ICT PHD

Research project for a PhD curriculum in ICT - Industrial Applications of ICT

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Proposed Title of the research:
Use of LoRaWAN and ultrawideband technologies for precise localization applications

Keywords: (5)
LoRa, Ultrawideband, Localization

Research objectives: --(max 10 rows)

The proposed research project aims at developing new techniques, based on the joint use of Long Range (LoRa) and ultrawideband radio technologies, for locating and tracking people inside buildings. It is known that LoRa technology allows to locate goods over large distances with a small infrastructure and at low costs; ultrawideband technology, on the other hand, can be used to achieve extremely precise localization inside buildings, but over smaller distances. The activities envisaged in the research project aim at studying how the aforementioned technologies can be integrated to develop a system for the precise localization of people working in industrial environments. The information acquired by the localization system will be exploited to limit the risks that may arise in performing work activities, thus improving safety in workplaces.

Proposed research activity -- (max 10 rows)
This research project is motivated by the interest in the development of new embedded micro-systems equipped with dual radio technology (ultrawideband and LoRa) and which can be used both as localization anchors and as nodes for environmental sensing. These systems should be able to localize multiple people operating in industrial environments and operate with low energy consumption, being intended for the mass market. The PhD student will spend one year in the Telecommunications Laboratory of the Department of Engineering “Enzo Ferrari” (DIEF). During this period, he will focus his attention on state-of-the-art localization techniques based on ultrawideband technology and on the potential offered using LoRa technology in localization. He will spend the remaining period in the Embit research laboratories (18 months) to carry out experimental activities and at a prestigious foreign university, where he/she will be able to deepen the study of localization techniques.

Supporting research projects (and Department)
This research activity is partially funded by the Italian Government (Ministerial Decree n. 352 of 09/04/2022).

Possible connections with research groups, companies, universities.

The research work will be accomplished in close cooperation with the company Embit (https://www.embit.eu). The involved PhD student will be allowed to spend 6 months in a prestigious foreign university.

(*) optional
(**) optional/to be completed on the second year