A Different Kind of Information Appliance: Fridge Companion

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ABSTRACT
A prototype device is described that allows a user to understand and contemplate the inner workings of a common home appliance, the refrigerator. The device monitors select physical properties of its host and displays scheduled graphic presentations on the host's principles of operation. Fridge Companion is a device designed to make domestic life not easier but deeper.

Keywords
Information appliances, time and duration, domain specific design, information utilization, contemplation, context-aware computing.

INTRODUCTION
Considerable effort has been invested towards making homes and appliances "smart". Often this means that an appliance is networked to other household appliances. Situated and connected, they can perform tasks any one of them could not accomplish alone [3,6]. Many now available appliances such as coffee machines, electric blankets, alarm clocks and refrigerators are able to share data in users' homes and even place orders for food items [7]. More recently "non-functional" design considerations such as social communication have been investigated in information appliances. The prototype designs for social spaces from the Casablanca Project [4] are examples of current non-functional information appliance design philosophy.

Fridge Companion has a different emphasis. It attempts to include more intangible aspects of intelligence such as reflection and contemplation and expand on the idea of pervasive computing [6]. It invites the user to ponder the inner workings of its host appliance. Fridge Companion is a context specific [2] information device designed not to make life easier but richer.

INFORMATION APPLIANCES FOR CONTEMPLATION
Fridge Companion is an example of an approach of designing information appliances towards contemplation.

The design philosophy subjects aspects of utility to aspects of intellectual pleasure. This type of companion device is intended to make the inner states of a select host appliance apparent to the user. It is programmed to collect data and make the physical and conceptual principles of its host accessible. Fridge Companion is a particular instantiation of this general smart appliance design philosophy.

SITUATED INFORMATION, TIME AND INTERACTION
Fridge Companion is a situated interactive device with two distinct modes of operation. The first state is that of continuous presence. In this state the device monitors the difference between ambient air and refrigerator temperatures and displays the result to the user. The second state is that of periodic presentation. In this state the device first asserts the users presence and then displays sequential chapters of a graphical presentation on the underlying principles of its host. In this case the host is a cooling device so the presentation topics are selected from the field of thermodynamics.

Duration and presence
The operating system polls a set of 8bit A/D converters to which a thermistor sensor suit is connected and writes the results to memory. A difference function of the temperature

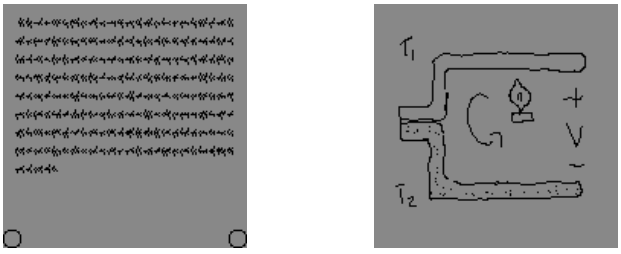

Fig.1: transcription and presentation (Seebeck effect)

readings is synchronized with the computer's system clock[1] and correlated with its display resolution. New

[1] The prototype designed to test these concepts uses a modified Palm m100 with PalmOS 3.1 in C++.

measurements are added to previous ones creating a graph of the collected data over time that visualizes both the collection of data as well as the passing of time. Each hour, one line of data is collected. During the day the transcriptions run from bottom to top, during the night from top to bottom. The transcription also functions as an event monitor. Opening the refrigerator door results in a noticeable spike in the recorded temperature function. The result is a pleasing transcription of the ambient temperature fluctuations and refrigerator visits. The goal of this continuous inscription process is to create ambient data constructions over time, to visually prolong the past via the present into duration as described by Bergson [1]. This process of data collection and visual transcription works as an approximation to the experience of duration. The fact that the measurement system can be used as a kitchen thermometer as well as a low-resolution clock is not significant. The utilitarian instruments build a functional basis from which the design goal of intellectual pleasure and increased awareness is derived.

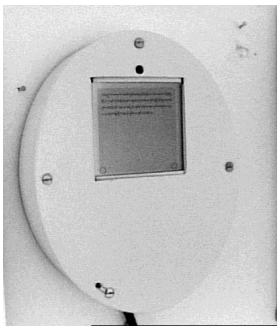

Fig. 2: Prototype in operation

Periodic and situated informed poetic

In contrast to the first state, the second state and behavior occurs periodically. In this example it is designed as a biweekly event. At the user set specific days and times a series of graphical descriptions on thermodynamics are displayed. The metaphor of a lecture series is useful to condition an uninitiated user's expectation towards this new device type. The lecture series contains a knowledge database of 300 bitmaps and text segments that are divided into 30 sessions to be displayed over 15 or more weeks. The series begins at the set date and time with the first graphic lecture and continues at the set days until the series is completed. Topics range from the main laws of thermodynamics over evaporation, compression refrigeration, entropy, the Seebeck and Peltier effects and thermo-couples, in which 2d graphics, text and key formulae are displayed. As opposed to the interactive laboratory of the E^3 approach [5], the Fridge Companion's descriptions resemble notes from an artist's sketchbook. Both explicit information and gestural sketches are used to investigate the various aspects of thermodynamics in an associative fashion and to create a kind of informed poetic that conveys facts but leaves room for imagination and curiosity. At the onset of any lecture, the device displays a hand that points to a temperature-based touch sensor protruding from the device. Fridge Companion is aware of the user and the environment via the same physical properties. A window of multiple minutes is set to allow the user to make a decision. The lecture is only presented if the user acknowledges his/her presence by activating the sensor (with any warm body part). The device acknowledges this action with a short buzz, the frequency of which is also a function of the current temperature measurements. Should the user decide not to view the presentation or simply not be present, the lecture is put aside until the next date. The user's presence conditions the transitions into presentation mode. The user is invited but never required to interrupt his/her routine and actively participate in the manifestations of the device. Fridge Companion has its own internal life and can wait. Each presentation can be repeated by reactivating the said sensor. After the short lecture, the device returns to state and behavior I to continue the monitoring process leading eventually to the next presentation. The lecture series completes itself only with repeated participation and patience over time.

CONCLUSIONS

A prototype device has been described that suggests an alternate interpretation of the idea of the information appliance. It continuously monitors a host appliance and its environment, periodically comments on principles underlying its measurements, and interfaces to users in the same fashion it senses its environment to create with its host an appliance that fosters awareness and contemplation.

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REFERENCES

1. Bergson, H. Creative Evolution [L'Évolution créatrice, 1907] Trans. from the French by Arthur Mitchell, 1923.
2. Burrel, J., Treadwell, P., Gay, G., Design for Context: Usability in a Ubiquitous Environment, *Conference on Universal Usability*, (CUU'00), 2000, p.80-84.
3. Fitzmaurice, G. Situated Information spaces and spatially aware palmpilot computers, *Communications of the ACM*, July 1993, Vol. 36, No 7, p 38–49.
4. Hindus, D. Mainwaring, S. Leduc, N., Hagström, A., Bayley, O., Casablanca: Designing Social Communication Devices for the Home. *Proceedings of ACM CHI 2001 Conference on Human Factors in Computing* (SIGHCI'01), 2001, p. 325–332.
5. Salisbury, M., Borning, A., A User Interface for the Electronic Encyclopedia Exploratorium, *Proceedings of the '93 International Workshop on Intelligent User Interfaces***,** 1993, p. 263-267.
6. Mark, W., Turning Pervasive Computing into Mediated Spaces, *IBM Systems Journal* 38, 4, 1999, p. 677-692.
7. http://www.iclretail.com/abouticl/releases/fridge.htm