PILLO

Personal Information Link to Lie On

a.k.a. The Pinterface (The Pillow Interface)
a.k.a. The PDA (Pillow Digital Assistant)

The pillow is a very common artifact that is in very proximity to our head during a considerable amount of our lifetime—during sleep. Therefore, it might be a natural and intuitive interface for several purposes during the night.

Traditional functions of a pillow

- **Rest the head when asleep**. For this purpose, it has to have the exact right amount of softness, combined with the exact amount of support for our head.
- **Additional functions** are possible, mostly emotional: "hug it in loneliness, talk to it in confidence, hit it in anger, and cry on it in sadness." (Chris Dodge, 1997)

It is an artifact that has very close proximity to our body, mainly our head. Therefore, it could serve as a natural and intuitive interface because of these physical and associative properties.

PILLO enhanced functions

- **Watch**: user can ask for the current time, PILLO replies in speech or vibration (Morse code?)
- **Alarm clock**: can wake you up with smooth vibration, soft music, etc. Does not interrupt you in deep sleep phases, waits until it is most comfortable for you.

- **Handsfree cordless telephone, intercom, and cellphone interface**: built in close-proximity low-soundlevel speakers and microphone (voice dialing).
- **Body signal monitor:** temperature, blood pressure, and heart rate.
- **Emergency button** functions (for elderly persons), "pillow switch": if it is hit, or a loud noise occurs, it automatically can send a message (audio or text) to caregivers or emergency services.
- **Audio web browser:** permanent web connection (wireless LAN to in-house proxy), speech recognition and speech synthesis capabilities
- **Hi-fi stereo player** (mp3 player), with vibration instead of a subwoofer; in combination with external speakers can serve as the effect channel (sounds coming from behind the user's head)
- **Massage**: vibration of different frequencies and amplitudes.
- **IR transcoder**: replacing a TV remote control: speech-to-IR, or squeeze-to-IR (two corners mean channel up/down, two other corners volume up/down).
- **TV program assistant**: user can ask: "What is currently on TV, when is my favorite show on?" (speech interface).
- **Email and voicemail audio client:** checking incoming email and voicemail, voice controlled, or squeeze controlled.
- **Sleep learning**, subconscious and subliminal learning: add the URL of the text that you have to read for next class, and next day, you know the content of the text... (http://www.sleepnet.com/rls2/messages/869.html)
- **Adaptive softness for pillow fights**

As an interface, it has to be audio and tactile only, for most of the time, our eyes are closed—or are looking away from the pillow (TV setting). Specific squeeze and pressure sensitive areas on the pillow cover could be useful.
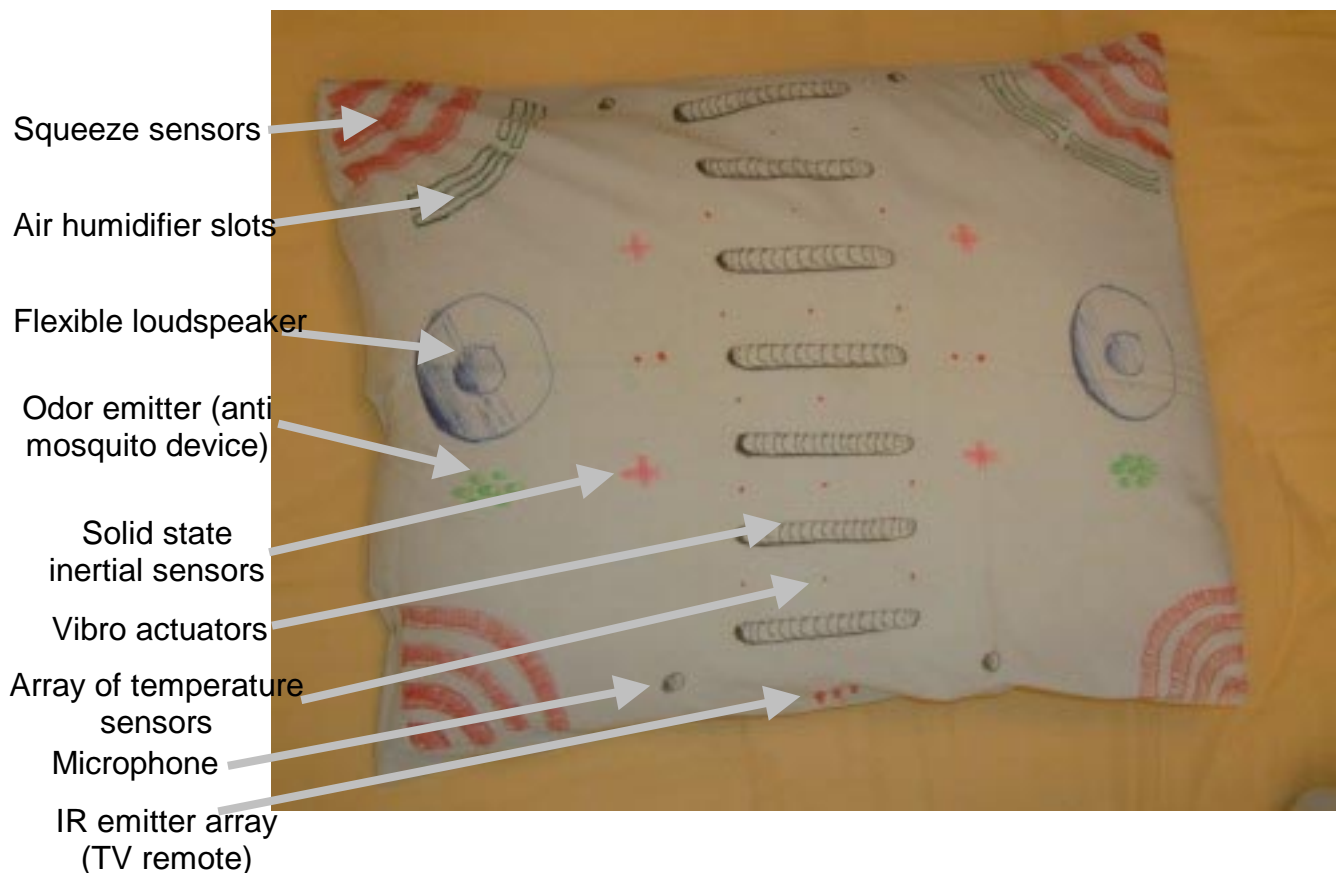

Built in actuators

- **Audio/music out**, transmitted via Bluetooth from cellphone, cordless telephone, computer, hi-fi stereo, TV set (can serve as effect channels in combination with external speakers of TV set).
- **Speech synthesizer**, for text-to-speech, e.g., email and audio web browser.
- **Vibration/pulsation**: for waking up; as effect for video games and TV; for massage.
- **Temperature**: compensating ambient room temperature, e.g., cooling down in summer, heating up in winter.
- **Air cleaner and humidifier**: if air is too dry ad water; if too humid remove water.
- **Shape change**: can get thicker or thinner, or change to U shape (for airplane flights).
- **Density change**: can get softer or harder automatically, or upon request of the user (bucky, foam, latex).
- **Glow**: might serve as a reading light; a night-light for kids.
- **Odor emitter**: aromatherapy functions, combined with ambient sounds (jungle ambience!); special sub function: mosquito control (keeps mosquitoes away).
- **Shrink/inflate**: pillow can be told to shrink itself to minimum size and then transported easily (airplane). On location, it would inflate again to its normal size and density.

- **Self fluffing** in the morning (inflating and deflating at high rate)
- In addition, of course: **self cleaning**...

Built in sensors

- **Temperature**: continuously monitoring our head temperature, as well as the ambient temperature. Sends this information wireless to a server.
- **Heart beat and blood pressure** sensors, e.g., for preventing SID.
- **Movement/activity**: how active is the person during sleep?
- **Squeezing**: if user squeezes it in different corners, it serves as a simple joystick.
- **Speech recognition**
- **Proprioceptive**: knows if it is used horizontally (bed), or vertically (supporting your back on a chair, in the TV setting).
- **Pollen sensor/filter**: alerts the user/sleeper of upcoming pollen, anticipating allergies.
- **Magnetic field sensor**: are you sleeping on a water vein? "If a water vein is running underneath someone's bed, it could be detrimental to their health."

Squeeze sensors
Air humidifier slots
Flexible loudspeaker
Odor emitter (anti mosquito device)
Solid state inertial sensors
Vibro actuators
Array of temperature sensors
Microphone
IR emitter array (TV remote)

Although there must be many electronic elements in the pillow, it has to be completely soft and flexible. To power the internal electronics, sensors, and actuators, the pillow has built-in thin film lithium batteries that are charged with induction from the mattress (no direct conducting contact necessary, works through bed sheets and pillow cover).

Related research

Dunne, A. & Gaver, W.W. (1997): *The Pillow: Artist-Designers in the Digital Age*. CHI 97 Electronic Publications: Late-Breaking/Short Talks; http://www.acm.org/sigchi/chi97/proceedings/short-talk/wwg.htm

Dodge, C. (1997): *The Bed: A Medium for Intimate Communication*. CHI 97 Electronic Publications: Late-Breaking/Short Talks; http://www.acm.org/sigchi/chi97/proceedings/short-talk/cd.htm

Chris Dodge:

> "…The most salient object of a typical bed environment is the pillow which has two inherent roles: most functionally it is a place to rest our heads, and, more emotionally, it sometimes serves as a physical substitute for the person that we wish to be next to. Pillows are objects onto which emotional actions are made: we hug them in loneliness, talk to them in confidence, hit them in anger, and cry on them in sadness. It is an artifact that has very close proximity to our bodies, either it is next to our head or pressed up against our torsos…."