

STRACE

Stress analysis with existing sensors
for patients with stress related
disease

Scientific Basis and Goal

- Previous research has shown that heart rate variability (HRV) can predict stress induced psychogenic non epileptic seizures (PNES) 5 minutes ahead of time.
- Small market: 3000 new patients in Europe per year
- Small market: few funding opportunities

Scientific Basis and Goal

- Stress and stress measurement in PNES patients is not different from other stress related disease
- Also in depression and burnout it would be valuable to prevent stress exacerbations.
- Our PNES patient group gives us a unique testbed for developing stress alerts with HRV

Is there a Market?

- Depression: 8.5% of population, Burnout: one reports indicates 19.5% of working population; >180 sickdays@ 400€ per case on average
- EU workforce: 220 M
- EU damage due to work related stress: 25 B€
- Estimated potential market size: 1 M users in EU for a benefit of > 20k€ per recovery + prevention
- Initial B2B marketing to large employers possible





Battery life

Streaming Mode: 20+hrs
Memory mode: 36+ hrs

Data Management

Flash memory



Bluetooth LE (Smart)



Form Factor

Small and comfortable

Case: 44 mm x 40mm, height 16 mm
Weight: 25 gr

Event Mark Button

Certification

CE certification
FCC certification

Sensors



Photoplethysmography (PPG)
Continuous Heart Rate (HRV, Stress, Relaxation)



3-axis Accelerometer
Movement, Activity



Temperature + Heat flux
Activity, Context

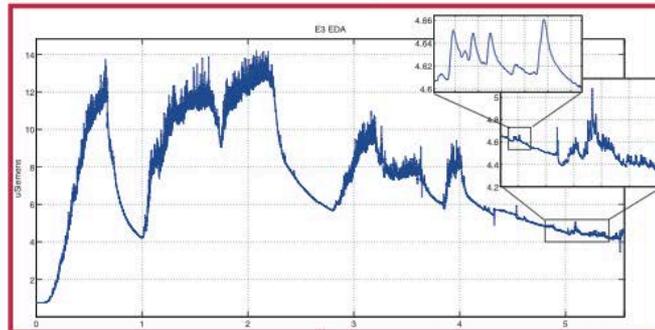


Electrodermal Activity (EDA)
Skin conductance (Arousal, Excitement)

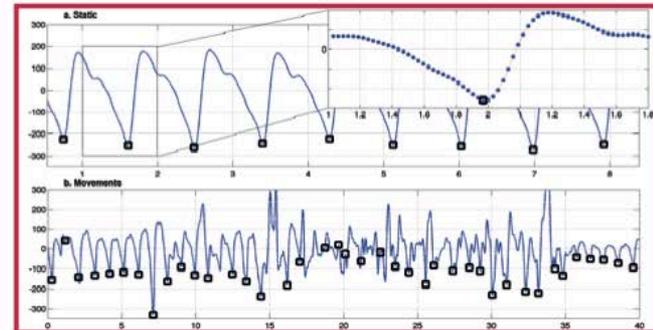


Measure both branches of the autonomic nervous system.

Electrodermal Activity



Continuous Heart Rate



Status today

- Negotiated with Philips the use of a research version health watch: PPG & accelerometry
- Implemented smartphone app for data collection from watch
- First student project: compare accuracy between ECG and PPG. Results: beat times are accurate, missed beats are a problem
- Second student project: identified and implemented a motion analysis method for seizure identification

Future Student projects (please apply)

- Find optimal estimators for stress indicators in case percentage of beats is missing
- Analyse PPG signal for more beat estimates
- Implement signal analysis in smartphone
- Patient and volunteer studies
- User interaction design
- Implement stress signalling app in smartphone

Requirements

- For PNES patients the system must be both physically and socially unobtrusive.
- For depression and burnout patients the system must be physically unobtrusive and the alert must provide an 'alibi'
- Students are welcome for projects and business (in case of success)