

Keep the Stress Away With SoDA: Stress Detection and Alleviation System

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Technology description

Researchers at Princeton University in the Department of Electrical Engineering have developed a new system to detect and alleviate stress in a continuous, adaptive, and user-transparent manner, i.e., without the need for user intervention.

The system is an automatic stress detection and alleviation system called SoDA that provides immediate and precise stress detection with user-specific and adaptive feature selection mechanisms. SoDA takes advantage of emerging wearable medical sensors (WMSs), specifically, electrocardiogram, galvanic skin response, respiration rate, blood pressure, and blood oximeter, to continuously monitor human stress levels and mitigate stress as it arises in an adaptive manner based on the stress response of the user. In addition, the system is flexible enough to easily incorporate other WMSs when they become available and can be used as an application in smartphones, tablets, smartwatches, fitness trackers, etc.

Additionally, the invention is the first stress analysis/mitigation system that offers two options to the user: 'generalized' and 'individualized'. In the 'generalized' model, the system detects and alleviates stress by using a pre-designed stress model based on data obtained from a population of individuals. The 'individualized' model is designed based on the individual's stress response. The 'generalized' model becomes active just after turning on the system, whereas the 'individualized' model requires training data from the user for modeling purposes.

The research interests of the Jha lab include power- and temperature-aware chip multiprocessor (CMP) and multiprocessor system-on-chip (MPSoC) design, design algorithms and tools for FinFETs, three-dimensional integrated circuit (3D IC) design, embedded system analysis and design, field-programmable gate arrays (FPGAs), digital system testing, computer security, quantum circuit design, and energy-efficient buildings.

Application area

- A stress detection and alleviation system for
 - o Personal use
 - o Therapeutic use
- A diagnosis and follow-up system for other physiological conditions

- Telemedicine systems
- Personal wellness application in smart devices

Advantages

- Continuous and user-transparent system
- User-specific and adaptive
- Early detection and treatment of stress
- Faster intervention
- Improved doctor-patient communication
- Adaptable to new WMSs

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