

Dream Lane: A System for Better Sleep

MAS672 New Paradigms for HCI

Project 2

Spring 2008

Effects of Sleep

Overall performance and level of engagement

- Mortality rates for all causes of death is lowest with people that get 7-8 hours of sleep
 - <4 hours of sleep, mortality rate jumps 2.5x
 - >10 hours of sleep, mortality rate 1.5x higher
- Immune system
- Energy levels
- Weight
 - UK scientists found sleep deprivation led to hormonal changes which told the body to eat sugary or starchy food to provide an energy boost and to shift to storing food as body fat
 - Researchers at Columbia University discovered that
 - People who sleep two to four hours per night are 73% more likely to be obese than are people who sleep seven to nine hours.
 - People who sleep five to six hours per night are 50% more likely to be obese than normal sleepers.
- Motor skills (accidents)

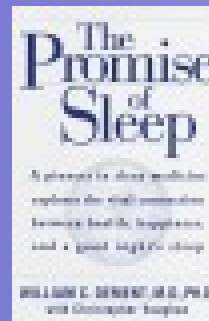
Effects of Sleep

- Cognitive functioning/Learning
 - Trouble concentrating
 - Poor memory consolidation and retention of information
- Stress/anxiety levels
- Depression



Good Night, Good Life

“Effects of sleep deprivation on health and well-being have been documented by research. **Cognitive skills** and **physical performance** are impaired by sleep deprivation, but **mood** is affected even more. People who get less than a full night's sleep are prone to feel less happy, more stressed, more physically frail and more mentally and physically exhausted as a result. Sufficient sleep makes us feel better, **happier**, more **vigorous** and **vital**.”



William Dement
US sleep researcher

Technology and sleep deprivation

- Technology does indeed play a role in depriving sleep
- Gadgets are distracting at bed time
- Many teenagers are damaging their health by not getting enough sleep and by falling asleep with electrical gadgets on



Sleep aides

- Eyeshades/ Earplugs
- Special sheets
- Special pillows
- CDs and sound machines
- Special lights
- Magnetic pulse devices
- Microcurrent devices
 - The application of direct electrical treatment to the brain



Sleep Gadgets



Sleep gadgets

- Lots of sleep gadgets on the market specific problem in mind.
- But no gadgets to help encourage or train *healthy sleeping habits* and provide overall sleeping plan

Tranquil Moments®
Sleep better with clinically proven acoustic therapy



ocean surf thunder-storm summer night
stream rain

... plus seven sounds created specifically to soothe you—celestial, meditation, unwind, white noise, focus, rejuvenate and serenity

New digitally recorded nature sounds plus seven additional sound programs, all developed at the Center of Neuroacoustic Research.

Exclusive Sleep Enhancement Technology™ gradually slows playback speed of each program over a 20-minute period to gently lull you to sleep.

Sleep timer with auto shutoff sets programs to run for 30, 60 or 90 minutes or can be set for continuous play.



Healthy Sleep Device

- Encourage user to go to sleep when tired or on time for tomorrow's schedule
- Ensure user gets optimal level of sleep
- Helps user get to sleep
- Helps user wake up



Sleeping on time



- Limit distractions to sleep (disable gadgets) and provide a environment conducive to sleep (darken room).
- Encourage user to get ready for bed
 - Remind user to read book or perform other disengaging activities at designated time by lighting up a book or other object
 - Help user develop a bedtime routine to 'program' your body to know that it's time for bed
- Interfaces with schedule
 - If user has early appointment, encourages user get sufficient sleep by dimming lights 9-10 hours prior and disabling gadgets
- Monitor levels of fatigue
 - When user reach certain level of fatigue (monitored using heart rate sensors), light dim slowly and PC/gadgets stops working
 - Monitors the Tiredness & Spirit status index (TSI) (traditionally measured by Tiredness Warning Devices used by truckers)
 - Prevents user from getting caught up in surfing the internet or using gadgets when they should be sleeping, but can be overridden

Getting to sleep



- Detects if user is having trouble sleeping and offers relaxing music or Hypnosis for sleep CD
 - Study published in the Journal Of Advanced Nursing shows people listening to soft slow music before sleeping experienced physical changes, including lower heart and respiratory rates that led to more restful sleep.
 - If music does not work, tries other techniques making note of which techniques do work to use in the future
 - Deep breathing
 - Progressive relaxation
 - Visualization
 - Imagination
 - Also, detect if user wakes up in the middle of the night and is having trouble getting back to sleep and detect if user wakes up prematurely. Offer similar solutions to help user sleep stay asleep longer

Set alarm times



- Sets alarm based on when you fall asleep (as measured by body sensors) and how long you wish to sleep
 - Wakes user up in time for any appointments
 - Ensures users sleeps at least 7 hours (or more if catching up on sleep)
 - Attempts to wake user up in a lighter sleep stage so user is not groggy, brightens the room or slowly raises volume on radio
 - No more user error or forgetting to set the alarm

Implementation

- PartnerCare Nexaver - Noninvasive body sensor
 - Enables real-time monitoring of vital signs, such as heart and respiration, in a non-intrusive, non-radiating and non-contact manner without any inconvenience or life style changes of the user.
 - Can be placed unobtrusively under user's mattress
- Wirelessly communicate with stereo, computer, and gadgets via Personal Area Networking protocol such as Bluetooth, Zigbee, IrDA, etc.



Questions?



