

Skin-like, Soft Patch for Continuous Cognitive Stress Monitoring

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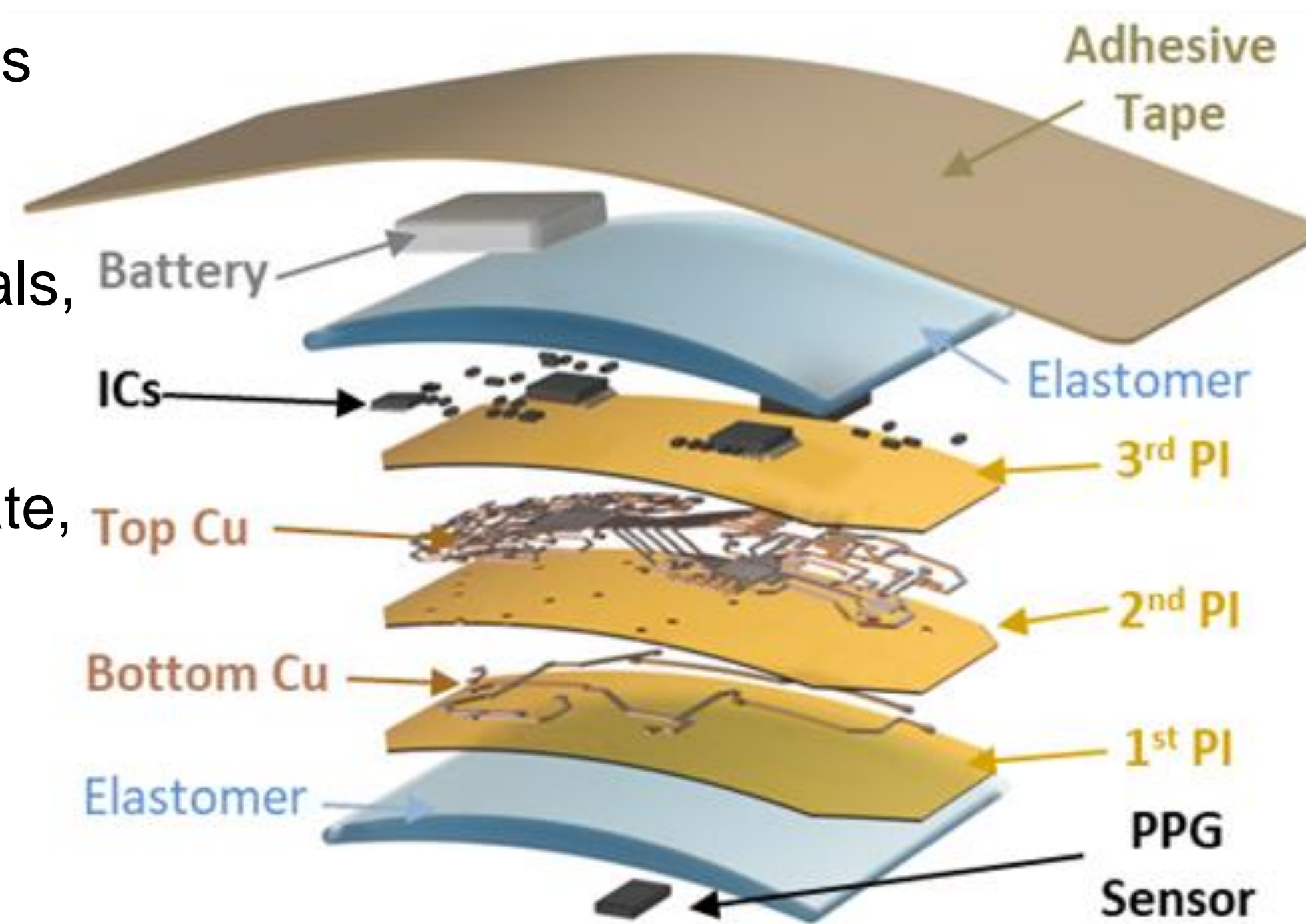
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Motivation

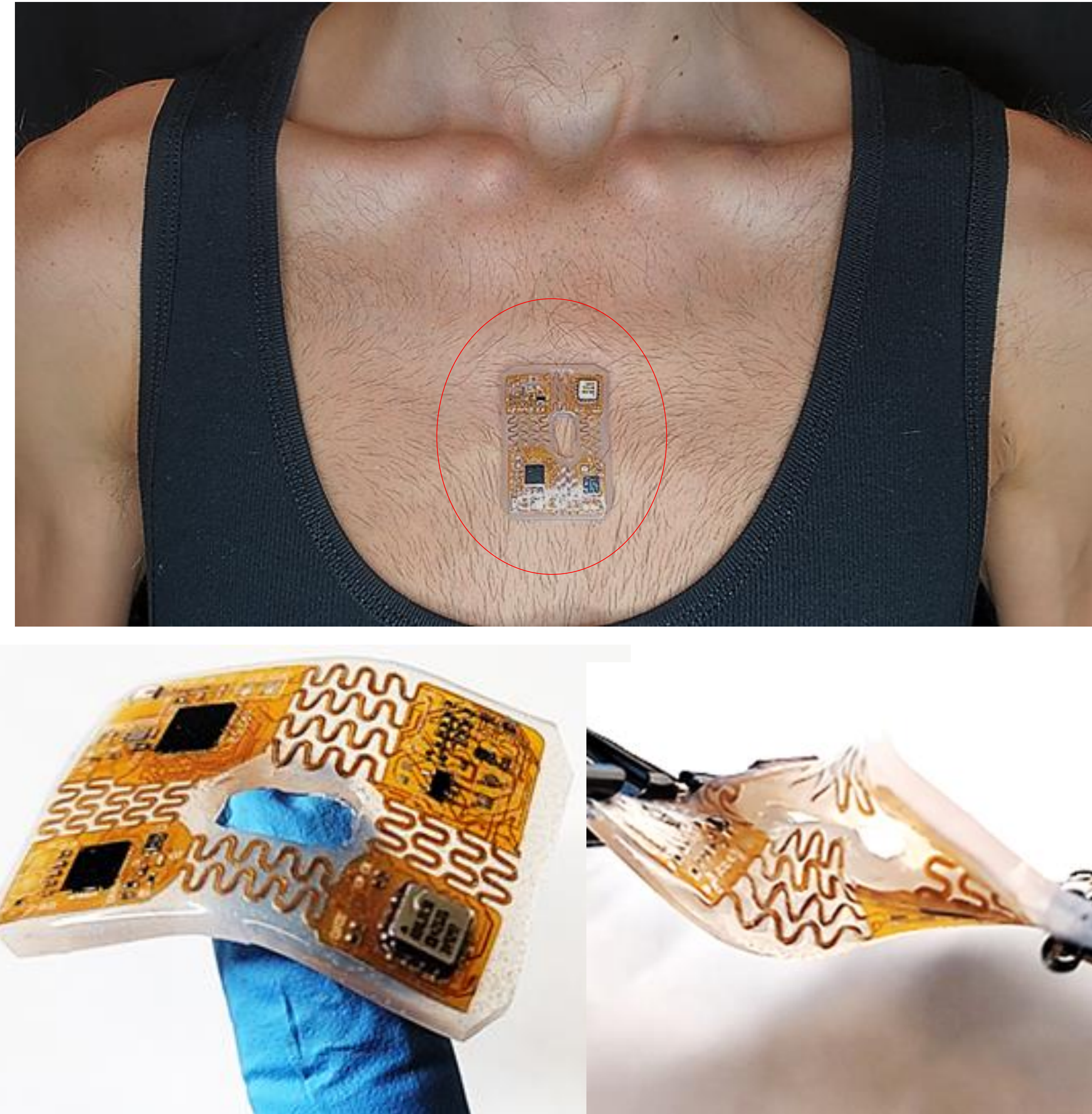
- There is no objective, clinically accepted method for quantitatively measuring cognitive stress and sympathetic nervous state.
- Qualitative surveys are neither objective (high interpatient response variability) nor practical (ill-suited for dementia patients, those with mental illness, and continuous monitoring).
- New insights into cardiac mechanics may provide a solution.

Methods

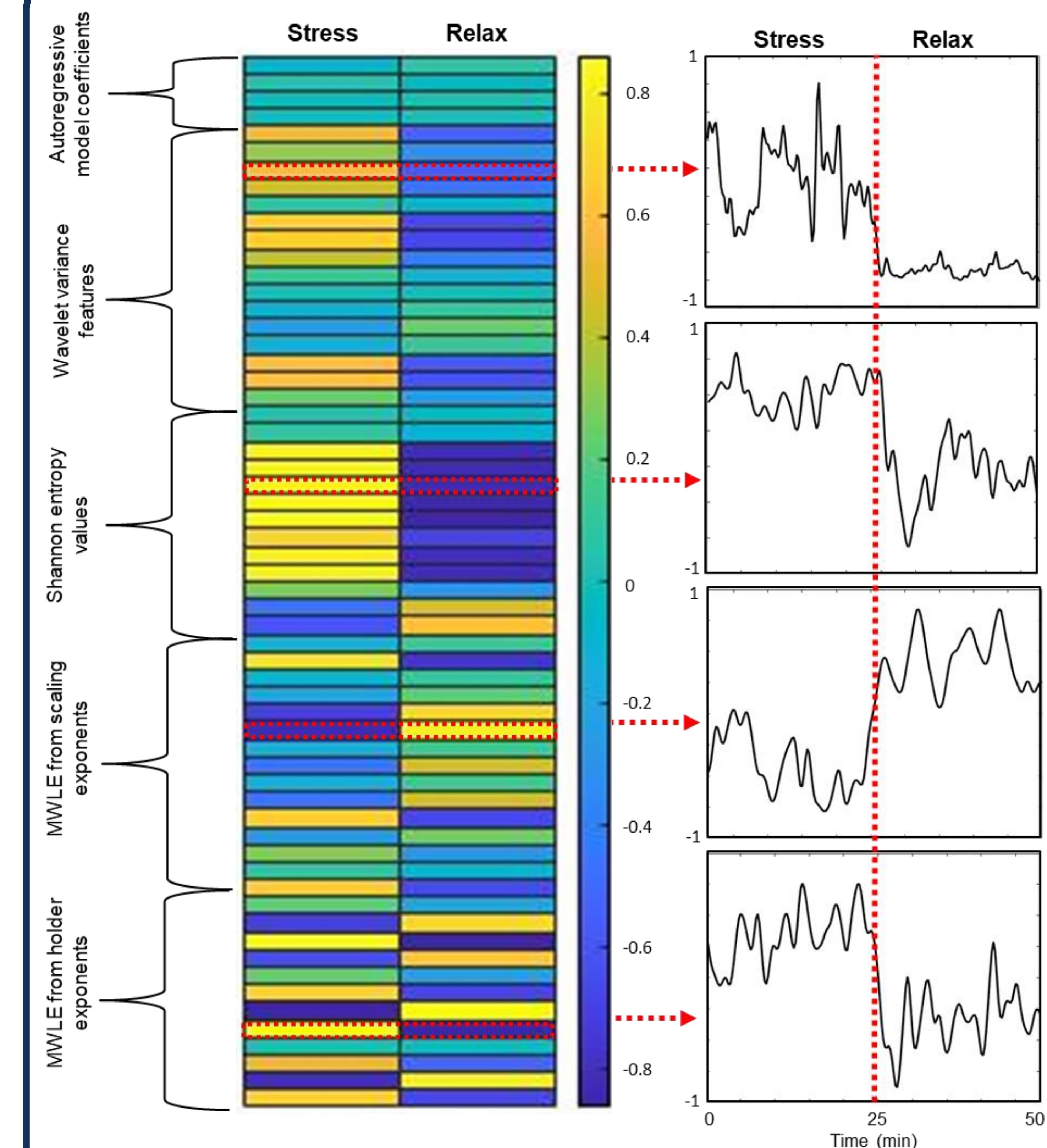
- The soft patch was microfabricated with ultrathin metals, integrated into an elastomer substrate, and optimized to measure SCG, PPG, and ECG..



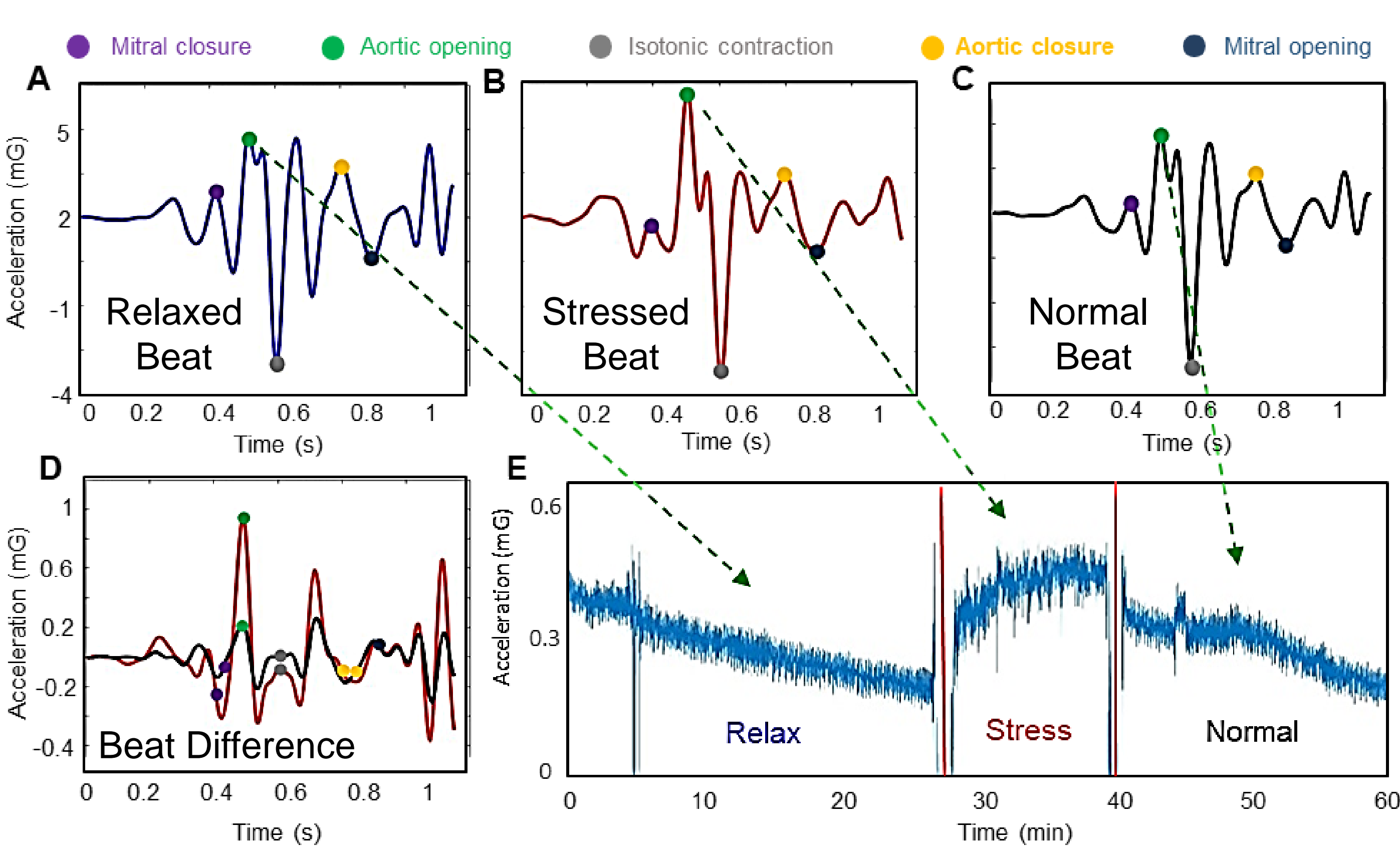
System Overview



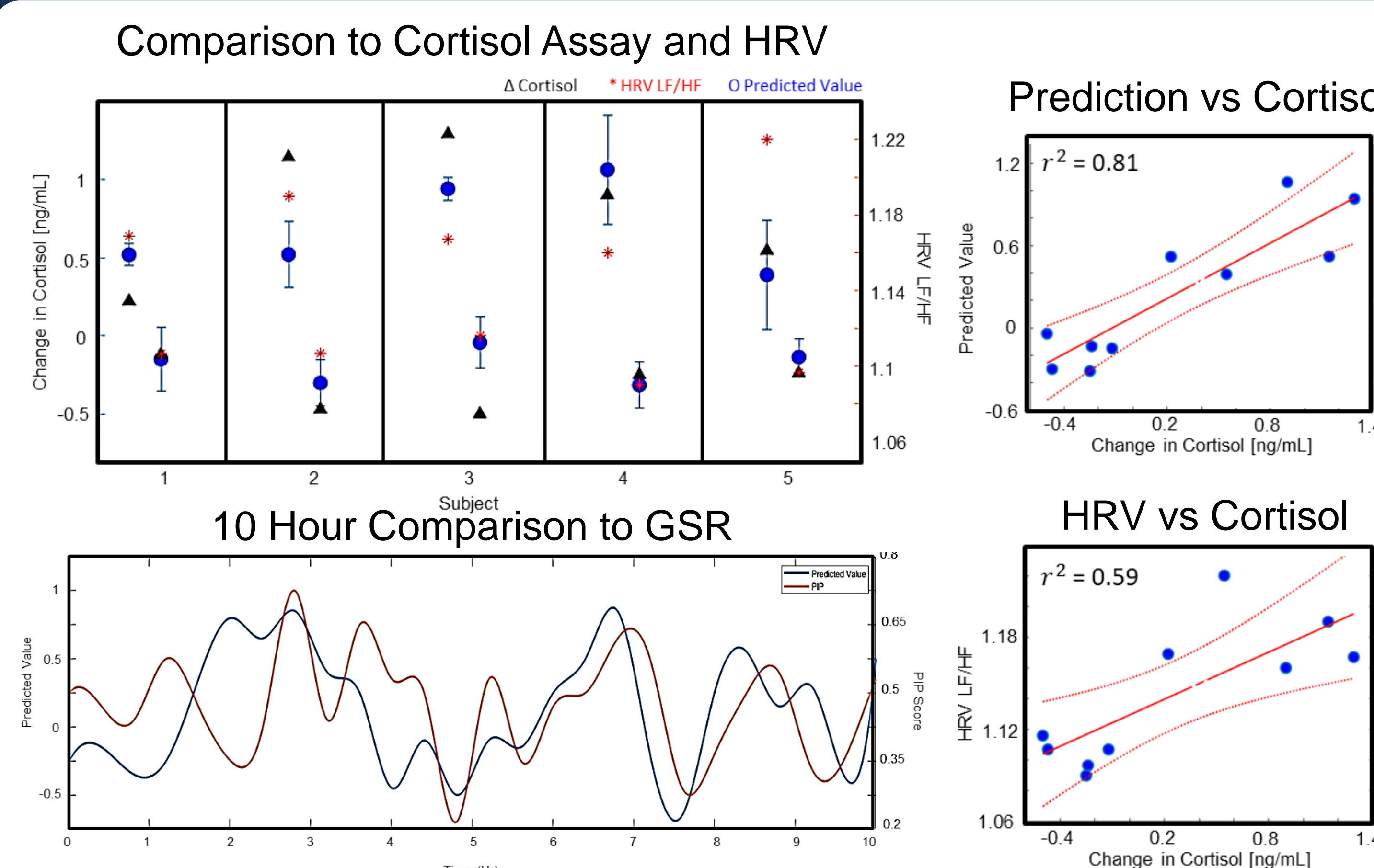
Cardiac Changes with Stress



Heart Mechanical Signals



Overnight Trials with Symptomatic Patients



Conclusions

- First device (wearable or wired) to continuously measure cognitive stress through the SCG signal on the sternum.
- Preliminary trials indicate an increased correlation with salivary cortisol compared to HRV metrics ($r^2 = 0.81$ vs 0.59).
- Exceptional full day wearability and user comfort.

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