Friedrich-Alexander-Universität
Department Artificial Intelligence
in Biomedical Engineering | AIBE

Master's Thesis

Wearables and Biosignals in Pilot Training and Aviation Safety

Background:

Wearable technology (such as fitness trackers) use several sensors to record biosignals, such as Photoplethysmography, Accelerometers/Gyroscopes, and Electrodermal activity. These sensors may be helpful in an aviation context, particularly with respect to human factors and pilot performance.

Potential topics/ideas for one or more Master's thesis:

- **Fatigue in pilot training**: Student pilots get tired after about 30-60 minutes of fligh training. This is highly individual, and it makes no sense to continue flight training after this time, as the learning effect decreases. Investigate whether this can be measured by biosignals.
- **Inflight fatigue during long-distance and/or long-hour flight services**: Commercial flight crews perform duty times in excess of 13 hours. Glider pilots fly up to 14hrs without break (and without autopilot). Can fatigue be detected? Assess impact, potentially offer solutions for prevention.
- **Hypoxia warning and prevention**: Pilots must use oxygen or pressurized cabins when flying above 10.000 feet, as oxygen availability decrease with increasing altitude. Hypoxia-related incidences have caused fatal accidents in the past. Wearables can measure blood oxygenation and may help to prevent Hypoxia-related incidents.
- **Pilot capacitation monitoring in single-pilot operations**: While single-pilot operation is the norm in general aviation, only few aircraft are certified for single-pilot operations in commercial aviation. Single pilot operations are also planned in large commercial freight aircraft while enroute. Exact question tbd.
- **Participation in the "CogPilot Data Challenge 2.0":** Click here for more details.

Tasks:

- Literature research
- Design a study protocol (e.g. simulator flights, observational study during actual pilot training,…)
- Conduct the designed study
- Evaluate recorded data and write thesis

Requirements:

- Very good (i.e. fluent) German language skills for topics 1-4 (You will be conducting a study with sport pilots, some of whom have limited English skills)
- Some aviation background knowledge (e.g. simulator flying, private pilot license, model building,…)

Please send your CV, your transcript of records and 2-3 sentences about your motivation to:
Michael Nissen, Machine Learning and Data Analytics Lab, michael.nissen@fau.de

Machine Learning
Data Analytics