2025 START Program
CFP Brief

THEME: **02. Digital Health**

SUB-THEME: **2.2 Population health-based biomarker discovery**

Context/ Overview

This call for proposal (CFP) seeks research proposals focusing on the use of wearable data from a large population of users that can be used to detect when a person has an illness or acute medical condition. Wearables continue to grow in ubiquity, yet their potential remains underutilized. These devices, being closely integrated into users' lives, offer a unique opportunity to passively monitor chronic health conditions and prompt users to take preventative actions. A wide range of health problems occur in the general population that may benefit from personalized biomarkers, yet one of the primary challenges in biomarker development for identifying rare health challenges is the problem of scale. Low incidence events, especially when combined with high burden of disease, present a unique biomarker development challenge. Detecting low incidence rate events can lead to an unacceptable number of false positives, which requires unique algorithm and user experience solutions.

Problem Statement

Low incidence and high morbidity health events, like illness or cardiac arrest, frequently coincide with physiological changes that are can be identified using wearable devices. These physical ailments often lead to signs of strain in the body that can lead to changes in body temperature, heart rate, respiration, and sleep or activity patterns. However, the low frequency of these events at a population level present challenges in algorithm development. Datasets of wearable data from sufficiently large populations may allow for accurate algorithm development and ultimately lead to dramatic improvements in health outcomes.

Objectives & Scope

The objective of the proposed research is to develop algorithms and solutions for passive population-level detection of adverse health events using wearables. This system should be personalized for each user, while also preserving their privacy to encourage user engagement. Proposals should include studies to collect datasets of wearable data from large numbers of individuals and associated illness events.

Specific Topics & focus areas *

This call invites research proposals in this field, using smartwatches, earbuds, smart rings, or mobile phones with potential topics including but not limited to:

1. Detection of asymptomatic or presymptomatic illness in an individual within a large population[1]
2. Detecting high mortality conditions in the general population such as cardiac arrest or loss of pulse[2]
3. Development of digital biomarkers for acute clinical deterioration such as narcotic overdose detection

※ The topics are not limited to the above examples and the participants are encouraged to propose other original ideas.

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