FACULTY MENTOR
Garudadri, Harinath

PROJECT TITLE
Multisensory stimulus to promote executive function and motor competence
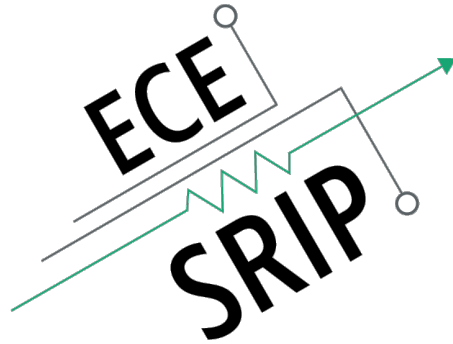
PROJECT DESCRIPTION
There is emerging evidence that simultaneously combining physical activities (aerobics, dancing, etc.) with cognitive tasks (e.g. musical performance) leverages neuroplasticity and results in greater benefits than either of them alone, in improving cognitive and memory functioning and preventing dementia in older adults [1-4]. We implemented a prototype system called Odoroki (a portmanteau for Japanese Odoru=Dance and Okesutora=Orchestra), which engages the visual, vestibular, proprioception, motor, and auditory systems of an individual or small group of users in simultaneous physical and mental activity. The system presents visual cues for a "dance" synchronized to a MIDI track of familiar music. Based on these cues and their short-term memory of the music, the users move their bodies to follow the dance, and receive real-time visual and auditory feedback. The system also generates objective scores corresponding to the users' competence; the difficulty of the activity can be adjusted based on the complexity of the dance and with parameters such as the latency between visual stimuli and auditory feedback. We are requesting SRIP support to (i) improve visual sensing multi user movements in the visual field, (ii) perform a qualitative and quantitative assessment of the system and (iii) create preliminary evidence in support of a larger grant for healthy aging and/or rehabilitation for neuromuscular disorders.

INTERNS NEEDED
1 MS and 2 BS students

PREREQUISITES
Mastery in C, C++, MATLAB, Linux is must. Interest and relevant courses in computer vision, image processing and machine learning is bonus.

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PROJECT TITLE
High density, high resolution, wireless wearable EEG

PROJECT DESCRIPTION
We are developing a multi channel (16, 32, 64) wearable EEG system with applications in sports concussion, epilepsy detection and cognitive disorders. The design for active electrodes and gateway are ready. You will be assisting in electrode interface, system integration and prototype development.

INTERNS NEEDED
2 MS or 1 MS and 1 BS student

PREREQUISITES
C, Matlab and knowledge of embedded software (Raspberry Pi or Arduino or realtime data acquisition) are must. One or more of Signal processing, TCP/IP and sockets programming, and Graphical user interface for realtime displays is bonus.