DST Woman Scientist Scheme (DST-WOS-A)
Title: Project title: "Self-enabled monitoring of hypertension towards low cost digital Healthcare",
Duration: 2020-2023
Approval sanction No: SR/WOS-A/ET-67/2018 dtd: 08-08-2019
Sanctioned Amount: INR 23.83 lakhs (approx.)
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Mentor of the project: Dr. Rajarshi Gupta

Summary/ background:

Hypertension is a major cardiovascular risk factor with a high prevalence in many countries. As per World Health Organization (WHO) statistics, one in every three adults suffers from high blood pressure (BP) or hypertension in South-East Asia Region. In India, it is one of the most common causes of medical consultation with a clinician. Conventional BP measurement methods suffer from limitations like discrete in nature and the discomfort caused by the cuff inflations. Ambulatory BP monitors, using oscillometric principle also require periodic calibration.

The proposed research work is aimed to develop an automatic non-invasive system to compute the human blood pressure in a non-invasive manner from the finger PPG signal. The project component consists of establishment of an empirical model, its validation with various categories of cardiovascular patients, and hardware implementation. The present research proposes a multi-agent stochastic algorithm based systolic BP and diastolic BP measurement scheme. As PPG signals are prone to corruption by motion artifacts (MA), the first stage of signal processing will involve MA reduction using an adaptive computational intelligence technique. The next step will be to deduce an exhaustive feature set (time, frequency, transform domain) and selecting the optimum set of features and their contribution towards the BP. So, a feature selection (and elimination) and ranking technique are to be utilized. Next part is to derive the BP measurement model (an empirical relation) after selection of appropriate features from the ECG and /or PPG. As the whole scheme is intended for the personalized health care, periodic calibration of the model will be required. Once BP computing model is established and validated using a number of patients through offline data acquisition, the same will be embedded in a portable device so that an autonomous system can be developed.

Over the last few decades, there is a gradual tendency of a common person to pay attention to his own health for enjoying a good quality of life. Among the different initiatives taken by 'Digital India', the scope of '*e-Health India*' is to make all medical facilities available all the time from any part of country through electronic communication. With more than 1.3 billion Indian population with poor doctor-to-patient ratio, use of portable healthcare devices to enable self-monitoring can reduce frequent clinic visits and prevent sudden cardiac illness due to hypertension.