

# Systems and Methods for Determining a Cardiovascular Condition of a Subject

**R**esearchers at the University of South Florida have developed a novel Wearable nano-fiber embedded ECGI smart shirt for the diagnostics of cardiovascular diseases.

Heart disease is the No. 1 cause of death in the world. Cardiac disorders often happen in daily life, and account for some 30% of mortalities in the US. However, state-of-the-art medical devices usually fail to prevent life-threatening acute cardiac events (e.g., heart attacks). This is mainly because embedded computing, sensing, modeling, and communications are not adequately integrated with physiological processes to achieve medical cyber-physical systems with high levels of functionality, adaptability, autonomy and effectiveness.

The novel telemedicine monitoring technology developed at USF captures critical spatiotemporal heart dynamics utilizing a wearable cardiac Electrocardiographic imaging (ECGI) system that is real-time, low-cost, and provides high-quality data and advanced analytical tools for improving telemedicine-based health outcomes.

The wearable ECGI system is composed of a network of soft nano-textile ECG sensors in clothing and a wireless data acquisition device for collecting high resolution physiological signals and transmitting them to a smart phone. Software algorithms receive and process the wireless physiological signals. A management level decision support system consisting of medical personnel, a data server, a computing server, and historical databases analyze the signals. Computing servers perform long-term cardiac trend analysis and integrate prior knowledge from historical databases to provide the medical decision support. In this framework, the user's smart phone receives prompt feedback of cardiac risk information.

This technology is applicable to the cardiovascular device industry.

### ADVANTAGES:

- High resolution remote monitoring
- Wearable and comfortable
- Direct wireless communication with user

### Telemedicine Monitoring System

