

Collaborative Research: CPS: Medium:

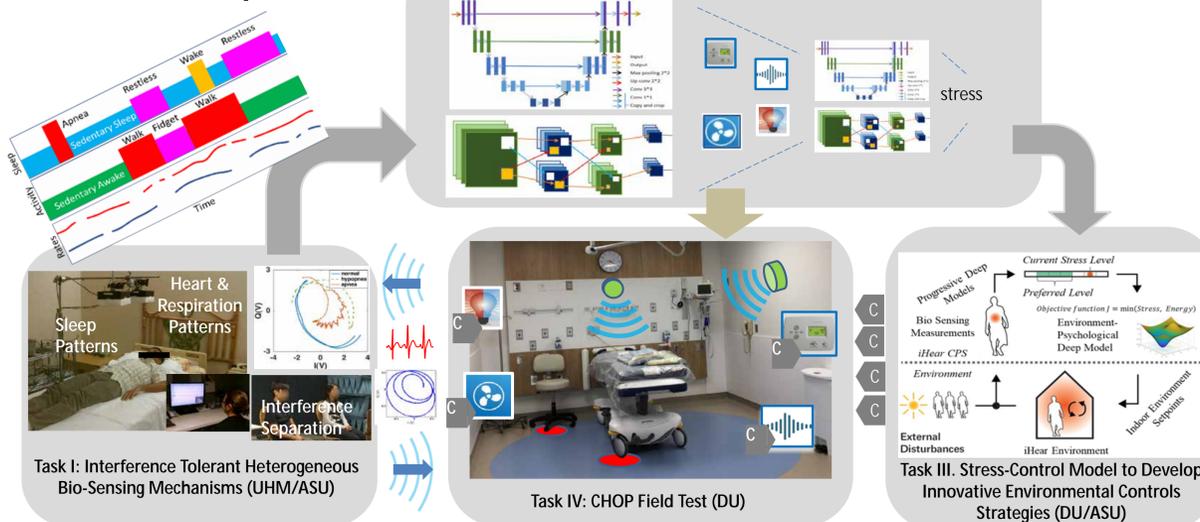
i-HEAR: immersive Human-On-the-Loop Environmental Adaptation for Stress Reduction

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Challenge:

- How might indoor environmental quality (IEQ) reduce stress and anxiety?
- Can we design personalized, responsive, and adaptive hospital rooms that mitigate patient stress?

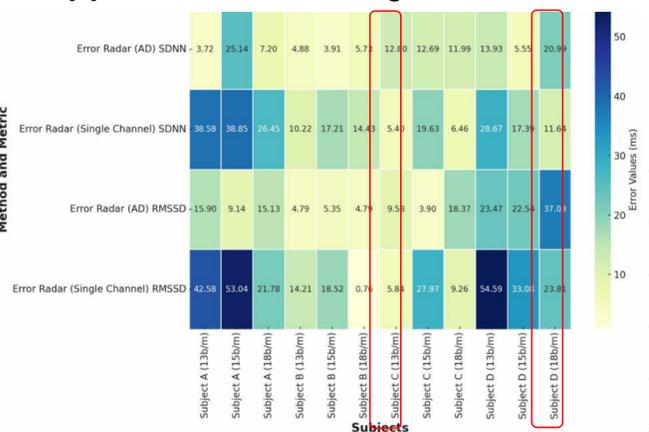
i-HEAR Concept



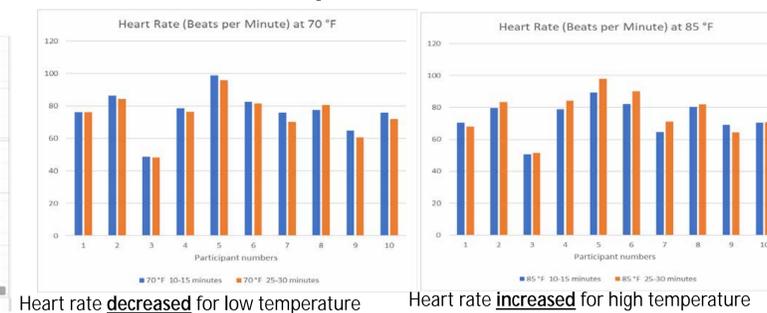
Scientific Impact:

- Heterogeneous biosensing and data analytics for real-time control
- Human centric stress/IEQ model
- Immersive, responsive environments

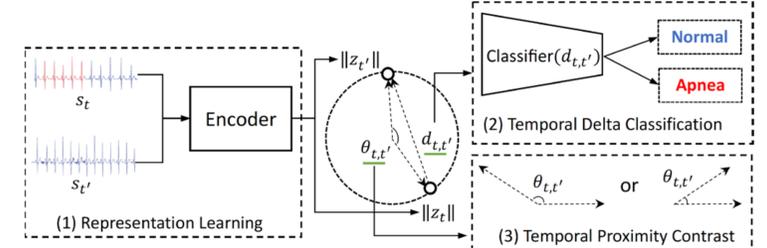
Doppler Radar HRV Algorithm Results



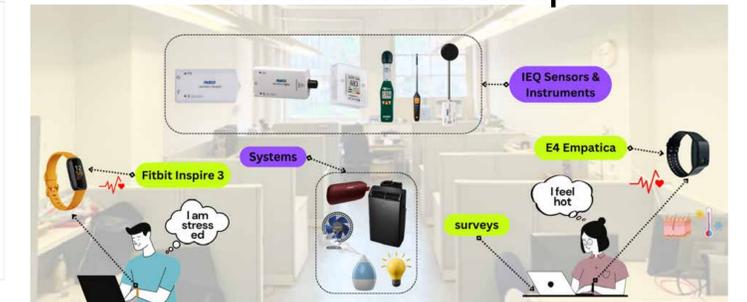
Non-contact Human Thermal Adaptation Assessment



Progressive Deep-Model Development



Cross-Modal Test Setup



Key Innovations:

- Algorithm development for heart rate variability (HRV) analysis

- Progressive deep-model development for stress assessment

New Contributions:

- Non-invasive human thermal adaptation assessment

- Cross-modal testing assessing IEQ impacts on occupant comfort and stress levels

Broader Impact: Society

- Innovative tools for human-centric design
- Wellness and performance in any built environment
- Sensing, modeling, and control strategies applicable to smart manufacturing and transportation

Broader Impact: Outreach/Education

- Range of graduate and undergraduate students
- Undergraduate capstone projects
- K-12 IEQ online competition

Broader Impact: Quantified

- Improved patient satisfaction
- Reduced hospital stays
- Reduced energy consumption