

Swedish Healthy Home

Promoting Health and Wellbeing while Minimizing Wasted Energy

Light-dark patterns reaching the retina synchronize human circadian rhythms, such as the sleep-wake cycle, with local time on Earth. If we do not receive a sufficient amount of light of the right spectrum, for a sufficient amount of time, and with the right timing, we can experience circadian disruption. Short-term circadian disruption leads to poor sleep and poor performance. Circadian disruption over many years has been associated with health risks, including diabetes, obesity, cardiovascular disease and cancer.

The LRC is funded by the Swedish Energy Agency to develop a lighting system that promotes health and wellbeing through improved circadian entrainment while minimizing wasted energy via intelligent control of LED lighting. The Swedish Healthy Home system consists of wearable sensors that monitor user light exposures and activity patterns, a smartphone app that recommends a lighting scheme based on user data, sensors to determine user location, and a hub that integrates all the information to control the home lighting.



The LRC's demonstration room shows that intelligent control of LED lighting can provide cycled electric lighting with cool, high light levels during the day (left) and warm, low levels in the evening (below).



Wearable Sensors

The light logger is a wearable device that measures circadian stimulus (CS) over time via an RGB sensor. A wrist-worn activity logger with a 3-axis solid state accelerometer measures activity over the day and night. The light and activity data are used to estimate circadian entrainment as well as sleep quality.



Light logger (left) and activity logger.

Smartphone Apps and Beacons

The primary app calculates a light treatment based on user data collected by the sensors and sends the treatment schedule to the hub. To determine which room users are in or if they are away from home, beacons are placed around the home. A secondary app works with the beacons to determine user location.

Connected Lighting and the Hub

The hub communicates with the apps, controls the connected lighting, and configures the lighting schemes. The connected lamps should have variable light levels and CCT in order to precisely control the circadian stimulus. The system provides



The beacon (left) and the hub.

lighting that is tailored to the needs of each individual, while minimizing energy usage.

Sponsor
Swedish Energy Agency

