Source: authors

The precision of locating is highest when it comes to VLC technology with accuracy of 5 cm.