ARTIFICIAL INTELLIGENCE

DM 351 PRNN - AI for the development of medical devices for telemedicine applications

Funded By

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Context of the research activity

The research will focus on the development of a digital twin that associated with a telemedicine platform will be able to support patient, caregivers and medical staff. The application is intended for patients that are inserted in a home care clinical pathway. It will be validated by means of a clinical trial.

Objectives

The pandemic has accelerated the use of medical devices integrated with telemedicine technology in the clinical processes. Companies are expanding the functionalities of their basic products developing AI based applications to deal with the increased amount of available data for both medical staff and patients. The translation of keywords like patient empowerment, digital twins, clinical decision aid systems … from research to products is becoming a reality.

The applications are for elderly or fragile people that need a continuous monitoring the evolution of their pathologies for an early detection of changes that can lead to a worsening of the patient clinical status.

Through the use of telemedicine platform for tele-monitoring it is possible to acquire physiological signals from different sensors and data entered by the patients or their caregivers. The natural evolution is this type of products is to integrate them with intelligent systems able to extract information from the data.

The research will be conducted in cooperation with a company that sells a tele-monitoring platform. It will consist in the development of a digital twin that associate with the platform will be able to support patient, caregivers and medical staff.

The goals are to develop a system that:

a) analyzes the collected data daily; it will generate different kind of alarm if it detects changes in the patient clinical status

b) summarizes the data to produce information for specialist visits
c) allows the patient and/or the caregiver to actively interact with the medical staff
d) allows the medical team (general practitioner, specialists, home care
Because of studies previously conducted by our research group (a device for the early detection of heart failure, a device for human activities recognition, ...) the research will focus on cardiologic and neurologic patients. The research steps are:
1) to study the existing clinical pathways (available guidelines, interview with healthcare workers, ...); the results will be used to model the home care clinical processes associated with this kind of patients
2) to define the requirements describing the system components
3) system development
4) to start a clinical trial to demonstrate the efficacy of the system

Skills and competencies for the development of the activity

The candidate must have a Laurea magistrale in Ingegneria biomedica or equivalent. Competences on artificial intelligence (machine learning) are mandatory. Competences on telemedicine are welcomed.