



The SleepTank app: Individualized Sleep Planning for Cognitive Readiness



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SleepTank® app

The SleepTank® algorithm is a fuel gauge for the brain. It builds on the SAFTE model to track and predict mental speed and effectiveness using off-the-shelf wearables.

- **Validated:** Based on the SAFTE model – a thoroughly validated model of fatigue and alertness
- **Individualized:** Individualized to the user’s own sleep need, so effectiveness predictions are specific to the person and situation
- **Predictive:** Evaluates accumulated sleep history (or sleep loss) to project future cognitive capacity over the next 24-hour timeline
- **Actionable:** Provides guidance to how to prevent or recover from insufficient sleep in order to perform on the job
- **Effective:** Increases the quality and quantity of sleep behavior
- **Adaptable:** Works with iOS and Android devices as well as most off-the-shelf wearables, including Fitbit, Oura, Garmin, Apple Watch, or WHOOP bands

How It Works

- SleepTank is a proprietary sleep debt algorithm that equates hours of sleep to the fuel tank in a car.
- The SleepTank mobile app uses the sleep data scored by a consumer wearable to calculate the percent fill of the user’s sleep “tank”.
- Users receive notifications alerting them to go to sleep



- Bedtime: at the end of a normal day awake (~16 hours awake)
- Critical: fatigue levels impair performance (~18.5 hours awake)
- Empty: SleepTank level reaches 0% (~24 hours awake)



- SleepTank can also be used to extract data for research

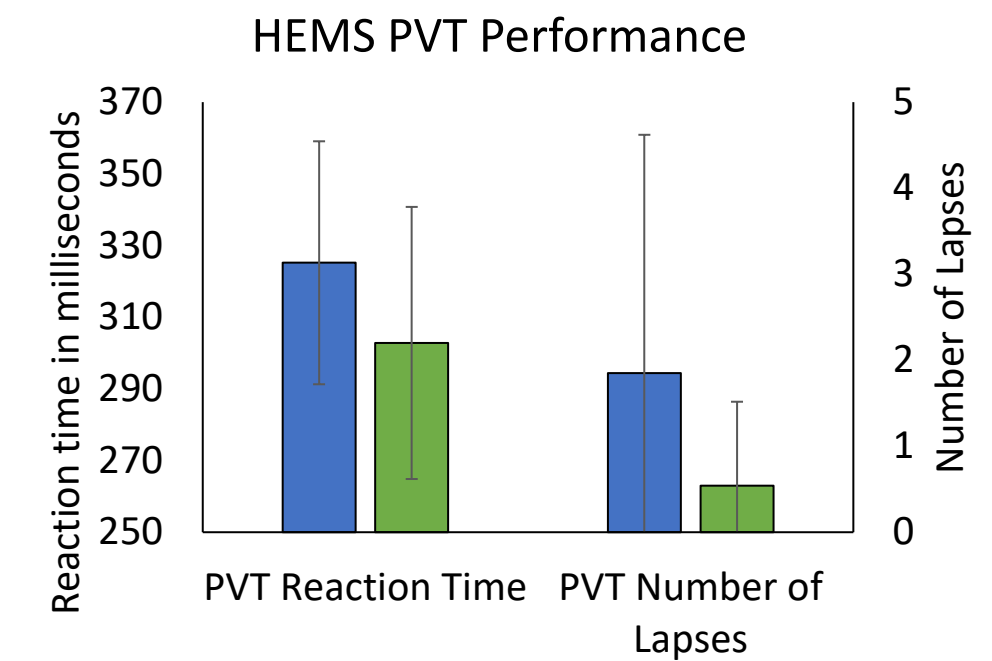
Advanced Development Status

- SleepTank development was funded through Medical Technology Enterprise Consortium (MTEC) Multi-Topic Request for Proposals (Solicitation #17-08-Multi-Topic) from 2019-2023.
- Second generation version of the mobile app and clockface is available now.
- SleepTank beta testing projects are underway with commercial aviation and military shift workers with plans to conduct further studies with professional drivers, and cargo aviation.

Results from Beta Testing

Helicopter Emergency Medical Services (HEMS)

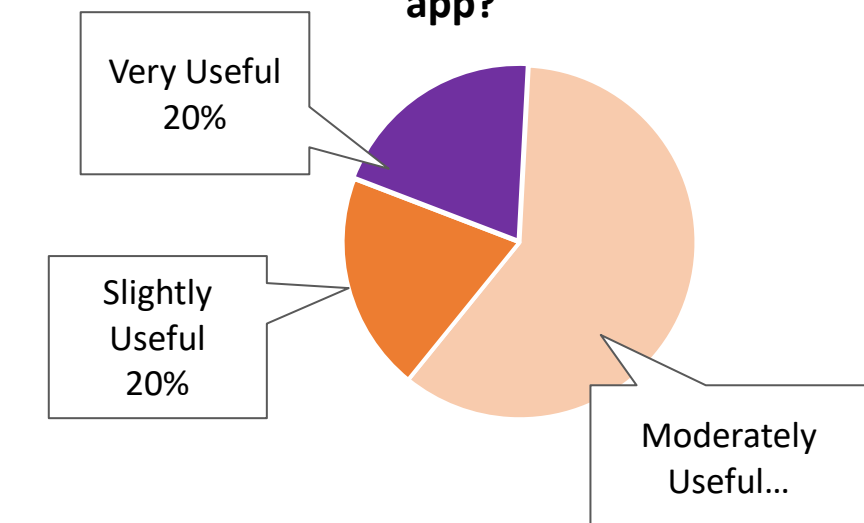
- Five (N=5) Norwegian HEMS crew members wore Fitbit Versa 2s alone (SleepTank-) and with access to SleepTank (SleepTank+) to assess the usability and effectiveness of the SleepTank™ app for improving sleep habits during 24/7 working operations.
- HEMS crew must be prepared to provide emergency services and pilot a helicopter at any hour of the day or under any weather conditions with low predictability of workload, timing of work events, or the availability of sleep opportunities.
- Reaction times on the psychomotor vigilance task (PVT) were faster and there were fewer lapses during the SleepTank+ week (green) compared to the SleepTank- week (blue).
- Sleep efficiency was higher during the SleepTank+ compared to the SleepTank- week (data not shown).



Cargo Pilots

- Ten (N=10) experienced cargo pilots from a major operator volunteered to wear a Fitbit Versa 2 or Charge 5 to evaluate the SleepTank app for improving sleep habits during 24/7 working operations over three months (June-October '22).
- Cargo operations frequently require pilots to cross multiple time zones and operate during the night, both of which are fatigue risks.
- All users found the app useful and felt that app-provided fatigue ratings matched their perceived level of fatigue.

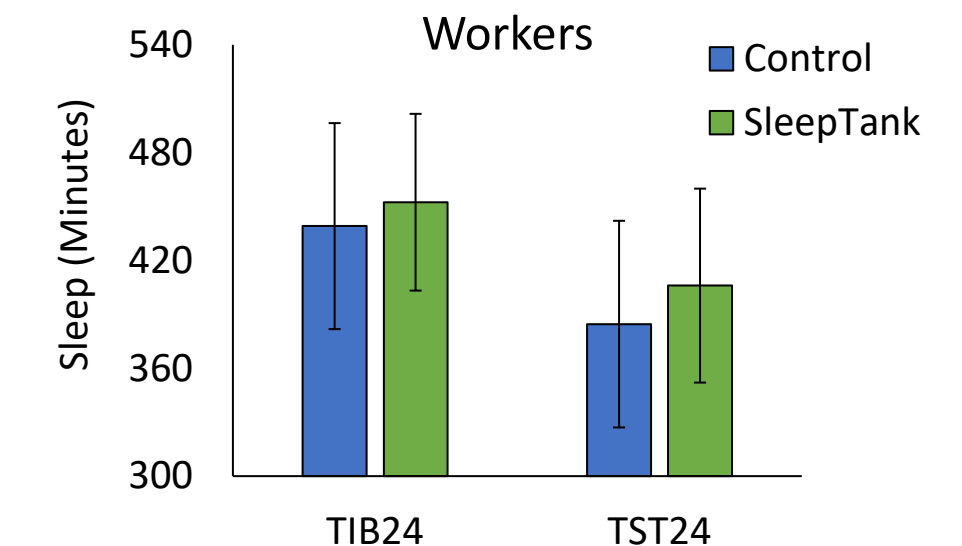
How useful did you find the SleepTank app?



Royal Australian Navy Shift Workers

- Forty-one (N=41) Royal Australian Navy shift workers from across 5 units on a rotating shiftwork schedule were assigned to either the Control (N=17) or SleepTank Group (N=17).
- Measures of time in bed (TIB24) and total sleep time (TST24) across the 24-hour period were longer in the SleepTank Group (in green) compared to the Control Group (in blue) across all shifts.
- Sleep efficiency was higher in the SleepTank Group compared to the Control Group across all shifts (data not shown).

Sleep Duration in RAN Shift Workers



Integration Strategies

- The SleepTank platform was designed to enhance military operational readiness by integration with ongoing soldier monitoring initiatives.
- SleepTank provides a remote platform to monitor sleep of groups and teams to understand the benefits and outcomes of proper sleep to sustain cognitive health.
- SleepTank data can be imported into SAFTE-FAST for proactive organizational fatigue management.
- The customer has choices: use our mobile app (iOS and Android) or integrate with existing ecosystems with the SleepTank API.
- For more information, please contact sleeptank@ibrinc.org