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SleepCompete.

A Smart Bedside Device to Promote
Healthy Sleeping Habits in Children



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Sleeping behaviour is an important factor that affects a person's health and well-being

good sleep can
positively affect

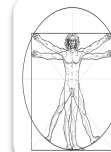


people's performance

a lack of sleep can
negatively impact



memory (Maquet, 2001)



immune system (Bryant, Trinder, & Curtis, 2004)



cognitive functioning
(Wagner, Gais, Haider, Verleger, & Born, 2004)

More sleep than work

young children (4-12 years old)
require between 9.25 to 11.5
hours of sleep every night

in adulthood, we spend more
hours sleeping (~2500 h/year)
than at work

Sleep monitoring is popular

a lot of businesses try to come up with apps and gadgets for the market



Jawbone Up

Sleep
Cycle



Beddit

Related work on adults

Mhóráin & Agamanolis
(2005)

- derive sleep patterns from monitoring a person's eye movements
- wearable solution in form of an eye mask

van Laerhoven,
Borazio, Kilian, &
Schiele (2008)

- use wrist-worn sensors (combination of light and simple motion and posture sensors)
- focus on body posture and movements during sleep as indicators for sleep quality

Sahami Shirazi,
Clawson, Hassanpour,
Tourian, Schmidt, Chi,
Borazio, & van
Laerhoven (2013)

- social alarm clock app "Somnometer"
- requires user to interact with the app: set status of 'awake' or 'sleeping'
- social functionality: share sleep ratings with friends on Facebook

Related work on children

Ozenc,
Brommer,
Jeong, Shih, Au,
& Zimmerman
(2007)

- “Reverse Alarm Clock”
- promotes healthier sleep patterns for children and parents alike
- clock communicates whether it is time for sleep or for getting up in a way that children understand
- keeps children from getting out of bed in the middle of the night and interrupting their parents’ sleep

Point of departure

problem

- In many homes, bedtime still remains a battle of wills between parents and children.

goals

- promoting **children's** good sleep habits for better performance in school
- prompting motivation to sleep at bedtime
- motivating children to sleep through the night, without interrupting **parents'** sleep in the middle of the night

Our approach

for children



enjoyable competition
(gamification)



receiving reward (from
device and parents)

for parents



reliable monitoring



parental support at
bedtime

SleepCompete

SleepCompete is a bedside device aimed at children.

Children and parents are able to monitor sleeping habits using a 'sleep score'.

By sharing this score with selected friends, we propose that SleepCompete will persuade its users to improve their sleeping habits.

Key functions of the device

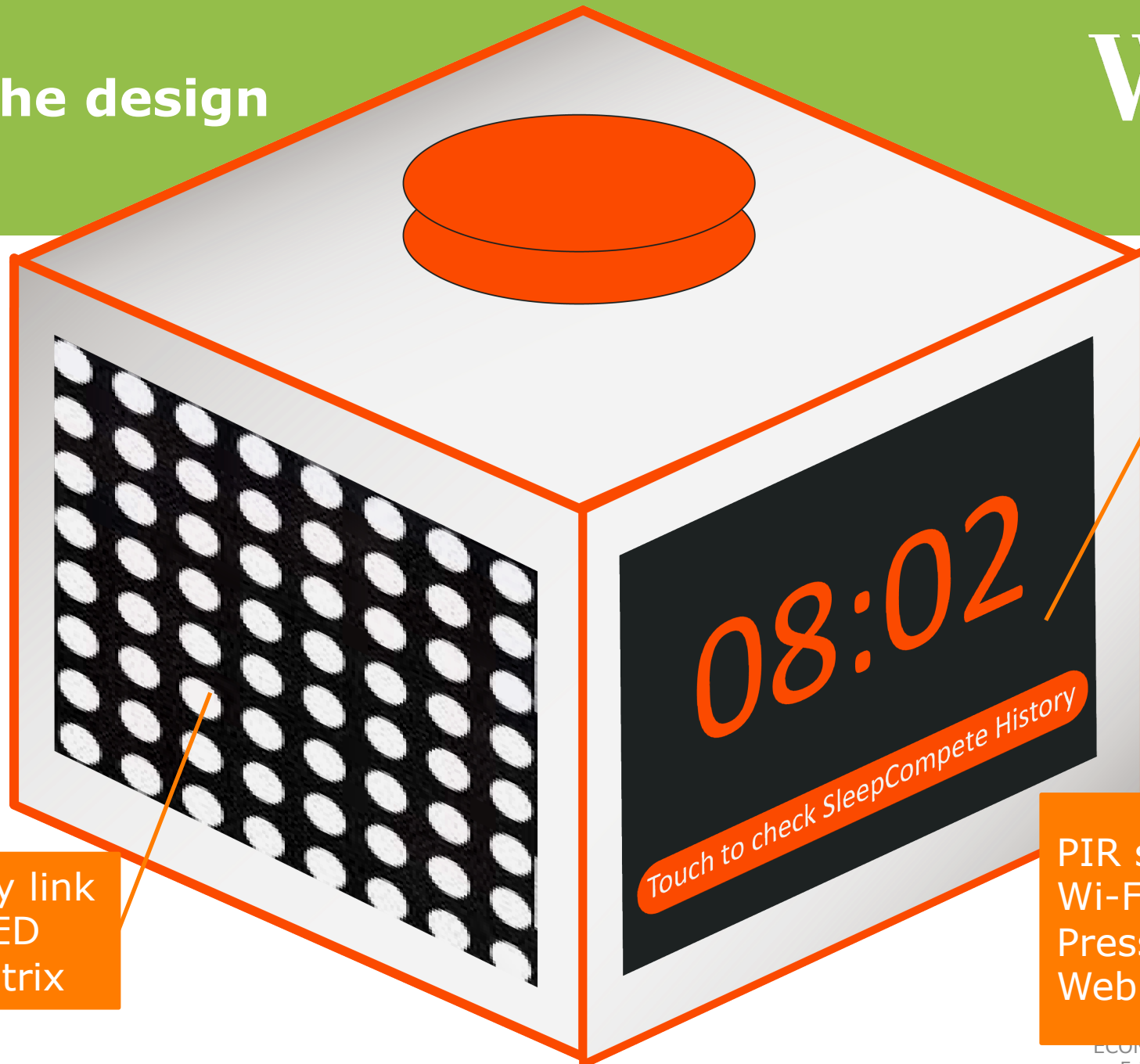
children collect “points” while sleeping soundly (sleeping score)

children can self-monitor their sleep habits and compare with others in a fun way

parents can monitor children’s sleep on a dedicated webpage

promotes healthy sleep patterns in a fun and useful way for children and parents alike

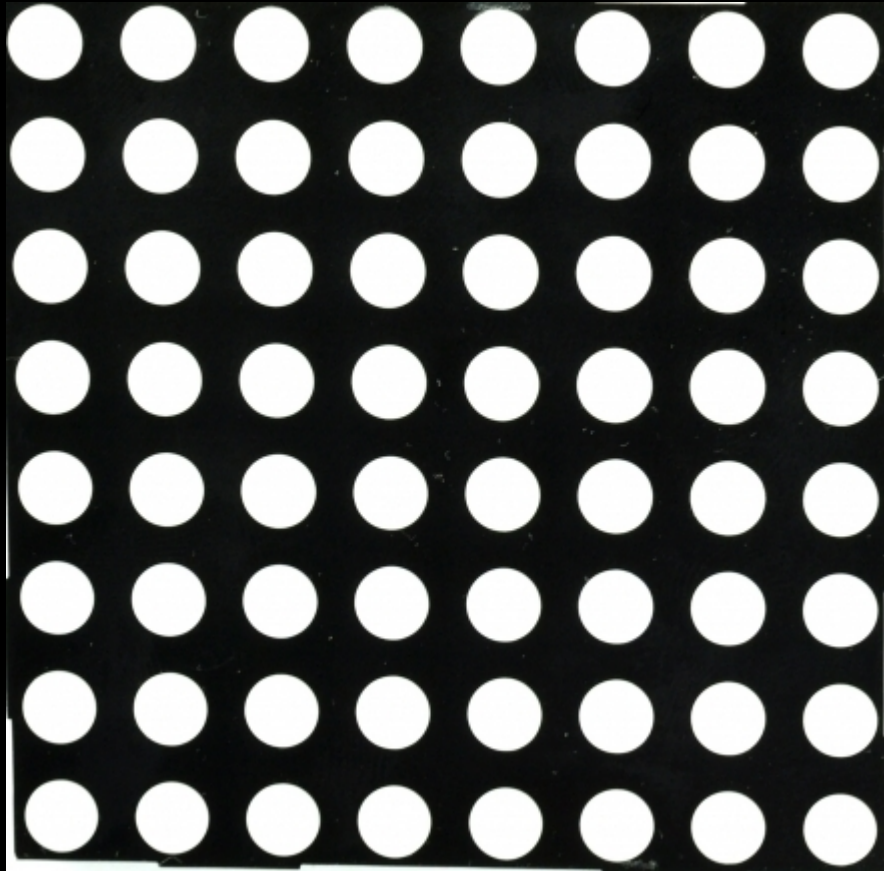
The design

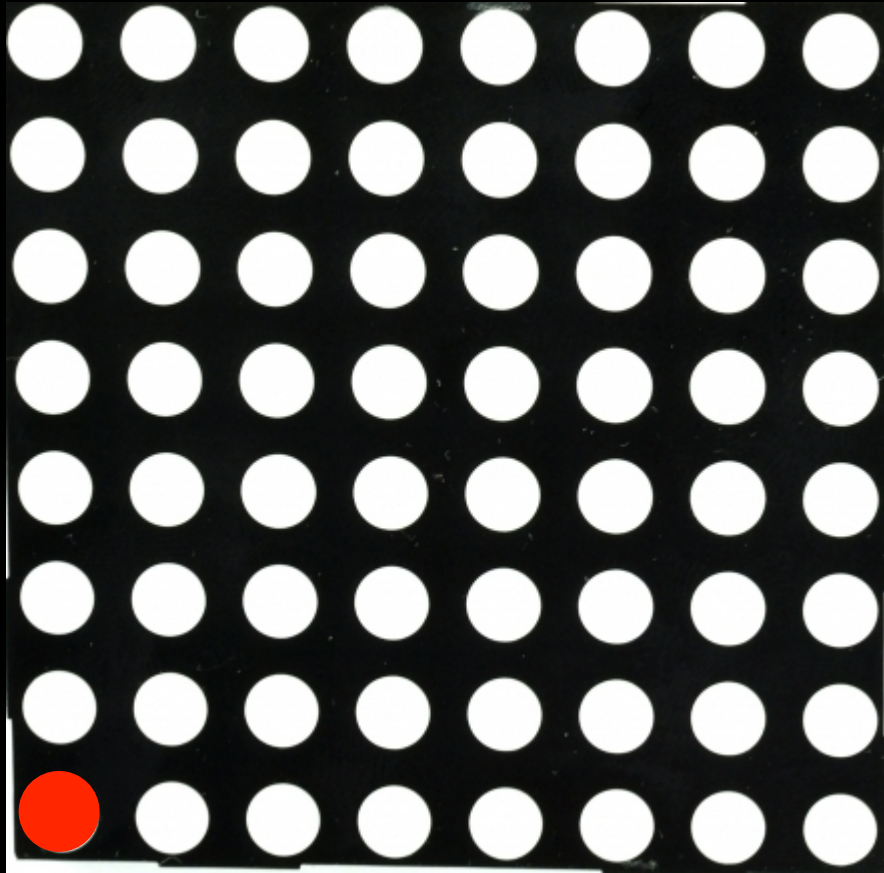


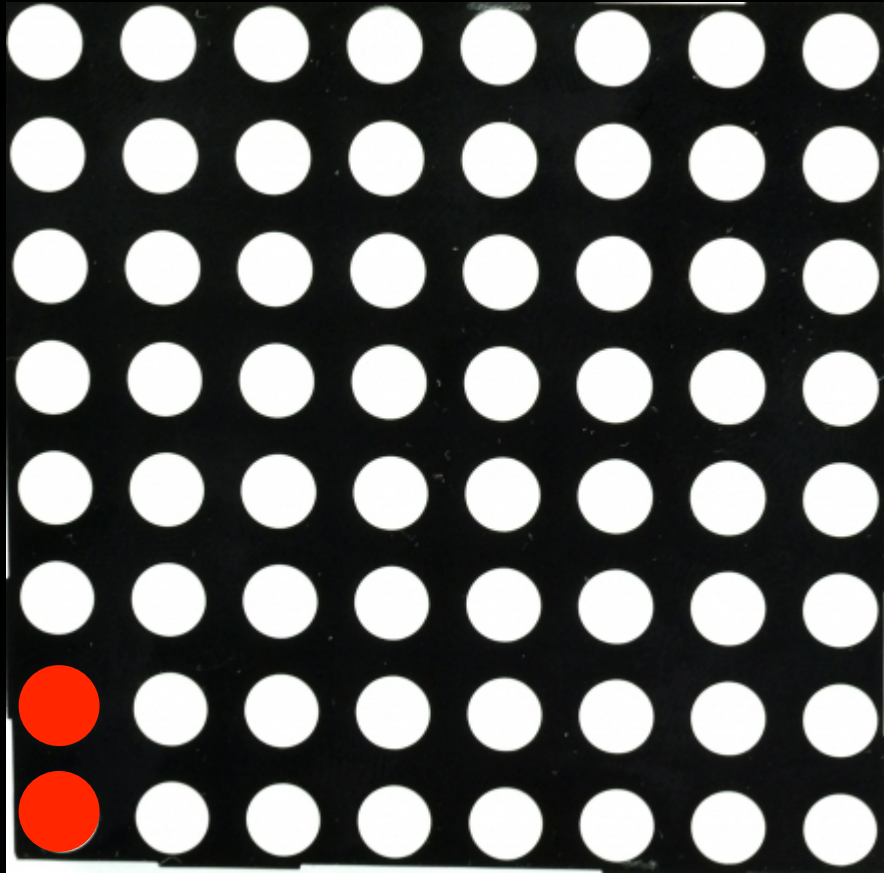
Touch screen
(active & passive state)

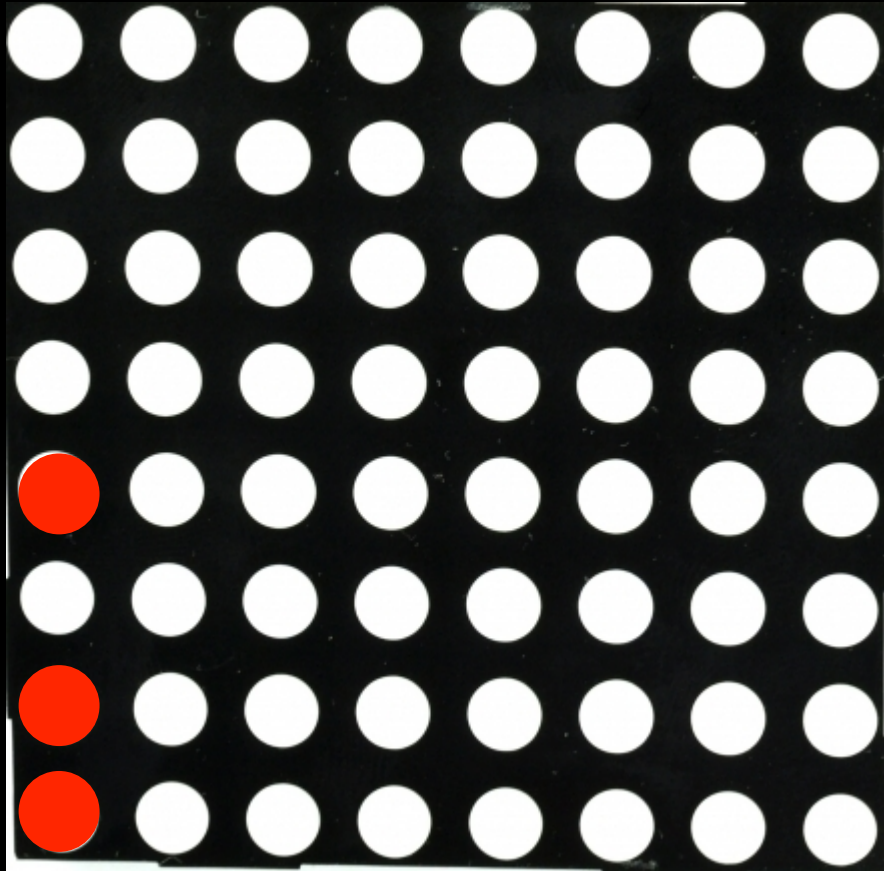
Daisy link
LED
matrix

PIR sensor
Wi-Fi module
Pressure sensor
Web server











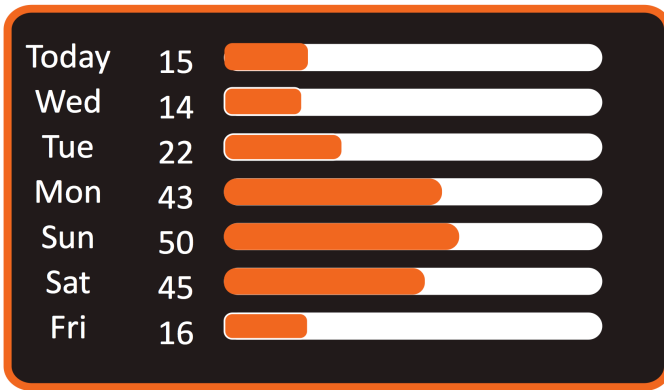




Your SleepCompete.

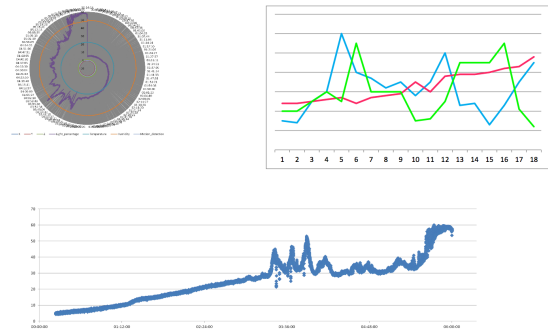
Logout

Compete with friends!



Learn more about why sleep is so important.....

SleepCompete Charts



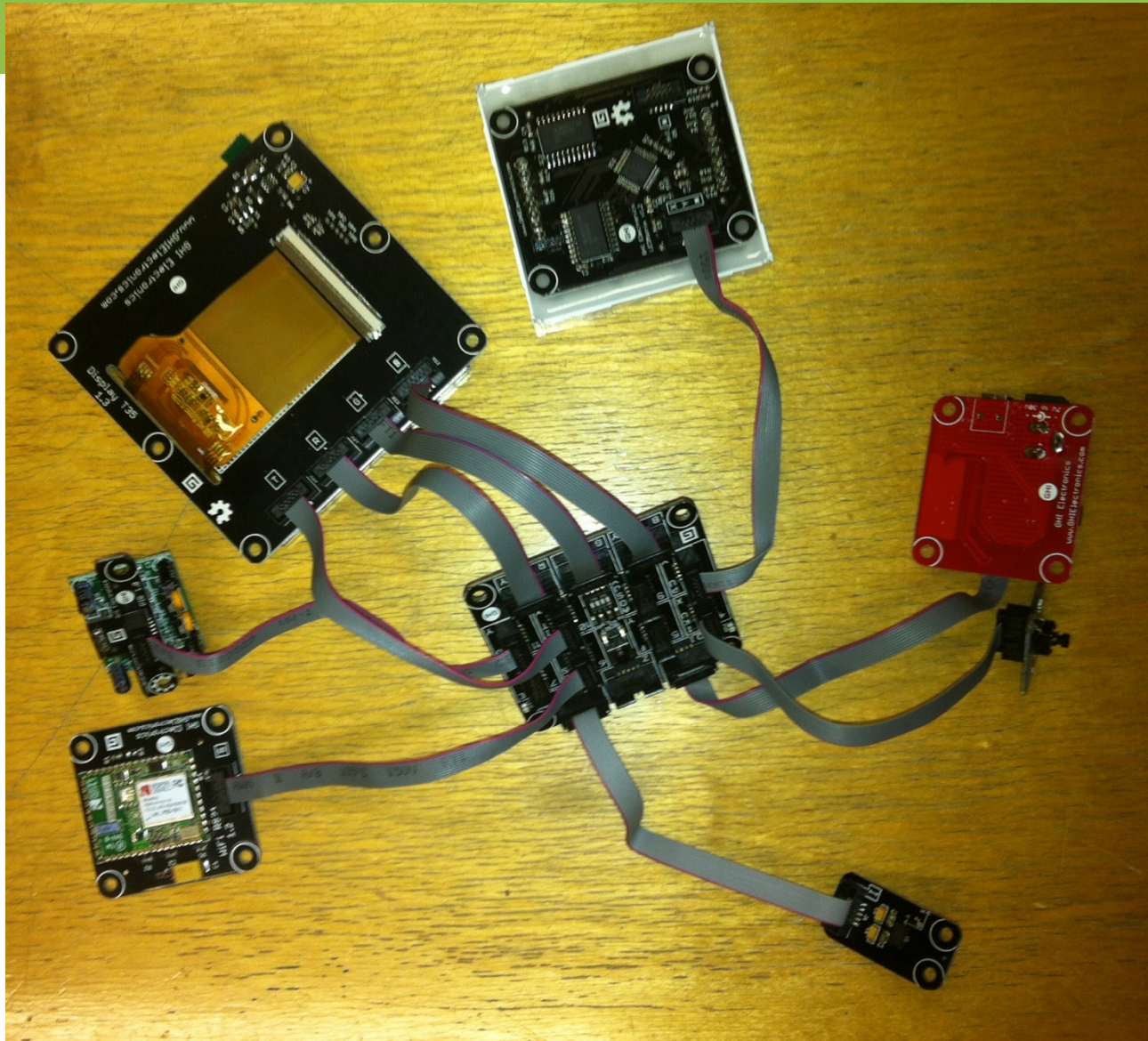
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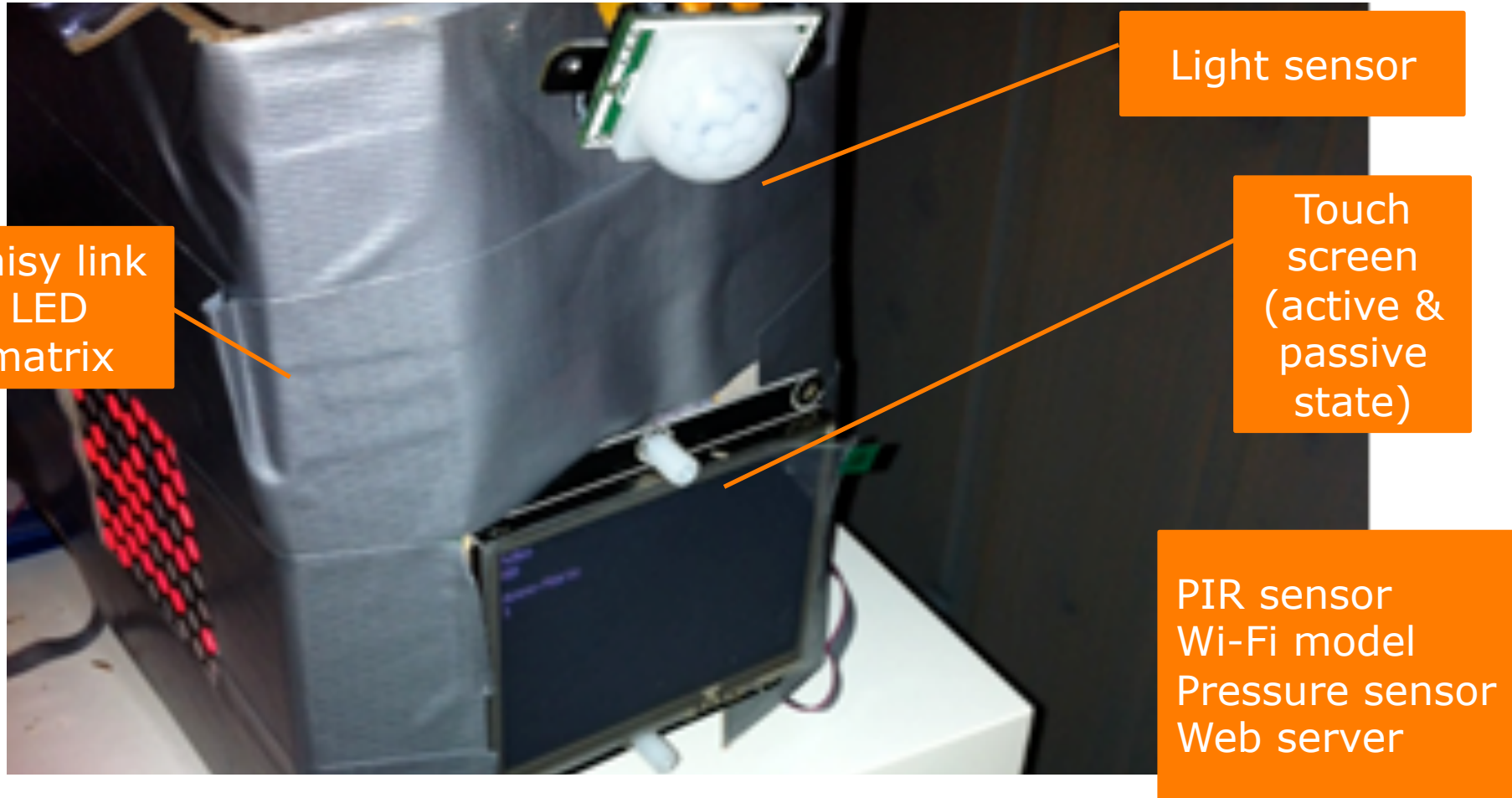


Pilot study

Microsoft Gadgeteer Framework



The prototype

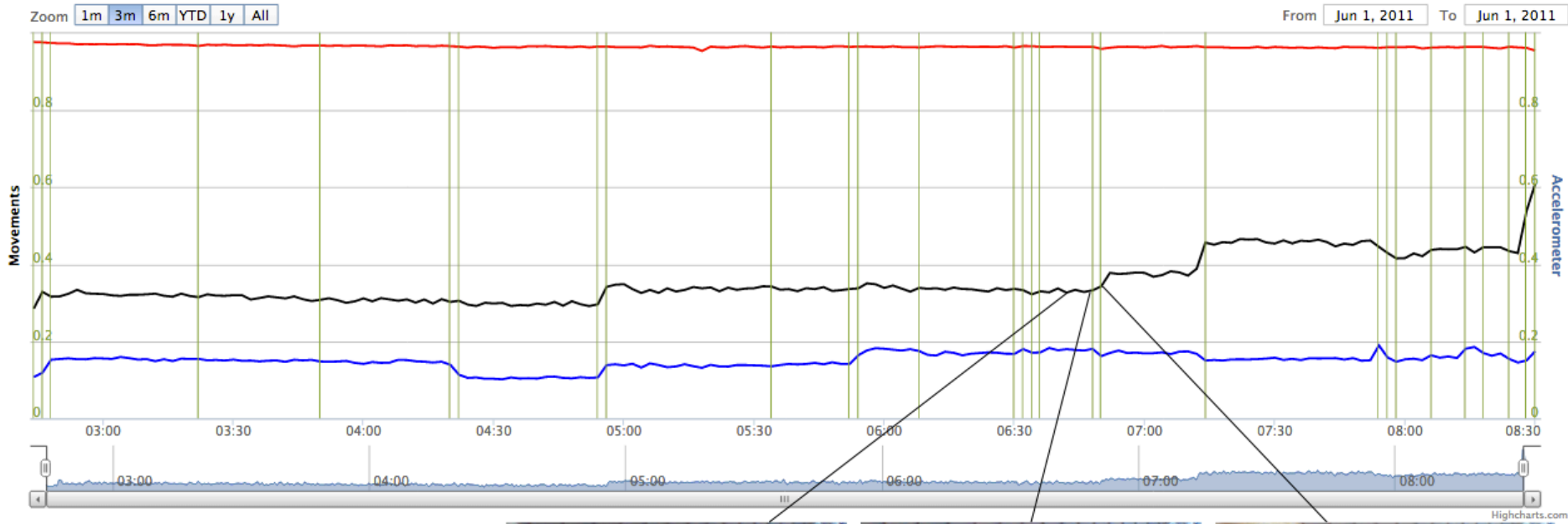


The functional prototype





Sleep Data



<http://social.cs.tut.fi:8090/index>

Ongoing and future work (1/3)

improve the prototype system

- improving the robustness and accuracy of our prototypes
- evaluating the effectiveness of the device in general
- establish the reliability of the relationship between movement and quality of sleep

further game features (e.g., levels)

- to improve motivations for children long term
- running long-term trials with families and children
- conducting semi-structured interviews with participants and surveys with larger user groups

limitation:
more sleep is not always better

- analysis of long-term effects should provide insights into whether upper limits are reached and countermeasures have to be implemented



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