THE CURIOUS HOME
INTERACTION DESIGN STUDIO

The Curious Home
Interaction Research Studio

This catalogue accompanies the exhibition
The Curious Home at The Pacific Playhouse, London,
29 June to 15 July 2007

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Curious Home illustration by Maja Sten
Design by Hyperkit
Printed by Dexter Graphics

First published in Great Britain 2007 by Goldsmiths,
University of London, New Cross, London SE14 6NW

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Research Studio, 2007

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Additional copies of this publication are available
from: Interaction Research Studio, Department of
Design, Goldsmiths, University of London, New Cross,
London SE14 6NW

ISBN 978-1-904158-81-3

This publication has been supported by Equator,
an EPSRC Interdisciplinary Research Collaboration

Interaction Research Studio

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You can find the Interaction Research Studio on the web at: www.goldsmiths.ac.uk/interaction

Films of our work installed in volunteers' homes can be viewed at: www.youtube.com/TheCuriousHome

EQUATOR

EPSRC
Engineering and Physical Sciences Research Council

Goldsmiths
UNIVERSITY OF LONDON

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Conclusion: The Anatomy of a Wave

Bill Gaver

So what can we conclude from the work shown here? The pages of this catalogue present our work in reverse, from the latest field trials all the way back to the tentative stirrings of ideas at the beginning of the project. It's like watching a film of a great wave hitting a beach, but played backwards: the water withdraws smoothly over the sand, begins to fizzle, then throws up spray and suddenly rears into a breaker, which retreats rapidly from the shore, gradually subsides into a swell, and disappears. Our work – the home trials, prototypes, engineering diagrams, sketch designs and concept proposals – are the flotsam carried by the wave, sometimes a coherent mass, sometimes a chaotic tumble of old ideas swirling away while new ones are gathered. In the end (which is where this catalogue begins) a single item is shown sitting peacefully in a changed landscape, like a mysterious piece of jetsam on a beach. What are we to make of such an unruly account?

The lessons I'd draw are threefold.

First, digital products – especially those for the home – do not have to reproduce our culture's preoccupation with work, consumption and entertainment. Instead, technology can encourage more exploratory engagements with life, providing evocative resources with which to discover new perspectives on ourselves and the world around us. Second, though digital technologies often seem the epitome of science and engineering, the methods we use in designing them need not be governed by such traditions. Interaction design can be a more subjective affair, with designers working in opinionated uncertainty and their products serving as tools for enquiry.

Third, new conceptual orientations open if we move away from the scientific concern with definition and certainty. The work here teaches us an appreciation for ambiguity and the power of interpretative appropriation. Most of all, it demonstrates the power of play to seduce us into radically new positions. This, I think, is the lesson that underlies all the others.

Of course, it is difficult to imagine the work shown here being done outside the context of Equator. Equator was an 'interdisciplinary research collaboration' (or IRC to the initiated), funded by the UK's Engineering and Physical Sciences Research Council (or EPSRC) at its highest level of support. The project brought together teams from eight universities around the UK to investigate new ways of interweaving the physical and digital in everyday life. Over an extraordinary six years, teams of computer scientists, sociologists, psychologists, fine artists and designers (that's us) worked together to explore ways in which technology might support children's play and learning, new forms of engagement with museums and cultural institutions, games that traverse digital and urban spaces, and technologies for the home (that's us again). The work in this catalogue is the result of our studio's engagement with the project, first at the Royal College of Art and more recently at Goldsmiths. It is only a fraction of the total Equator effort.

Being part of Equator brought us a number of benefits. The diversity of expertise in the collaboration allowed us to pursue ideas with a larger scope than would have been practicable working as a lone studio. This is most apparent in the prototypes we built, many of which rely on advanced sensing and display technologies, but it also applies to the perspectives from sociology and computer science that we accommodated. The sheer timescale of Equator (six years on one project!) meant that our work evolved over years, rather than months, and eventually transmuted into something that we never anticipated at the start. The momentum that we developed while exploring a wide range of possibilities helped our ideas to deepen – to mature and commingle – before being captured in finished prototypes.

Consider the Plane Tracker, for instance. This is an appliance that imagines the view from passing aircraft, which it does by picking up aircraft

transponder signals and using this information to control a reprogrammed version of Google Earth. Although it was one of the last prototypes we built, hints of the idea appeared in our earliest workbooks. Initially a proposal for transmitting 'compensatory data' from noisy and polluting transport, the idea took its final form by way of a long consideration of how 'digital window boxes' might act as seedbeds for exotic virtual plants dropped from aircraft overhead.

Far from being the result of single-tracked, dedicated development cycles, concepts like the Plane Tracker merged with and emerged from a skein of other possibilities, many of which carried through from the beginning of the project right to its end. The way our ideas developed and wove around one another is manifest in this catalogue. Flip through its pages and proposals appear and reappear, like old friends or recurring dreams – or, perhaps, the anecdotes of a pub bore. Equator enabled this process. It afforded us the time and flexibility and breadth of approach to allow ideas to rise slowly to the surface, to revolve around one another, sink out of sight, and sometimes reappear in new form.

There is nothing random about the prototypes we built, yet it could easily have been different.

Each of the devices we made reflects a complex set of social, technological and conceptual issues. During the first few years of Equator, for instance, ideas about non-utilitarian design mixed with ethnographic observations about the importance of surfaces in the home and computer science algorithms enabling load sensors to be used as input devices. The result was three prototype pieces of Weight Furniture.

The Drift Table allows people to 'drift' over the British countryside, viewing aerial photography through a tabletop porthole while controlling their flight (direction, speed, height) with the position and weight of objects on the surface. The Key Table uses load sensors to measure the force with which people place things on it, tilting a picture frame to indicate the degree of emotion implied by this force. The History Tablecloth lights up portions of a large grid of lacelike electroluminescent elements to emphasise the length of time objects have remained upon it. As a group, the three devices explore ways in which responsive furniture might allow people to engage afresh with information about the world, their homes, even their own activities.

A second wave of prototypes looked beyond the home to its situation in the surrounding physical and cultural context. They also reflect the research community's growing interest in 'ubiquitous computing', which foresees future 'products' made up of multiple sensors, processors and displays distributed over a space.

The Video Window is the most basic of these Threshold Devices, simply linking a video camera mounted on a tall mast outside the home to a display within. It's an exploration of how technology modifies what we see, how it adds its own features to the picture, and how the aesthetics of these features blend with utilitarian values such as checking the weather. The Local Barometer uses wind speed and direction to select geographic locations, then searches online classified advertisements for these locations and displays the resulting images and texts (modified to bring out latent poetry) on screens throughout the home. Lastly, the Plane Tracker – already described – provides resources for an appreciation that might focus on the ecological consequences of air travel, or the novel views of the earth it affords, or a recognition of the ways in which aeroplanes forge physical and conceptual links between one's own home and faraway lands. Together, the three offer new views from the home, views that provide a new kind of situational awareness which includes one's placement in virtual as well as physical space.

But look at the ones that got away!

The Window Box, mentioned above, would have 'grown' virtual versions of plants found only in the distant locations visited by passing transport. (We considered trains and lorries as well as aircraft.) It would also have balanced our competing desires for information and aesthetics, for clarity and mystery, and for conceptual appreciation and sensual

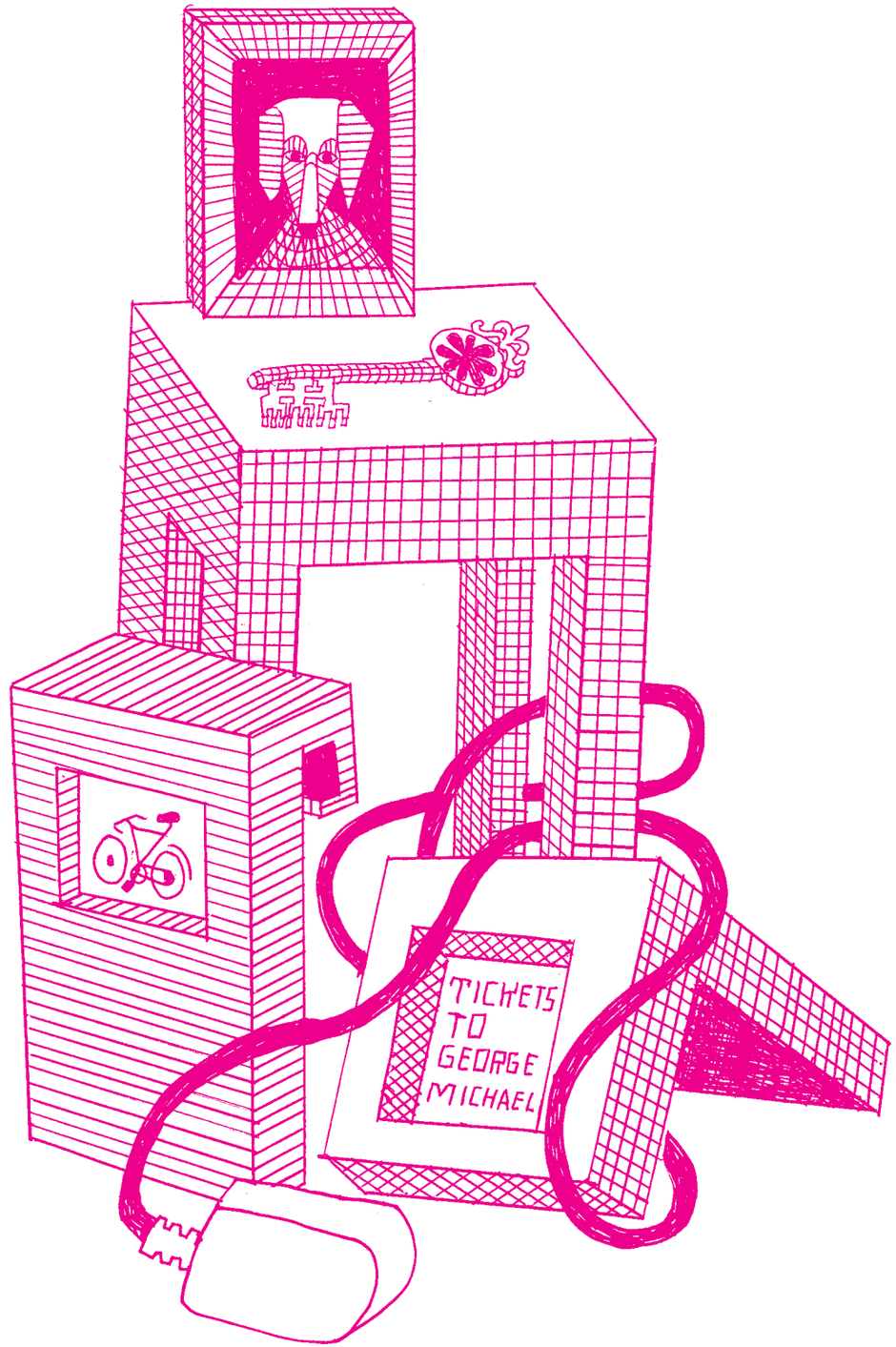
enjoyment quite differently than the Plane Tracker.

The Lampshare experiments, too, might have developed in significant ways. They started with an experiment in which two of us simply exchanged bedside lamps for a week. This shockingly powerful experience (one of the team-mate's partners refused to let the lamp near their bed!) led to further proposals for possession exchanges, and also to our remotely connecting two lamps so that they seemed to share power – turn one up and the other goes down. Although we discontinued our experiments at this point, they still hold promise. Perhaps we could add to the myriad combinations of voice/text/image used to support remote communication, and even to the evocative objects designed to support emotional contact, by creating a visceral sense of connection through the sharing of our mundane surroundings with electronic ghosts?

The Computer Vision devices and Ultrasound Tracking explorations were also intriguing. They began as ways of tracking certain objects around the home, in order to learn how the objects were, or weren't, used. Later, a number of sketch proposals explored the notion that detailed images of our possessions, captured through special 3D scanning devices, might act as a convenient substitute for the cupboards full of stuff, most of it rarely used, in our homes.

Storage, finally, is a central issue for the home. In exploring this topic, we began to see our homes as habitats for objects, with people an added extra. Could we change this situation and somehow make our belongings, those stolid sitting tenants, pay their rent? Along with the experiments in vision and location tracking, we imagined representing storage as a cinematic experience, to create evocative landscapes using the things we don't normally see. We captured images of the home's nooks and crannies, studied the evocative lighting effects employed by some contemporary artists and photographers, even researched the use of controlled explosions in blockbuster films. But we never developed these ideas, not because they were dead ends, but because our momentum gathered behind other projects. Storage is an issue to which we would like to return.

So it could all have been different. If it is clear why we pursued the design directions we did, it's not clear why we didn't chose the ones we didn't. We could have developed any of the areas we explored into finished prototypes, and then this catalogue would look very different – perhaps. But perhaps not. All these product ideas, from the most finished prototypes to the sketchiest proposals, represent a sensibility, not a commitment to a few best ideas. It's as if we reached into the rushing wave and grabbed what we could – more remains below the surface. From that point of view, this catalogue is a celebration of what we didn't build as much as what we did.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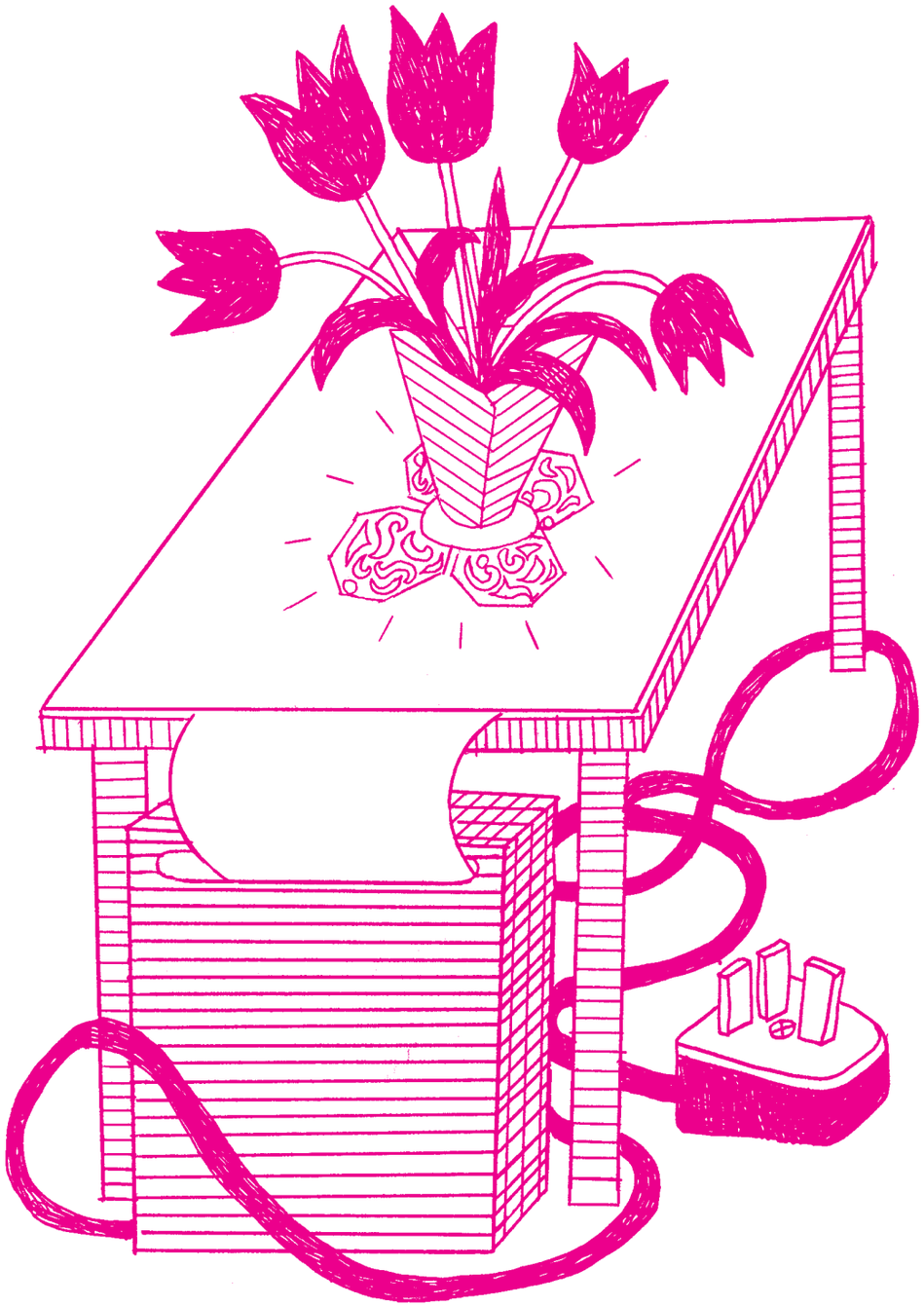
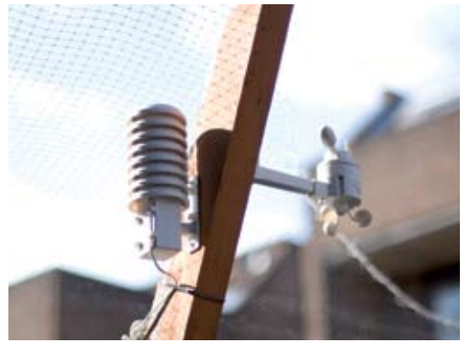


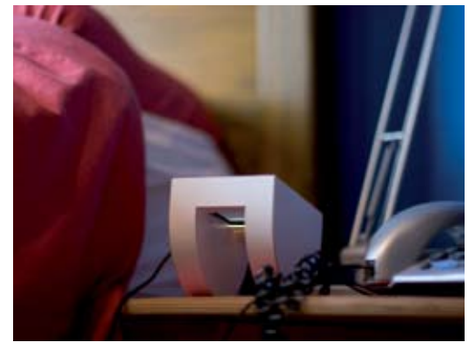
THE LOCAL BAROMETER CONSISTS OF SIX BRIGHTLY COLOURED DEVICES, EACH CONTAINING A SMALL SCREEN. ACROSS THE SCREENS SCROLL EDITED VERSIONS OF IMAGES AND TEXTS THAT CURRENTLY APPEAR IN CLASSIFIED ADVERTISEMENTS IN LOOT.COM. THE LOCAL WIND CONDITIONS DICTATE WHICH ADVERTISEMENTS APPEAR: ADS ARE SELECTED FROM AREAS THAT ARE UPWIND OF THE HOME, AND THE HARDER THE WIND BLOWS, THE GREATER THE DISTANCE BECOMES FROM WHICH THE ADS 'TRAVEL'. THE IDEA IS TO PROVIDE PEOPLE WITH A NEW SENSE OF THE SOCIOCULTURAL TEXTURES IN THE VICINITY OF THEIR HOME, BUT WITHOUT ENFORCING ANY PARTICULAR VIEWPOINT. PEOPLE ARE FREE TO INTERPRET THE IMAGES AND TEXTS IN ANY WAY THEY CHOOSE.

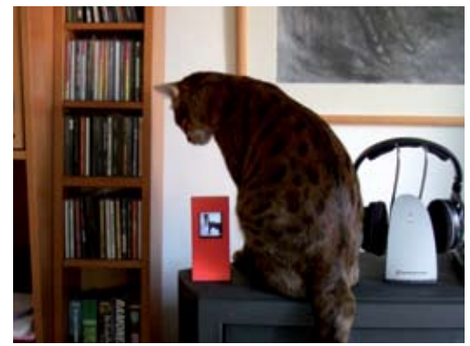
Installing the Local Barometer in Roy's Flat in central London, 4 April 2007

After months of work on the system, we finally installed the Local Barometer in someone's home. Roy had volunteered to try out the Local Barometer, and on an unseasonably hot and windless day in April, we arrived at his flat with the six display devices, a weather station and a home computer. While Roy and his two cats looked on, we placed each device in the location for which it had been designed: the bookshelf, the bedside table, the kitchen, and so on. We erected the weather station on the roof, switched on the computer and connected it to the internet, and then, before taking our leave, checked that all the components of the system were talking to each other. It took most of the afternoon. By the time we'd finished, the cats had lost interest in us.



LOCAL BAROMETER: INSTALLATION APRIL 2007





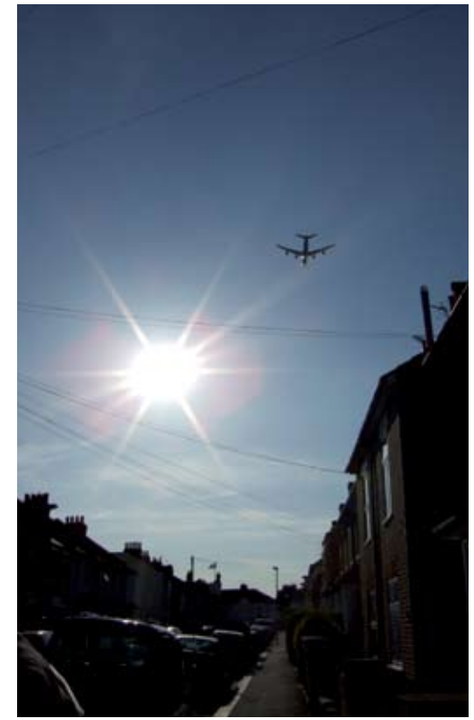
THE PLANE TRACKER DECODES RADIO SIGNALS FROM PASSING AIRCRAFT AND USES THIS INFORMATION TO CREATE IMAGINED FLIGHTS OVER THE GLOBE. AS YOU WATCH THE SCREEN, YOU ARE TAKEN UP AND AWAY, FOLLOWING THE ROUTES OF THE PLANES. WE HOPE THIS EXPERIENCE MIGHT STRENGTHEN PEOPLE'S SENSE OF CONNECTION WITH DISTANT PARTS OF THE WORLD. AS WITH THE LOCAL BAROMETER, HOWEVER, THE SYSTEM DOES NOT DICTATE HOW IT IS USED. PEOPLE MAY FIND THEIR IMAGINATIONS STIRRED IN WAYS THAT HAVE LITTLE TO DO WITH GEOGRAPHY...

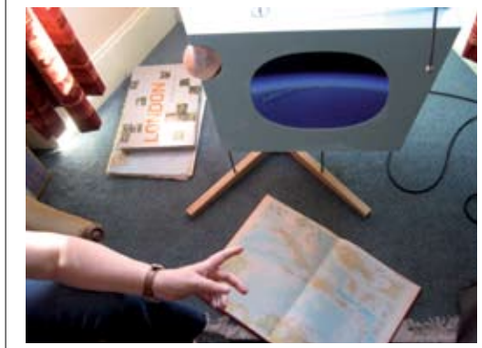
Installing the Plane Tracker in Gwen's House in west London, 3 April 2007

The day before we installed the Local Barometer in Roy's flat, we took the Plane Tracker to the house of another volunteer. Gwen lives in west London, directly beneath the Heathrow flight path. She is accustomed to the thunder of passing planes – it's as much a part of her life as the ebb and flow of traffic outside, and the chatter of birds. By chance, the day that we arrived, the weather was unusual and planes were approaching Heathrow from a different direction. Nevertheless, the aerial on the Plane Tracker, which was developed for us by NASA scientists, was able to pick up signals.

We were pleased to find a perfect place to sit the Plane Tracker: the bay window of the front living room. Not only did the window give a line of sight to passing aircraft, but it also provided a kind of frame around the device, highlighting its presence in the house. Next to Gwen's comfortable furniture, the Plane Tracker looked mysterious and inviting – or so we hoped.

PLANE TRACKER: INSTALLATION APRIL 2007

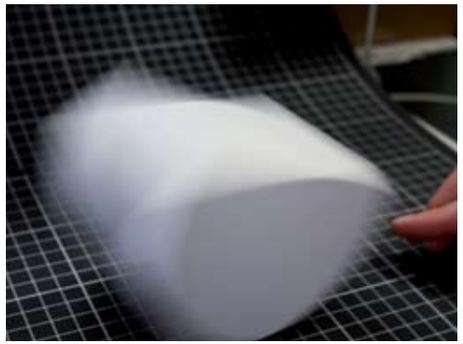


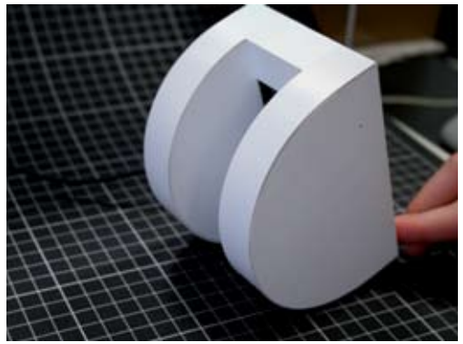


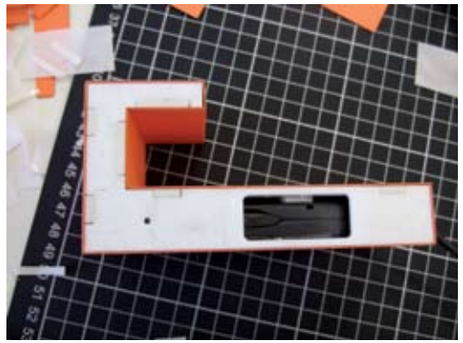
Building the Local Barometer, March 2007

After nearly two years of development work, we were ready construct the six devices that make up the Local Barometer. It was an exciting time. We had almost reached this stage twice before, but had then been forced to abandon our efforts on discovering a fundamental flaw in the hardware we were using. Our new system used stripped-down Nokia phones, which provided wireless connectivity, sufficient processing power, and a decent colour screen.

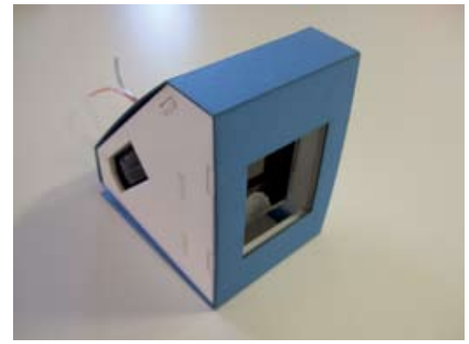
In order to create objects that would be appropriate for various locations in the home, we needed to change the form of each phone. Our solution was to create a second body for the phones – a shell in which to hide their flat, pocket-friendly design. First we removed the speakers and other unnecessary ancillaries, and repositioned each screen. Then we built new forms out of laser-cut acrylic shells. Around these forms we wrapped a cardboard skin, each with a different primary colour. The result was, we thought, both robust and striking.

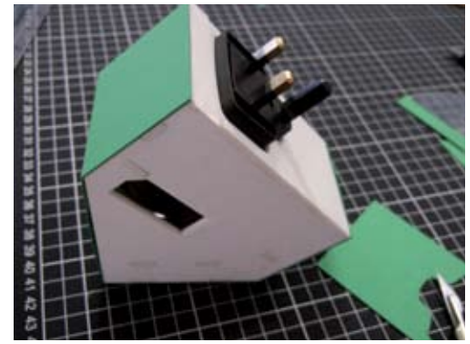


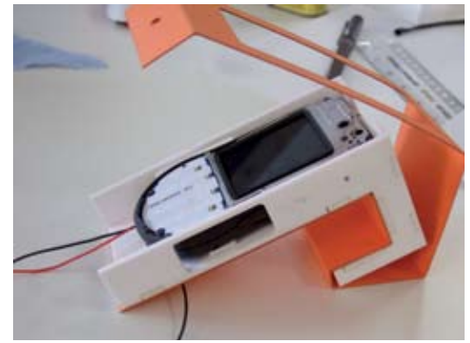


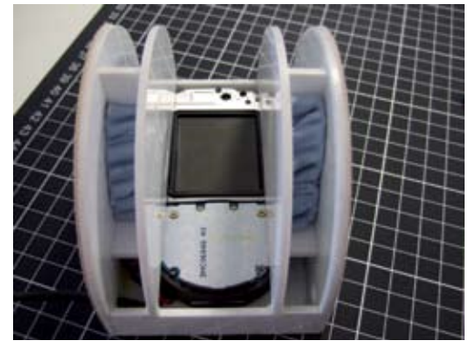


LOCAL BAROMETER: BUILDING MARCH 2007









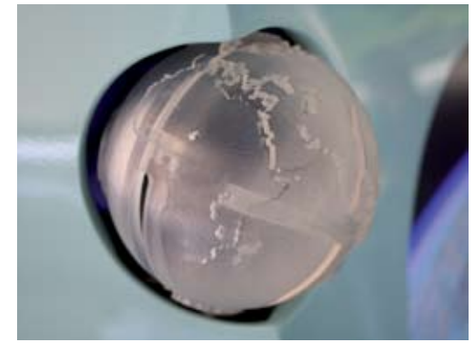
Building the Plane Tracker, February 2007

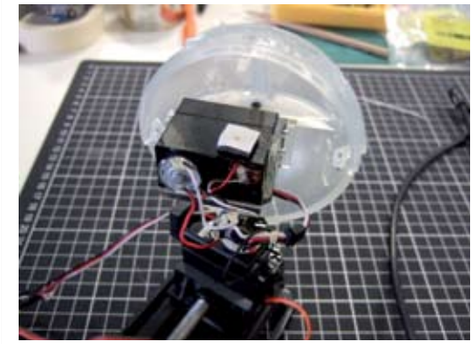
The Plane Tracker is probably the most technically complex piece we have built. On top of the technical challenge was the fact that our resources were limited. We didn't have the leisure or the money to gradually perfect each component, so we had to get it right first time.

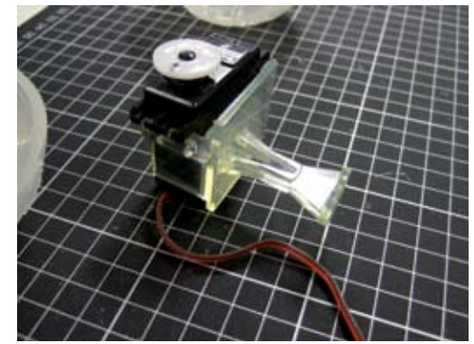
We spent two months planning, commissioning manufactures and sourcing components. The happiest day of this period was the morning that the case was delivered. Its complex form has been very difficult to resolve, and we were worried that it might not fit around all the parts. But it did. Perfectly. And what's more, the paint finish was superb.

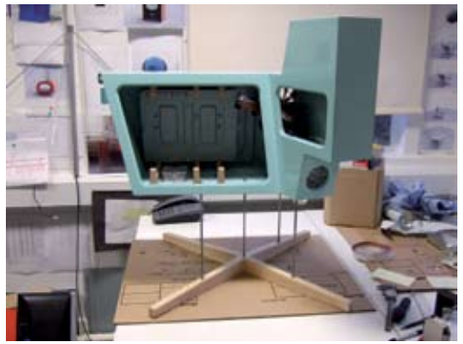
Only two weeks later, we were ready to install the Plane Tracker in Gwen's house.

PLANE TRACKER: BUILDING FEBRUARY 2007

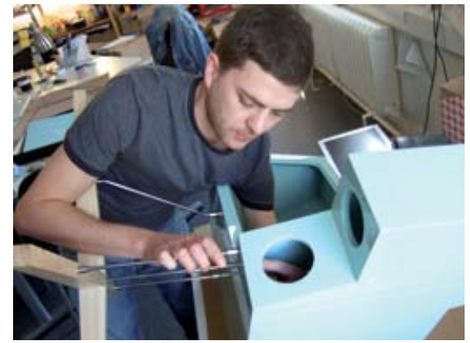


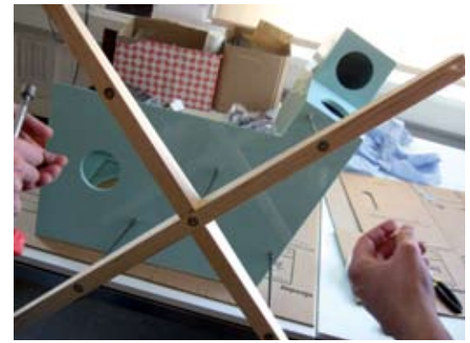


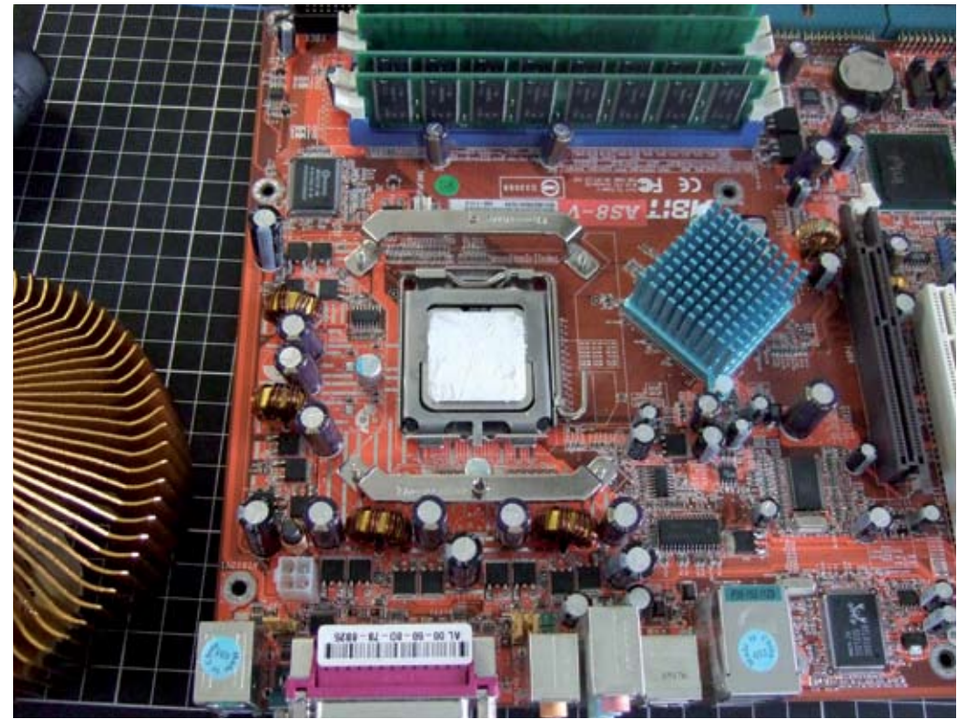




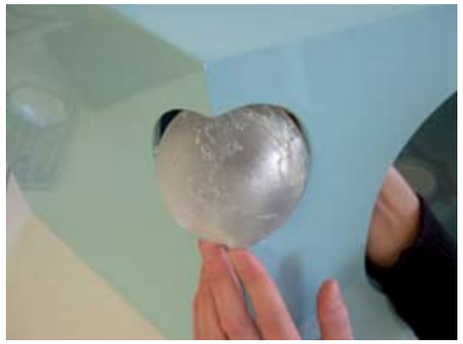
PLANE TRACKER: BUILDING FEBRUARY 2007













Design and Development of the Plane Tracker, January–December 2006

The original design concept for the Plane Tracker was very different from its final form (as you'll see when you read on). What both share is the fundamental notion that people who suffer from the noise of passing planes might somehow be compensated through the use of an intermediary device that unlocks the imagination, that turns noise pollution into a useful kind of dreaming. To this end, we developed a system that could decode signals from passing aircraft, thus revealing their departure points and destinations. But we then hit two major problems.

The first problem was that, whatever ideas we formed for using the information obtained about passing aircraft, they always seemed to demand that we generate vast amounts of content. Basically, we wanted to conjure up a vision of distant lands, but how do you do this without an encyclopaedic knowledge of those distant lands? Answer: use Google Earth. In early 2006, various research groups were beginning to exploit the malleability of Google Earth, and this prompted us to give it try. We soon discovered that, by reprogramming the software, we could recreate the flight of a particular aircraft across the globe. That was a great discovery, but then we hit the second problem.

We couldn't find a radio aerial sensitive enough to detect aircraft from indoors. Of course, we could have mounted an aerial outside, but this would have meant running metres of cable through people's houses. (We had tried this in an earlier project, and were wary of the complications it would cause.) An impasse. But then we came across an article in *Wired*, about a new technique developed by NASA scientists for designing super-sensitive antennas. The scientists had created algorithms for genetically evolving, from a family of initial aerials, an aerial which would suit its circumstances perfectly – an 'nth' generation aerial, if you will. We contacted NASA and, to our delight, they agreed to put one of their mammoth computers to work on our problem.

Now, our first sketches for this aerial were based on a picture in *Wired*, of an object which looked rather like leafless tree, or perhaps the roots of a turnip, seen upside-down. What NASA came back with was quite different. Our NASA antenna didn't branch out, and it was also bigger than we had expected. So, size became an issue. Another issue was strength: would this fragile structure actually stand up? We sent the design to Arup, an engineering firm, for structural analysis. Their verdict was that the aerial would have to be supported at three specific points, and it would then settle into the correct shape under its own weight.

The design of the Plane Tracker was somewhat informed by the Arup blueprint. Our early sketches echoed the form of a gramophone, but these quickly developed into a form influenced by the requirements of the aerial. However, we deliberately chose a style and colour and screen shape (a super ellipse) that evoke the golden age of travel and exploration.

As a final touch, we wanted to provide the viewer with an indication of their imaginary position on the planet, and so we experimented with various forms of instrumentation, from a digital readout of longitude and latitude, to a graphical representation of a globe that would function like a moving map on a secondary display. Eventually, inspired by aircraft instrumentation, we devised a mechanical globe. Basically a sphere with extruded land mass, this semi-translucent device twists and turns in the corner of the case, giving a rough idea of location – and rough is sufficient for our purposes, as great precision might detract from the on-screen experience.

PLANE TRACKER: DESIGN AND DEVELOPMENT JANUARY–DECEMBER 2006

Technical resources used in the design of the Plane Tracker

The antenna was evolved for the Plane Tracker by NASA Intelligent Systems [ic.arc.nasa.gov/projects/esg/research/antenna.htm].

It is tuned perfectly for receiving aircraft registration transmissions called ACARS on 131.725 Mhz [en.wikipedia.org/wiki/ACARS].

These transmissions contain various bits of information including the unique aircraft registration number (just like a car registration number) and its current flight number (just like a bus route). This broadcast is picked up by the receiver and is decoded on a PC using a free application called ACARSD [www.acarsd.org].

What the transmission doesn't contain is the flight information. In order to find out destination and departure airports the ACARSD system has to query, over the internet, amateur plane spotter website databases to retrieve the airports codes [www.planespotting.net].

The system also pulls the latest photograph of the aircraft and anything else it considers interesting.

Airport codes arrive in two forms, ICAO or IATA. The ICAO is a complete and very long list of all the airports in the world, however small, and uses a four-letter code. IATA is a list of all the major airports in the world and uses a three-letter code. For example, the ICAO code for London Heathrow is EGLL and the IATA code is LHR [en.wikipedia.org/wiki/ICAO_airport_code].

All this information is compiled and immediately appended to the daily ACARSD system log file, which is located on the Plane Tracker PC.

Reading this file, and imagining the flight that the latest aircraft is taking, is handled by the GENav program written by Jan Humble (Nottingham

University), Nicolas Villar (Lancaster University), Andy Law and Tobie Kerridge (Goldsmiths, University of London).

The GENav program then calculates the airport locations, their height above sea level and the direction of the runway. This is done by querying a file that was compiled from DAFIFT data taken before October 2006 from the US military's National Geospatial-Intelligence Agency [www.nga.mil/portal/site/nga01/] and data compiled by Arash Partow for his Global Airport Database [www.partow.net/miscellaneous/airportdatabase/].

The GENav program controls Google Earth, visible in the main window display of the Plane Tracker, and the mechatronic globe positioned on the front face left corner of the Plane Tracker case.

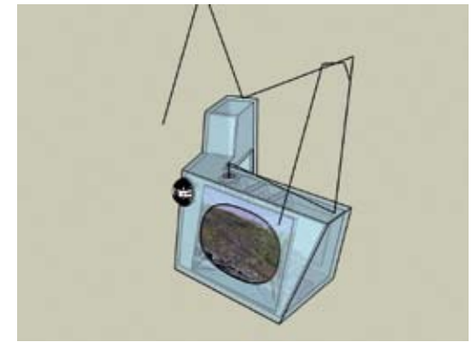
To give an indication of the current location of Google Earth, and therefore what part of the world is appearing on the Tracker's display, GENav periodically asks Google Earth where it is and aligns the mechatronic globe accordingly.

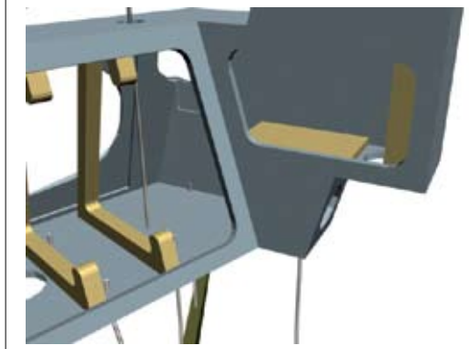
The Plane Tracker's object language

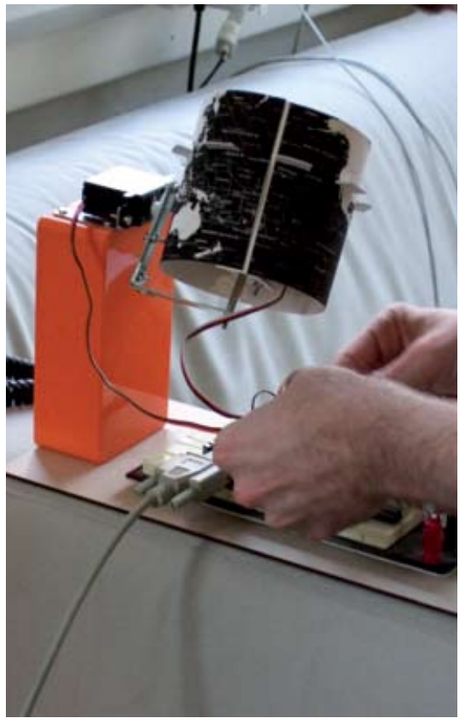
As the antenna was evolved by NASA and subsequently structurally engineered by Ove Arup, there were several requirements for the design of the Plane Tracker box. Andy Boucher and Andy Law decided to allow these requirements to form the brief for the Tracker's object language. In effect, the form would reflect the evolved antenna. Other material and visual references for the Tracker came from the artefacts designed in the 'jet age', around 1958.

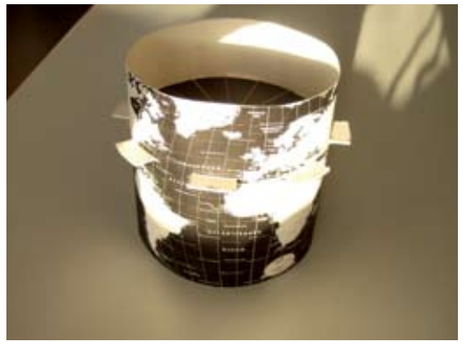
Two designers were extremely influential in the 1950s, Charles Eames and Piet Hein. The Tracker directly references a piece by each designer: Eames' La Chaise [www.vitra.com/products/designer/charles_ray_eames/la_chaise/default.asp?lang=gb_en] and Hein's maths for Fritz Hansen's Superellipse Table [www.fritzhansen.com].

PLANE TRACKER: DESIGN AND DEVELOPMENT JANUARY–DECEMBER 2006

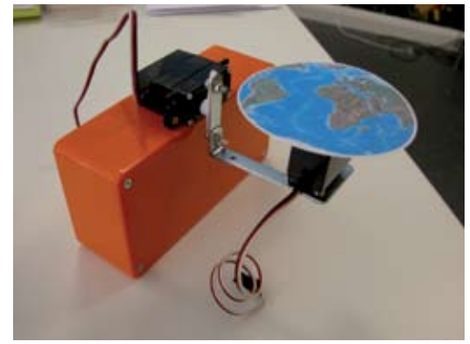


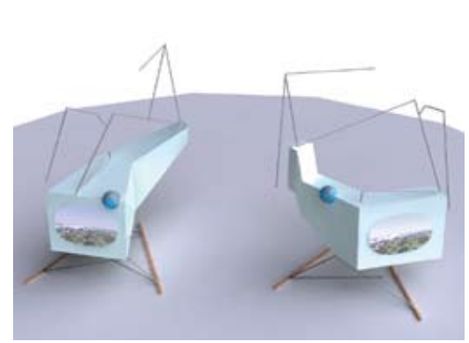


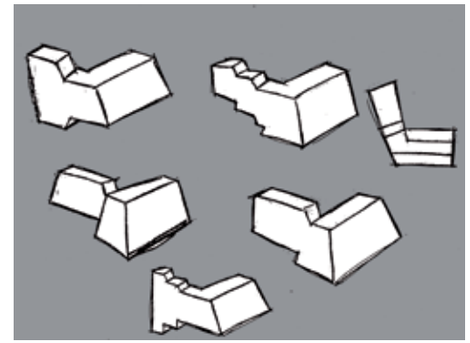


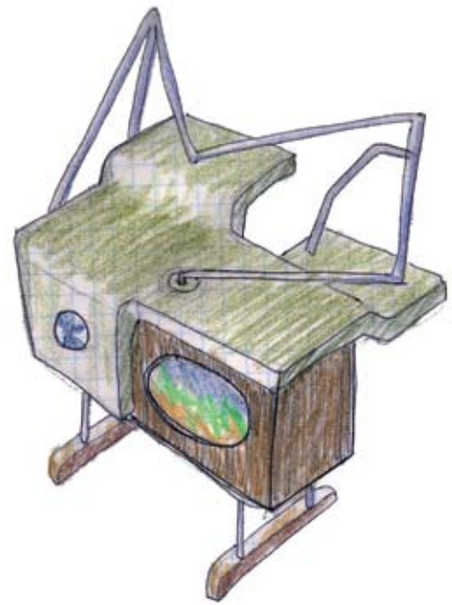


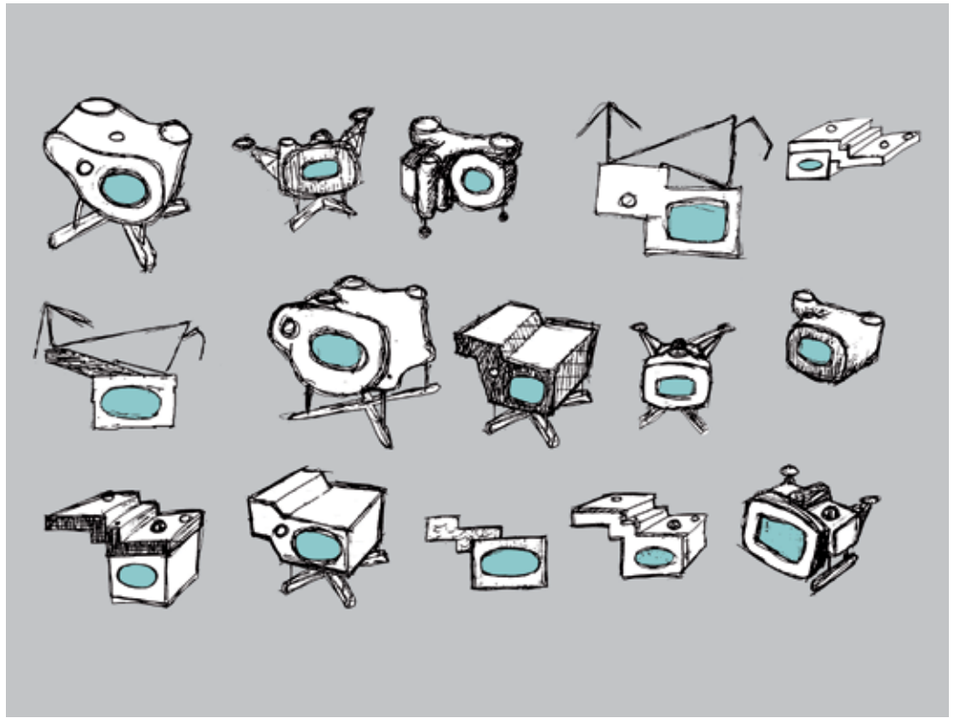
PLANE TRACKER: DESIGN AND DEVELOPMENT JANUARY–DECEMBER 2006

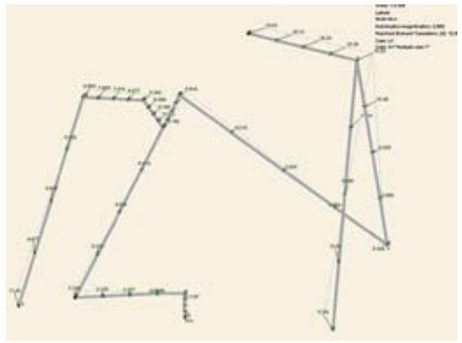


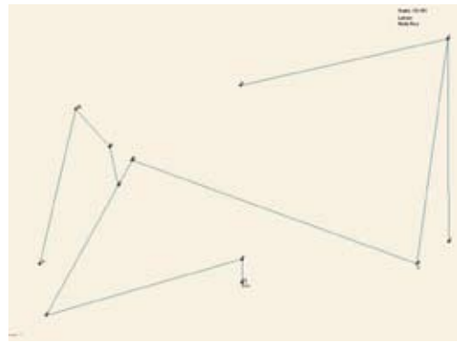


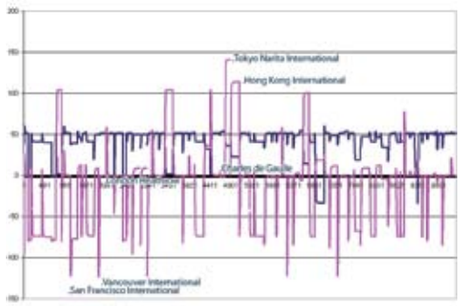


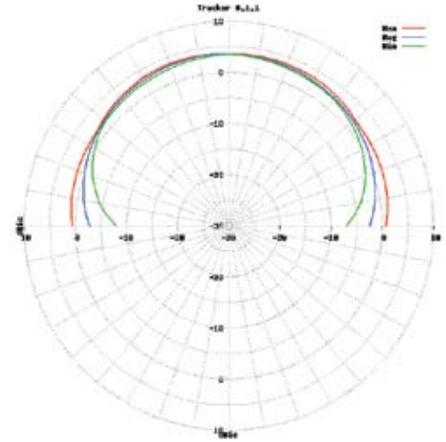


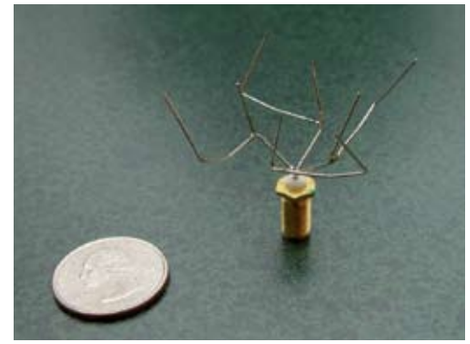












Top right: Gregory Hornby, University of California Santa Cruz at NASA Ames Research Center

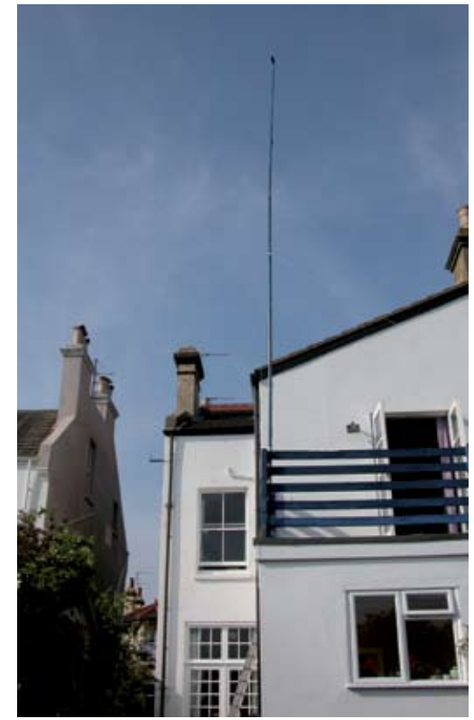
THE VIDEO WINDOW IS A SIMPLE DEVICE, IN BOTH CONCEPT AND EXECUTION. A VIDEO CAMERA MOUNTED HIGH ABOVE THE HOME PROVIDES A NEW VISTA WITHIN – AND THAT'S IT. ORIGINALLY DEVELOPED BY ONE OF THE TEAM FOR HIS OWN HOME, THE SYSTEM IS CURRENTLY HOUSED WITH VOLUNTEERS. WILL THEY FIND IT APPEALING? WILL IT BECOME A MEANINGFUL PART OF THEIR DAILY LIVES?

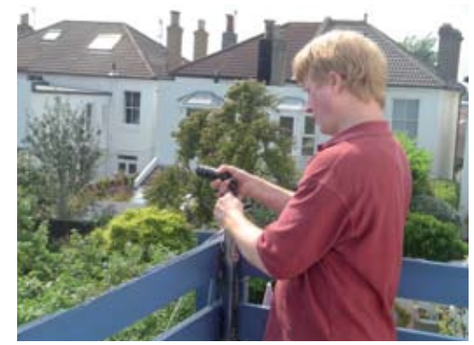
Installing the Video Window in Celia's house in Sussex, 16 June 2006

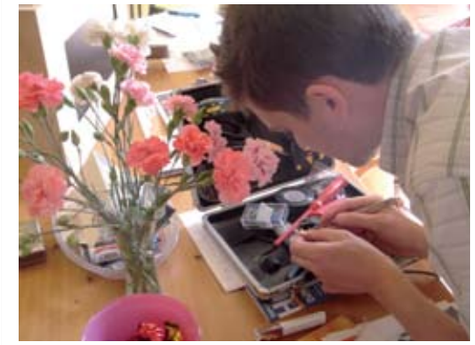
The Video Window consists of a Sony CCD camera mounted on a ten-metre fishing pole which is attached to the roof of one's house. The camera is linked to a display device indoors, which is always on.

Bill first designed a version of the system for his own home. In fact, he designed several versions. It was a hobby of sorts: refining the design in his spare time, with only himself and his wife to please. When we decided to install the system in a volunteer's home, we discovered that pleasing other people is more demanding, because makeshift arrangements (in which technology hobbyists tend to delight) can seem intrusive or even destructive. To avoid structural damage to the volunteer's house, we had to strap the pole to balcony, and then feed the cable, via drainage pipes, through a hole once used for a TV aerial cable.

We spent some time choosing a good view for the camera. With the pole extended all the way, the camera was just able to view the sea – something that the householders could only see by peering through the dormer window on the top floor of the house. The evening breeze made the camera sway to and fro, causing the image on the screen to sway gently, as if seen from the prow of a boat.







THE HOME HEALTH HOROSCOPE USES SENSOR DATA COLLECTED IN THE HOME TO MAKE INFERENCES ABOUT THE GENERAL WELLBEING OF THE HOUSEHOLD, WHICH IT EXPRESSES AS SHORT HOROSCOPES. IT EMPLOYS A SIMPLE INFERENCING ENGINE TO MAP THE SENSOR DATA (INTENSITY OF LIGHT, VOLUME OF SOUND, FREQUENCY OF MOVEMENT, AND SO ON) TO TEN DIMENSIONS WHICH ALTOGETHER FORM A MODEL OF THE HOUSEHOLD'S WELLBEING. THIS MODEL IS, OF COURSE, RUDIMENTARY AND HOPELESSLY SIMPLISTIC. HOWEVER, THE HOROSCOPES WHICH THE SYSTEM GENERATES ONCE A DAY, AND WHICH ARE DRAWN FROM A CORPUS OF ABOUT 10,000 FOUND ON THE WEB, ARE – ESPECIALLY IN COMBINATION – ANYTHING BUT SIMPLISTIC. JUST AS THE AMBIGUOUS LANGUAGE OF 'REAL' HOROSCOPES ALLOWS PEOPLE TO READ THEIR OWN LIVES INTO THEM, SO MIGHT OUR HOROSCOPES ALLOW PEOPLE TO READ BEYOND THE LIMITATIONS OF THE SENSOR-BASED INFERENCING. WE HOPED, AT THE VERY LEAST, TO ENCOURAGE REFLECTION AND DISCUSSION AMONG MEMBERS OF THE HOUSEHOLD, AND POSSIBLY TO HIT ON A FEW HOME TRUTHS.

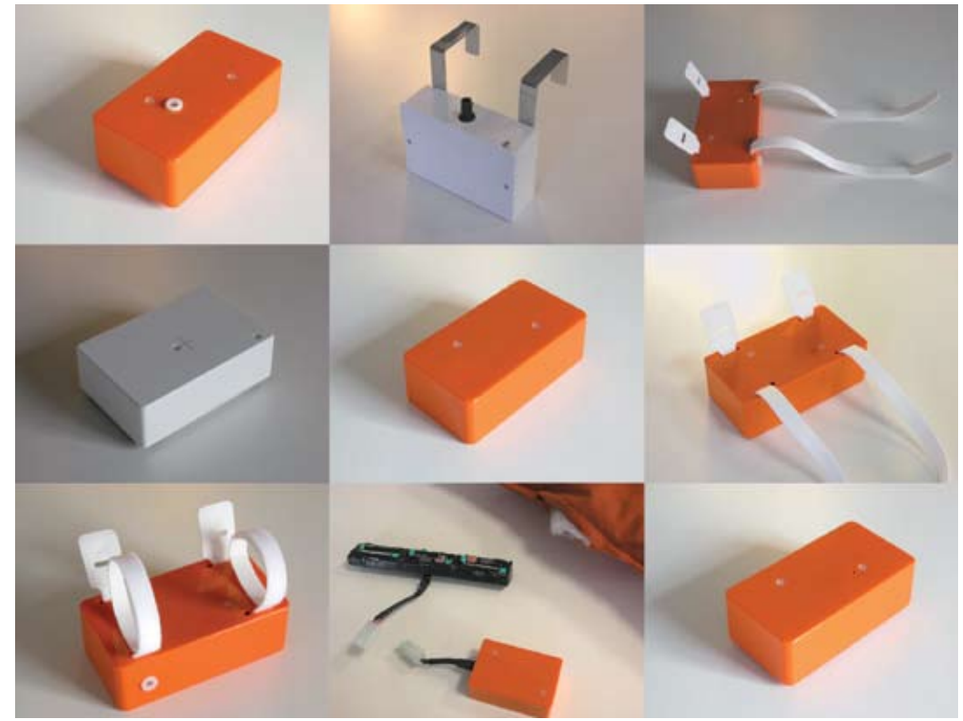
Living with the Home Health Horoscope in Fru's house in north London, 12 May 2006

We left Fru and her household with the Home Health Horoscope for two months, only returning to recharge its batteries once a week. Once as day, a small device in the kitchen would print out the day's horoscope, much as a cash register prints out receipts. We didn't explain what the system was for, or how it worked. (And we certainly didn't mention how many people were involved in its creation. Our partners in the Information Science Department at Cornell University collected the horoscopes while we designed the inference engine.)

To our surprise, this lack of information became one of the principle interests of the thing. Some members of the household suspected that we were playing games with them, and that we were really intent on somehow observing *them*, rather than their interactions with the system. Others were less wary, despite maintaining a healthy skepticism. Fru herself enjoyed the air of mystery surrounding the various devices, and engaged with the system throughout its stay. Fru had mixed feelings about the horoscopes, however. She objected to their tendency to stress how busy the household was. It wasn't that she thought this was wrong, exactly. It's just that she liked being busy and resented being told to slow down (though her friend Eddy thought this was good advice). Nonetheless, she based at least one important decision – the strategy used to purchase a house – on advice from the horoscope. Over time, however, she became disenchanted with the system, finding many of its pronouncements irritatingly agnostic – but that's horoscopes for you.

HOME HEALTH HOROSCOPE: LIVING WITH MAY 2006

HOME HEALTH HOROSCOPE: LIVING WITH MAY 2006



Design and Development of the Local Barometer, January–December 2006

The Local Barometer had a long gestation. Despite its apparent simplicity, it was a fiendishly complex system to develop. Along the way, we worked with many researchers in the field of ubiquitous computing, even collaborating on the design of brand new hardware which we hoped would underpin the system. Unfortunately, nothing emerged that was robust enough to work without periodic maintenance.

At one point, we all but gave up on the aim of realising the system. But then, as luck would have it, Mobile Processing [mobile.processing.org] was released in January 2006. Mobile Processing is an open-source software environment for developing applications for mobile phones. Since we had been using small screens, like those in mobiles, the new software suited us perfectly. Moreover, we could also use the phone handsets. These were relatively cheap, and reliable, and had all the features we needed.

We settled on a type of Nokia handset that seemed virtually indestructible. Then we went about our work, stripping outer shells, removing redundant features (cameras, speakers), and rotating the screens by 90 degrees, and so on. As we'd hoped, the phone was impervious to this treatment, and thus allowed us to experiment with new forms using cardboard casings.

While experimenting with the form of the handset, we also developed software. The concept was already in place by then: a weather vane reads wind speed and direction, and this information is used to generate a selection of postcodes, and this information is, in turn, used to select classified ads from Loot.com. Images are resized to fit the screen. Text is also processed, but for another reason: we decided to decontextualise the ads (i.e. make them less like ads) by removing punctuation and inserting line breaks at set intervals, in order to allow their latent poetry to emerge. (We had in mind the deceptively simple poetry of William Carlos Williams.) It didn't always work, but every now and then a mundane sentence would reveal hidden depths – a glimpse of wry humour, or exuberance, or sadness.

The final form of each Barometer was designed for a specific location: an upright form for the mantelpiece, an L-shaped structure that hangs over the edge of a bookshelf, a short squat model for a tabletop, a rolling shape that hides its screen for the bedside table, a hook-style construction for hanging, and a plug-style model that fits directly into a power socket.

LOCAL BAROMETER: DESIGN AND DEVELOPMENT JANUARY–DECEMBER 2006

Nokia N91 NEW! must be in a good working condition and not be blacklisted cash ready no timewasting preferably unlocked.	Challen piano upright circa 1950 1 careful lady owner good condition all singing all dancing	Pocket watch by h e peck Antique key wound silver swiss made pocket watch by h e peck of London Working but a couple of dents at back and seconds hand is missing
Ibanez PDS1 Distortion Programmable vintage guitar distortion pedal with 2 separate outputs from overdrive to heavy distortions with 20 memories John	Dog kennel NEW! dog kennel 3ft by 2ft by 2ft high	Rottweiler Puppies 4 dogs & 5 bitches black & tan KC reg wormed & de flead vet checked good temperament home reared with children mother can be seen

LOCAL BAROMETER: DESIGN AND DEVELOPMENT JANUARY–DECEMBER 2006



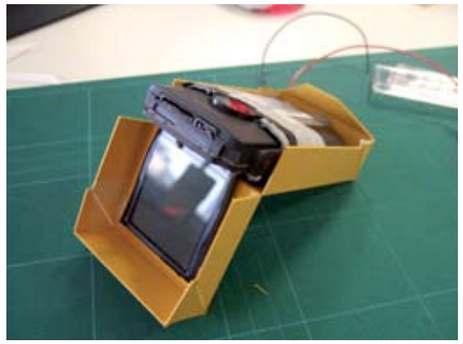


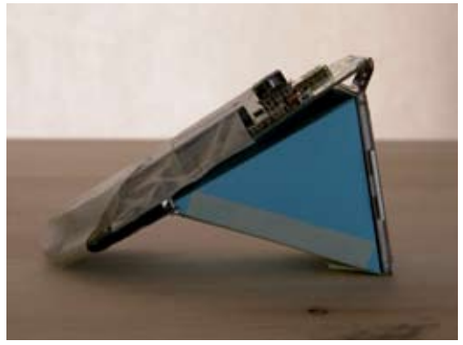


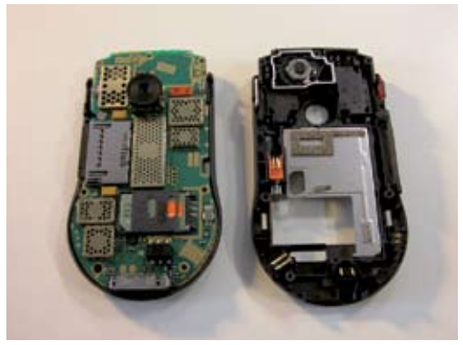




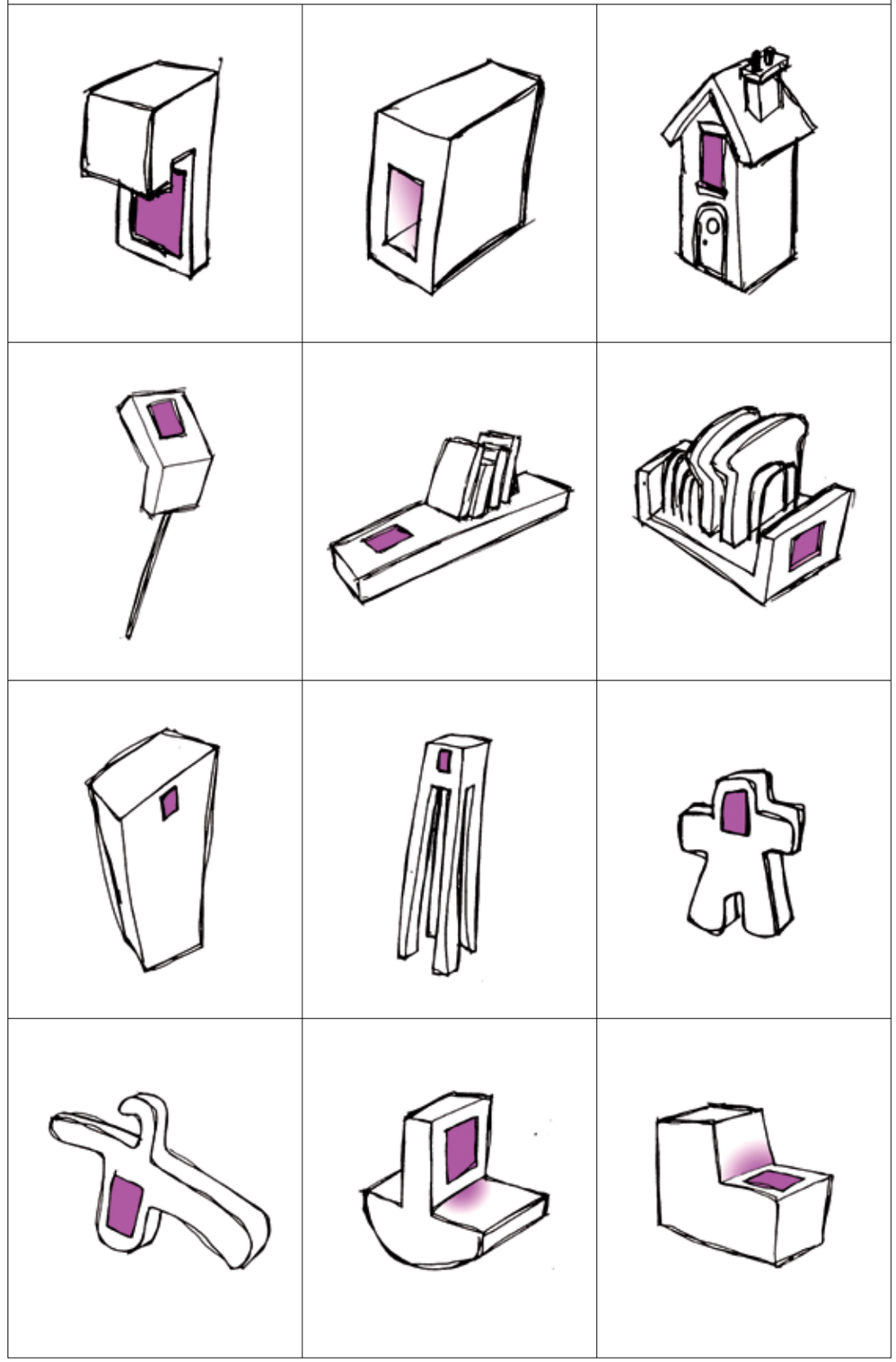








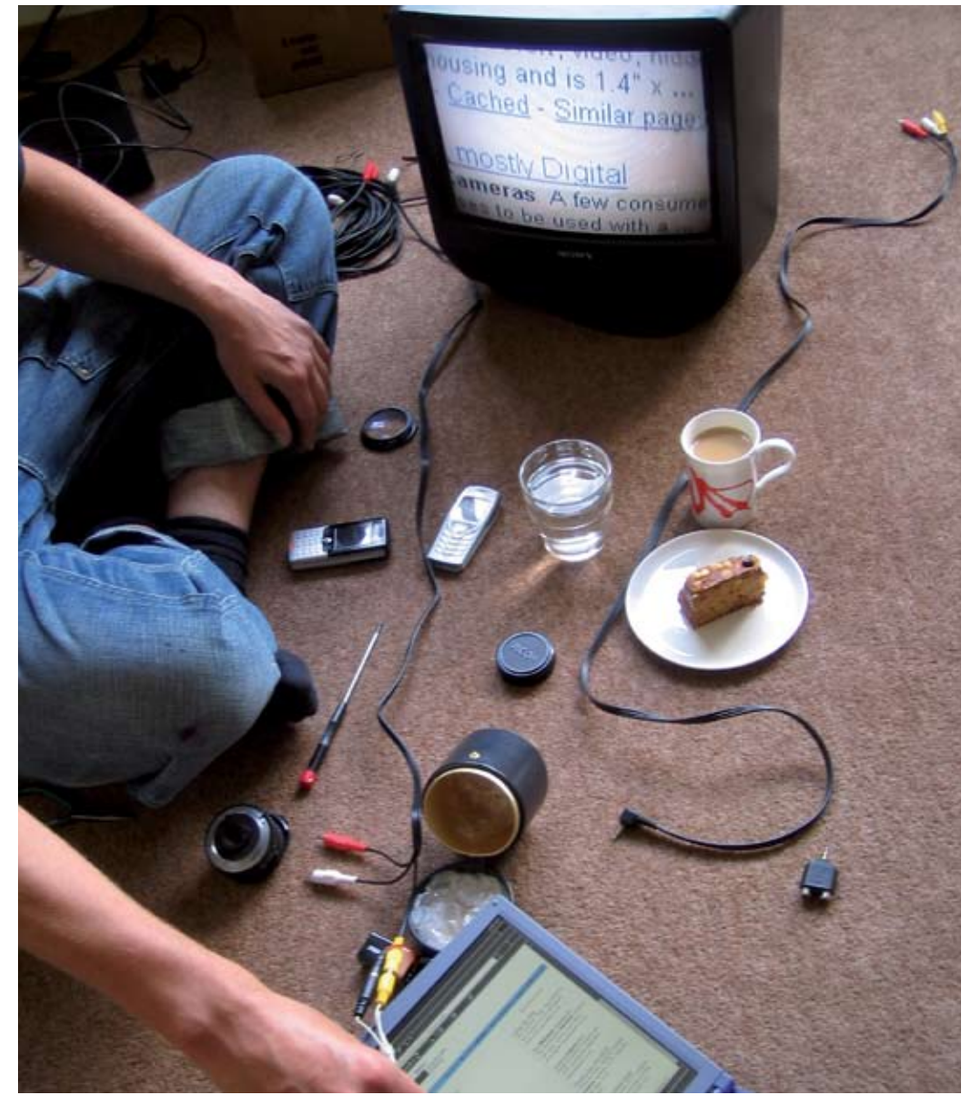
LOCAL BAROMETER: DESIGN AND DEVELOPMENT JANUARY–DECEMBER 2006



Investigating New Technology for the Local Barometer, November 2005

After abandoning our first attempt at building hardware for the Local Barometer, we explored simpler solutions. Here we were examining the possibility of using miniature cameras connected to pocket TVs.

LOCAL BAROMETER: INVESTIGATIONS NOVEMBER 2005



THE DRIFT TABLE ENABLES PEOPLE TO SLOWLY FLOAT OVER THE BRITISH COUNTRYSIDE FROM THE COMFORT OF THEIR SITTING ROOM. THE CENTRE OF GRAVITY OF OBJECTS LEFT ON THIS TABLE CONTROLS THE SLOW SCROLL OF AERIAL PHOTOGRAPHS DISPLAYED IN THE SURFACE, AND A DISPLAY ON THE SIDE OF THE TABLE SHOWS THE LOCATION OF THE AERIAL IMAGE. ADDING WEIGHT TO THE TABLE CAUSES IT TO 'DESCEND', ZOOMING IN ON THE LANDSCAPE BELOW – BUT IT NEVER DESCENDS VERY FAR, OR MOVES VERY FAST. IT JUST DRIFTS. MAKE OF IT WHAT YOU WILL, AND MEANWHILE IT KEEPS ON DRIFTING. YOU MIGHT SAY THAT IT'S A KIND OF HOLE IN THE HOME, ALLOWING THE IMAGINATION TO ESCAPE AND TRAVEL ELSEWHERE.

THE HISTORY TABLECLOTH DRAWS ATTENTION TO THE FLOW OF OBJECTS OVER A SURFACE IN THE HOME BY SIGNALLING HOW LONG THINGS HAVE BEEN LEFT ON IT. IF AN OBJECT REMAINS ON THE TABLE FOR A WHILE, A GLOWING HALO FORMS BENEATH IT; THE HALO GROWS SLOWLY OVER TIME, UNTIL THE OBJECT IS MOVED. WE DESIGNED THE HISTORY TABLECLOTH IN ORDER TO HELP US, AND OTHERS, CONSIDER THE DESIRABILITY OF USING TECHNOLOGY TO EMPHASISE EXISTING BEHAVIOUR.

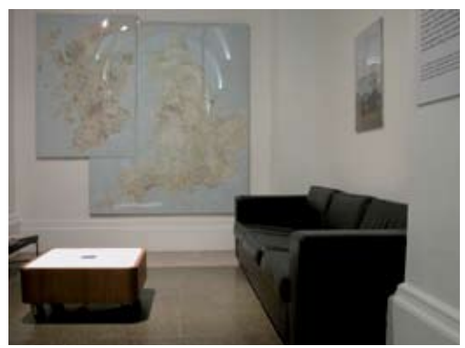
Exhibitions and Drift Table II, June–October 2005

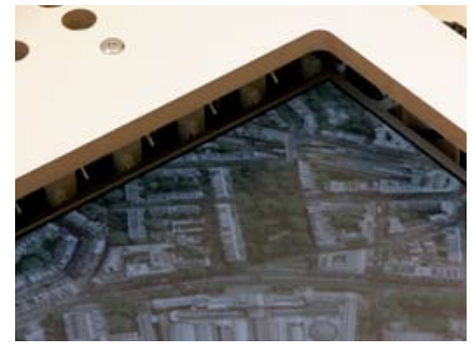
We were invited to participate in an exhibition at the V&A entitled Touch Me. The exhibition was about 'tangible connections', and the Drift Table and the History Tablecloth seemed good candidates for it. Soon after accepting the invitation, however, we were asked to include the Drift Table in an exhibition at Tate Britain called Picture of Britain, to run concurrently with the V&A show. And, to add to our predicament, around this time the Drift Table was badly damaged while being transported to a volunteer's home in Glasgow.

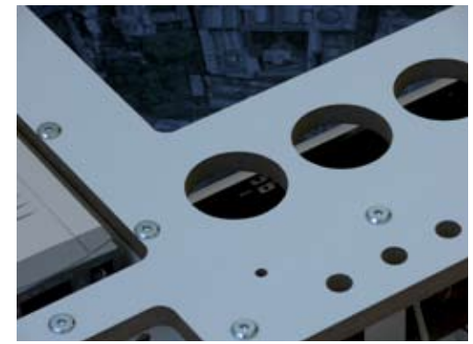
So we decided to build two new Drift Tables, each better and stronger than the first. (And it was a good thing we did, as we were then invited to participate in an exhibition at Kulturhuset in Stockholm, called Extra Ordinary.) In building the new pieces, we solved a technical problem that had bedevilled us for months: on uneven floors the chassis of the table would twist, causing inaccurate weight sensing. We introduced a flex-proof structure under the outer shell, and that did the trick.

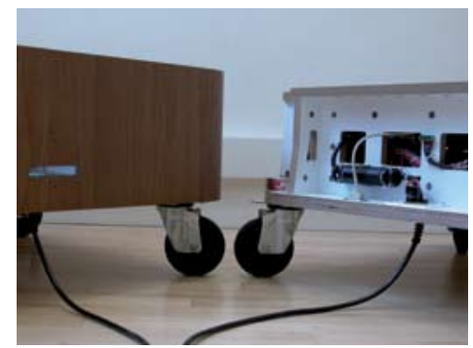
EXHIBITIONS / DRIFT TABLE II JUNE–OCTOBER 2005

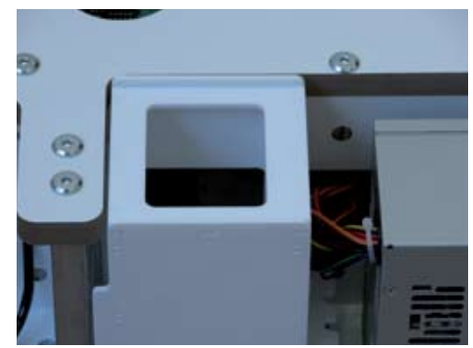

TATE











AREAS AROUND INTERNATIONAL AIRPORTS OFTEN CONTAIN EXOTIC PLANTS (AND SOMETIMES INSECTS), BORNE FROM MILES AWAY BY THE AIR TRAFFIC. THIS FACT LED US TO THE IDEA OF THE WINDOW BOX, WHERE EXOTIC DIGITAL FLOWERS BLOOM IN DIGITAL SOIL, IN ACCORDANCE WITH DEPARTURE POINTS OF PLANES PASSING OVERHEAD.

Window Box Development (Second Stage), February–June 2005

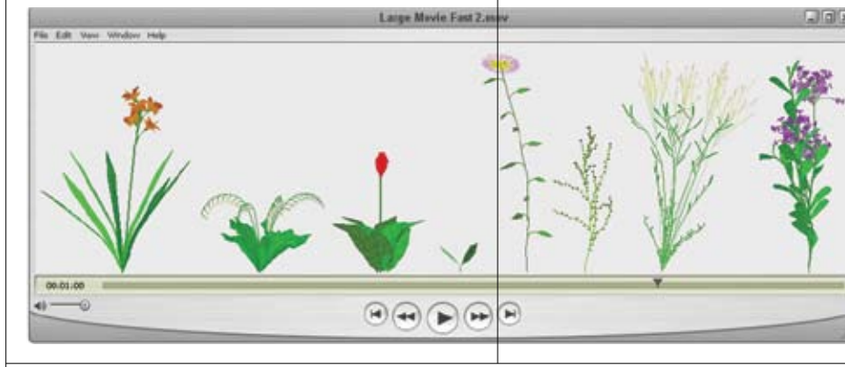
Here you see the final stages of the development of the Window Box, the concept that would later spawn the Plane Tracker.

At this stage we had purchased a basic scanner radio and aerial, and had started to decode radio transmissions of passing aircraft using the open source software ACARSD [www.acarsd.org]. Although the software was difficult to use, we quickly began to build a database of aircraft information (aircraft IDs, coupled with flight origins). From this, we compiled a list of airports, and categorised them by region. Then, using a global vegetation database, we established which plants were indigenous to each region.

The next step was to visualise what the Window Box might look like. We mocked up our ideas as animated movies, some quite simple. For example, plant labels scroll across a screen. More complicated was a sequence of time-lapse photography of plants growing. And even more complicated was a screen the size of a window box, in which appear digitally animated illustrations of various plants, each growing and then dying over a period of five minutes.

Although we were fond of our various window boxes, it soon became clear that our biggest challenge was generating sufficient content – and we weren't interested in this challenge. We are designers first and foremost. Only by necessity had we become amateur enthusiasts of PlantStudio (botanical illustration software).

WINDOW BOX: DEVELOPMENT FEBRUARY–JUNE 2005



Bottom left: UNEP/DEWA/GRID-Europe

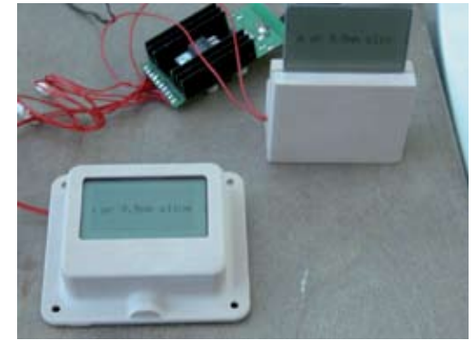
Local Barometer Development (Third Stage), February–June 2005

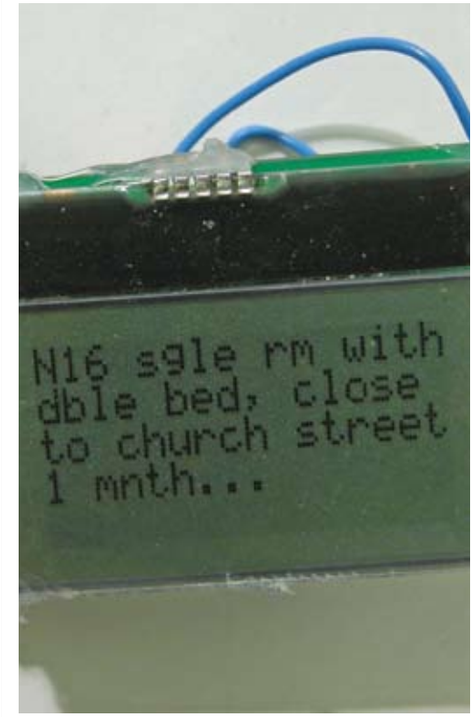
In early 2005, we were busy producing prototypes for the first generation of the Local Barometer. We had a semi-functional piece of hardware, and using a recently purchased desktop CNC machine (Computer Numerical Control), we had started to make casings for the screens. As it turned out, our efforts were doomed, because of a fundamental flaw in the hardware. However, the idea driving our efforts did not die.

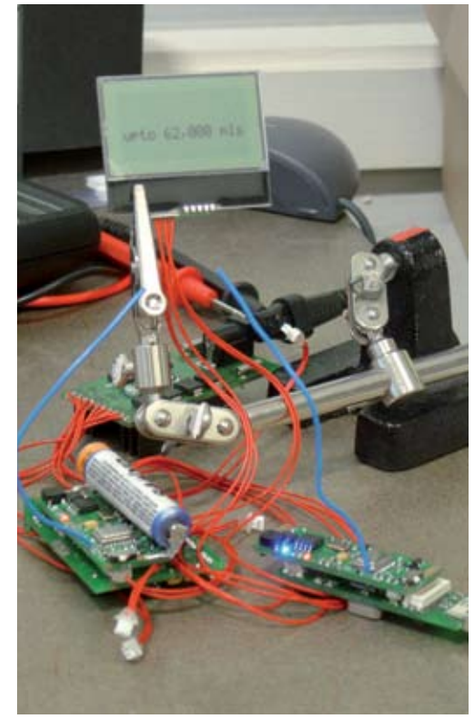
This period saw a rapid development of the software that culls website information, and we experimented with the new tools. The first web-ripper we built pulled images from major news sites (juxtaposing, by chance, terrorists and counter-terrorists in an unholy triptych). The second one added the feature that we called the Postcode Radar.

Working from a central point, the Postcode Radar gathered a list of postcodes, as if drawing a narrow triangle over the map. This data set could then be used to rip pages from websites full of classified ads, such as Loot.com and Autotrader.co.uk. The concept of the Local Barometer was born from the idea of combining the Postcode Radar with a weather station sensing wind speed and direction.

LOCAL BAROMETER: DEVELOPMENT FEBRUARY–JUNE 2005







N16 Newington Green Stunning 2 dbl bed flat in a little block, 1st floor..

N16

Cockatiels, 3 of, chicks, 3 mths old, N5

UNKNOWN

EASTERLY

N 316i SE N reg,

NEIGHBOURING POSTCODES

Blues guitarist, seeks blues band, Barnet.

N16 Newington Green Stunning 2 dbl bed flat in a little block, 1st floor..

N16

Fridge, student fridge, with lock as well as ice making space, N5

UNKNOWN

EASTERLY

CD player, alloys

NEIGHBOURING POSTCODES

Blues guitarist, seeks blues band, Barnet.

Isle of Sheppey, Kent, chalet bungalow, 5/6 bed.

LOCAL BAROMETER: DEVELOPMENT FEBRUARY–JUNE 2005

Within 1 mile

_Angel, large double room in friendly mixed houseshare, 2 bathrooms, f/kitchen, lounge, all mod cons, 5 mins tube & amenities.
_Armchair, Japanese style, single seater, 46in long, mag racks both sides, mattress cover, chunky, made of hardwood antique stain, collect, cash only.
_Attractive male, 39, wltm sexy, attractive, professional female, age unimportant, for ltr.
_Beko washing machine, white, only used once, warranty until May, pic avail via e-mail, buyer collects.

Within 5 miles

_Bassett Hound pups, red & white and tri colour, dogs, Champion Sire, ready now, price on application
_Blues guitarist and harp keyboards seeks blues band, Barnet and Herts area.
_Ford Transit 2.5 Diesel, 1995, M reg, SWB, long MOT & tax, ex British Telecom, grey. East.
_Ludwig Acrolite snare, 14in x 5in, aluminium-shelled snare, blue and olive badge, same classic sounds as the Supraphonic 400, some scratches and dings, but still a great snare.

Within 10 miles

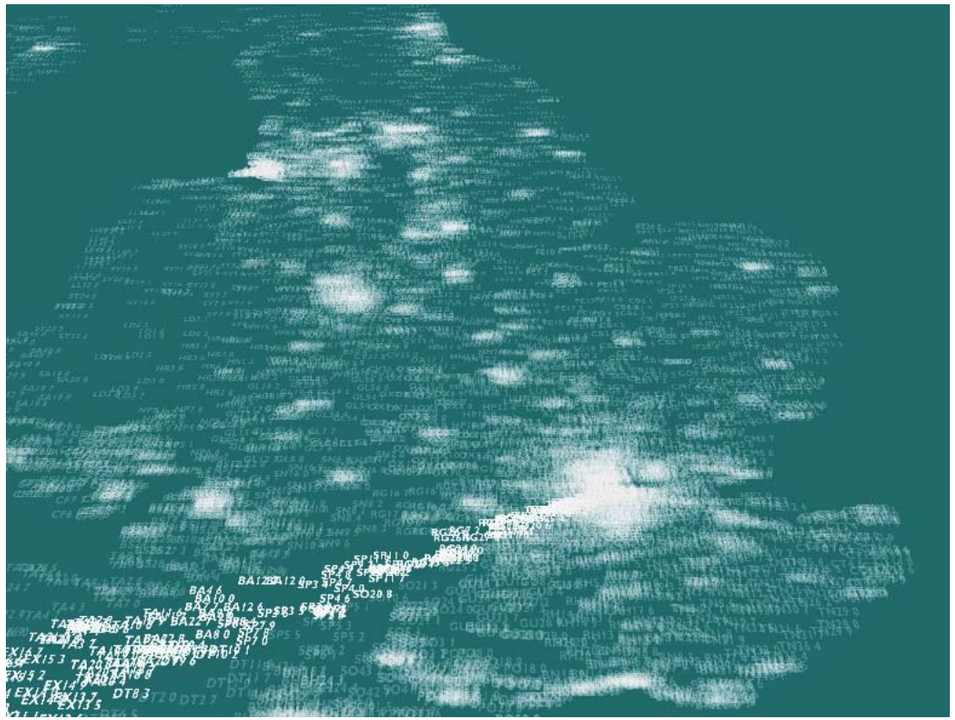
_Three piece suite, Italian leather set, 1 seater, 2 seater & 3 seater combo set, also comes with tea table.
_Compaq Deskpro Multimedia, Pentium 466Mhz, 128Mb RAM, 6Gb HD, internet broadband ready, as new, 15in monitor, CD-RW, speakers, Windows XP, Office 2000, games, music, can demonstrate.
_Full mobile disco, 4 intelligent, DMX lighting, 2 x 3 way 300w, 15 in speakers, 600w amp, twin Denon, Gem mixer and flightcase, smoke machine, stand, leads, any inspection.
_Fein Multi master tool, professional cutting tool & extra saw blades, unused, will sand, cut metal, ceramic and wood.

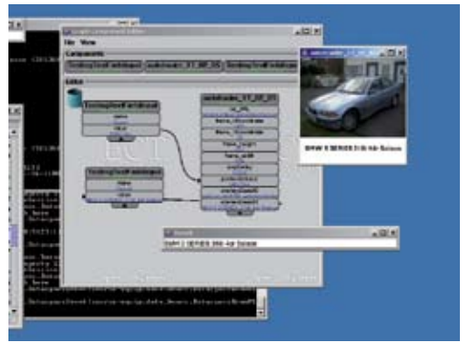
Within 20 miles

_1 Rosewood Telecaster, Japanese rosewood tele, maple neck, rosewood fingerboard and body, looks beautiful, plays wonderfully, perfect condition and setup.
_101 Classical Favourites, 11 cassettes in 2 box pack, hardly used, excellent condition.
_Confident, genuine male, 36, tall, gsoh, outgoing, seeks similar, extrovert, loud female, 18 - 35, for lasting, close, platonic relationship, Essex area..
_Essex, Chafford Hundred, Newly built w/presented 2 dbl bed apart, close to Chafford Hundred train, Lakeside shopping center & amens, d/g, gch, fit bthrm & kitch, lam floors, alloc parking, comm gdns, leasehold, no chain.

Within 50 miles

_Tenterden, Kent, 2 bed bungalow, lovely town, nr Ashford, over 60s only, new kitchen, req 2 bed house/flat in N London, urgent to be near family, removal costs paid.
_Isle of Sheppey, Kent, Chalet bungalow, 5/6 bed, e/suite master, lounge 26 x 11 x 12, kitch/diner 28 x 12.5, utility rm, WC + f/bthrm, d/g, gch, garage, log burners, lrg F & R gdns, large drive. Close to schools/amens. Freehold.





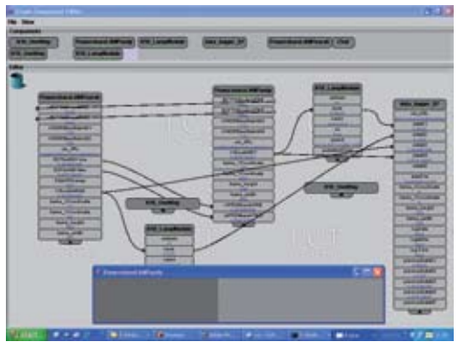
THE LAMP SHARE SYSTEM CONNECTED TWO HOUSEHOLDS VIA TWO ORDINARY DESK LAMPS. EACH LAMP HAD A SET OF CONTROLS TO INCREASE OR DECREASE BRIGHTNESS, BUT INCREASING BRIGHTNESS IN ONE LAMP AUTOMATICALLY DECREASED IT IN THE OTHER, AND VICE VERSA. IN EFFECT, THE TWO HOUSEHOLDS WERE SHARING THE POWER OF ONE BULB, AND WERE THEREFORE FORCED INTO A DIALOGUE EXPRESSED BY THEIR RESPECTIVE USE OF THE LAMP CONTROLS.

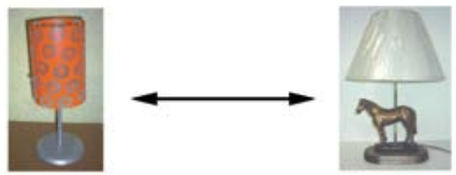
Living with the Lamp Share in Sarah's and Andy's flats in London, December 2004

Just before Christmas, we installed a prototype of the Lamp Share system in the flats of two members of the team. Sarah and Andy were used to working together on research projects, but they had never visited each other's flats. We were all intrigued to see how they would coordinate their use of the lamps, and what inferences they might make about the whereabouts of the lamp in each other's flats, and indeed about each other's lives.

The system had been developed using ECT (Equip Component Toolkit), software created by our Equator partners at Nottingham University. The purpose of the software is to provide designers (and others) with a simple tool for connecting multiple devices and computers over networks. Our purpose in using the software was simply to play with it. We were intrigued by the idea of linking two household by giving them a mutual, but limited, awareness. Would the Lamp Share provoke conflict? Or empathy? Or just plain curiosity?

All of the above, in varying proportions. It's hard to say exactly what the Lamp Share provoked, because shades of emotion are subtle and ephemeral. But an experiment we performed, called the Home Boundary Experiment, does give a sense of Andy's and Sarah's reactions – see the next section.





Networked collaborative lamps

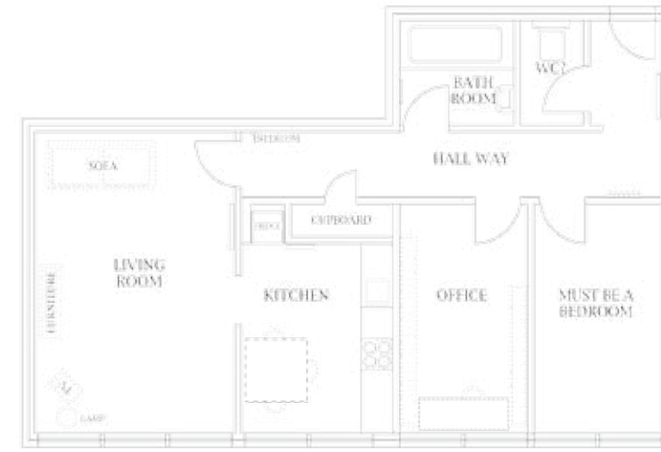
LAMP SHARE: LIVING WITH DECEMBER 2004

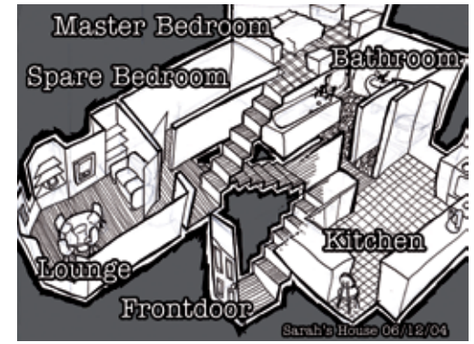
Home Boundary Experiment, December 2004

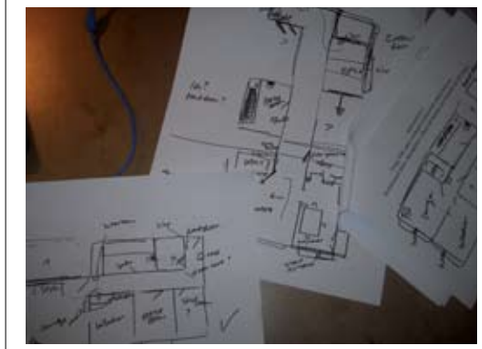
Partly as way of recording Sarah's and Andy's reactions to the Lamp Share system, and partly to test what effect it might have on their notions of boundary and privacy, we decided that they should each draw a plan of the other's flat. Since neither had ever visited the other's flat, and all they had to go on was the brightening and dimming of the desk lamp, they aided each other by providing a short, casual film showing a slice of life in their respective flats.

The results were unexpected. Sarah managed to guess the layout of Andy's flat, dead on, whereas Andy seemed to picture Sarah living in an impossibly contorted world.

HOME BOUNDARY: EXPERIMENT DECEMBER 2004





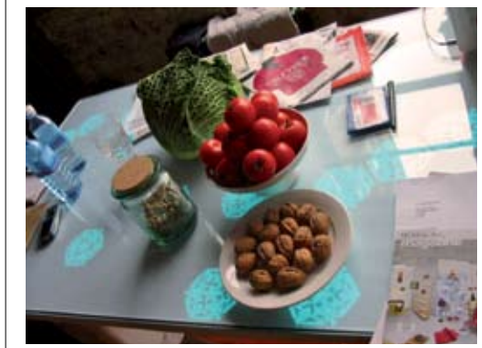


Installing the History Tablecloth in Guy's Flat in East London, October 2004–January 2005

When we commissioned the manufacturer to make the electroluminescent print for the History Tablecloth, they told us that it was the most complex print they had ever undertaken. Ensuring that the tablecloth operated correctly was also a challenge for us, as it had 96 addressable elements, each with a its own dimming control.

Eighteen months after work began on the History Tablecloth, we were able to install it in Guy's flat.

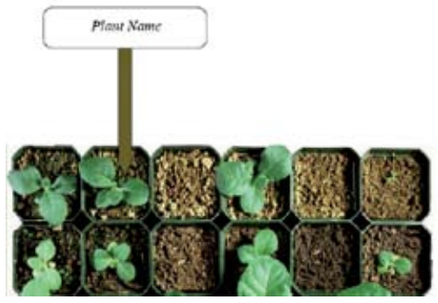
HISTORY TABLECLOTH: INSTALLATION OCTOBER 2004–JANUARY 2005

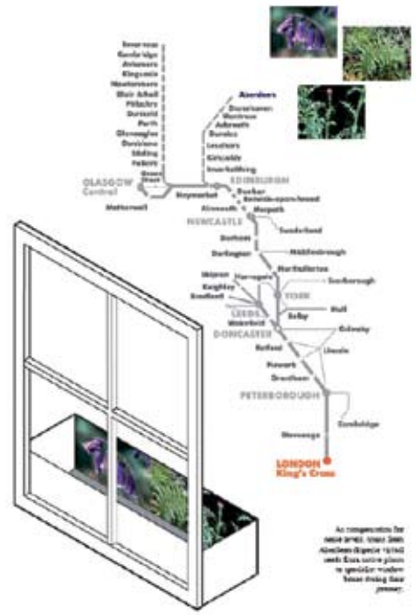


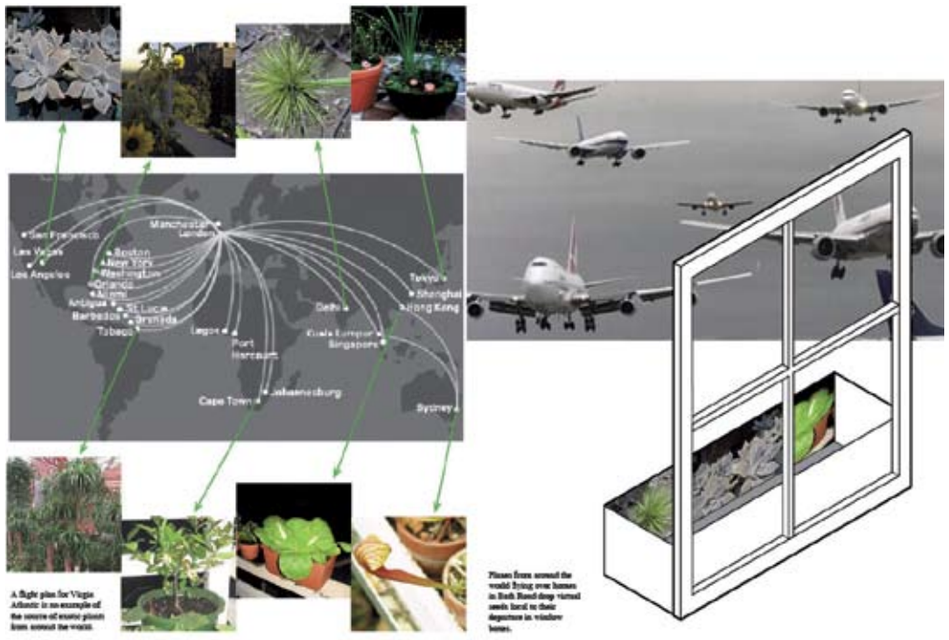
Window Box Development (First Stage), July–December 2004

The germ of the Plane Tracker concept appeared in 2001, in *Workbook 1* (which figures later in these pages), but it was now, in the second half of 2004, that we took the idea and ran with it.

The original concept, of aircraft data somehow compensating for aircraft noise, combined with a story about seeds and insects getting trapped in the undercarriage bays of aeroplanes, and being borne away to other parts of the globe. This notion fascinated us, and we began to think about digital window boxes, and to wonder about the life of digital flowers.

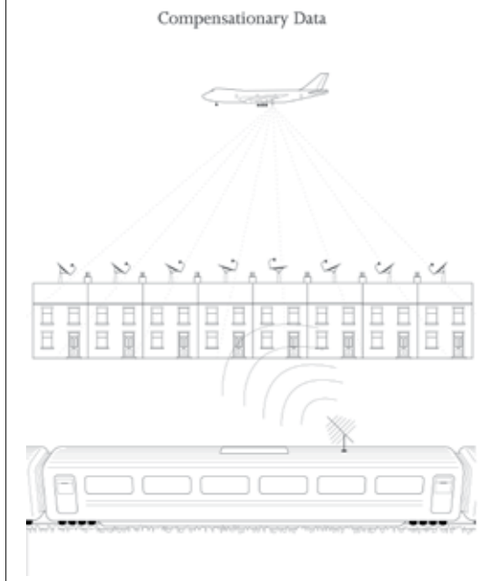


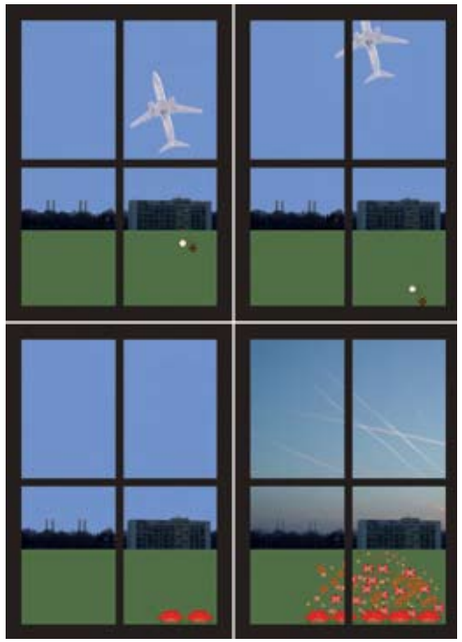


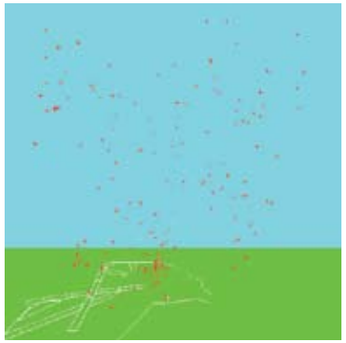


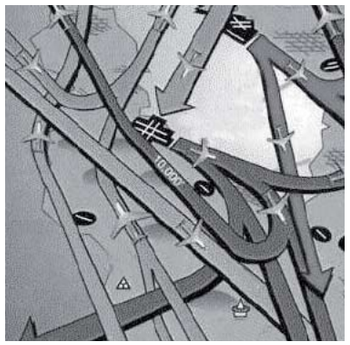
A flight plan for Virgin Atlantic is an example of the source of exotic plants from around the world.

Plants from around the world living over homes in Bath Road drop virtual seeds local to their departure in window boxes.









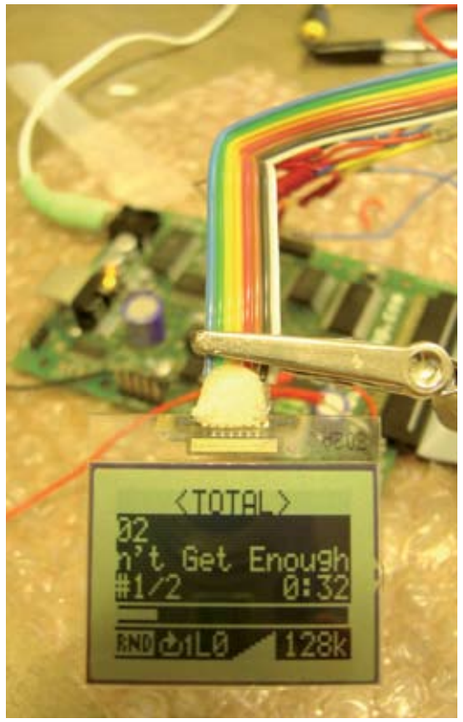
Local Barometer Development (First and Second Stages), June–December 2004

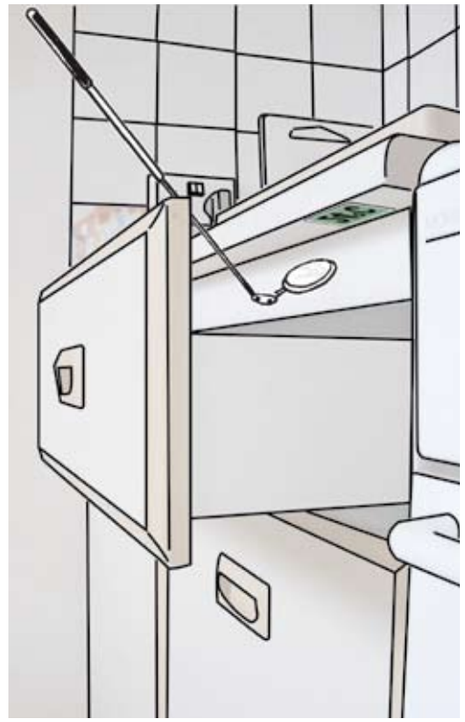
The idea for the Local Barometer emerged from an MP3 player which we built ourselves, using a black-and-white Nokia phone screen. This object demonstrated an elegance that we hadn't predicted when, half built, it sat between the crocodile clips of our soldering stand. We began to wonder how we could use such small screens around the home.

Our initial sketches concentrated on displaying very immediate and mundane information about the home – for instance, the number of times someone walked through a doorway over a given period. But we also started to consider how screens might be situated in the home, and we imagined them in terms of traditional ironmongery: name plates on drawers and cabinets, etc.

It wasn't long before our thoughts about displaying information that arises within the home, led to ideas about displaying information that arises outside.

LOCAL BAROMETER: DEVELOPMENT JUNE–DECEMBER 2004

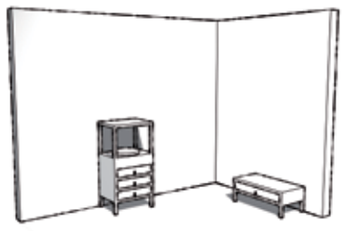




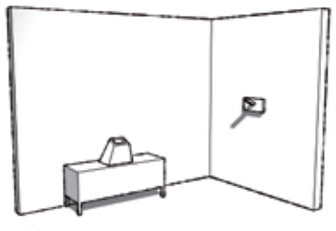
Computer Vision Experiments, March–May 2004

These sketches show various proposals relating to the use of computer vision in the home, concentrated mainly on object recognition and tracking.

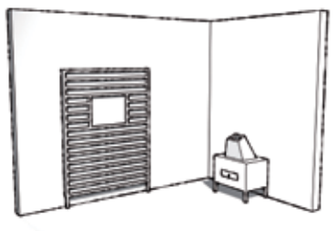
At this time, we were also interested in how people store objects, both in their homes and in self-storage buildings. How did people access the stuff they kept in boxes and cupboards? What if they could access things remotely, using a kind of iTunes library? The proposal for the Whimsy Shelves, for instance, suggests having miniature representations of all your stored items on a set of shelves. You could easily browse through these representations and also inspect your objects more closely: selecting one would launch a high-resolution image of the real thing.



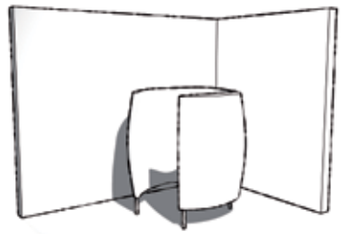
Storage and Display: The Lost and Found Bureau
Display objects singularly in drawers and then temporarily lose them to make the experience of viewing them more precious. Objects are captured by a scanner and then displayed in the drawers using a lenticular lens. The system shuffles the contents of the drawers so you get a different object every time you open it. There is a second single drawer unit that receives scanned objects and again displays a different one every time you open it.



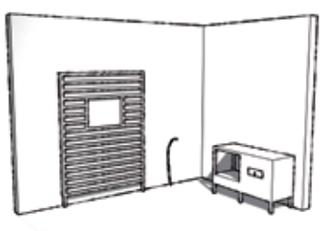
Links to the Outside World: The Miniature Street Viewer
See what's going on in the street by putting your street in a box. Give people a digital periscope to play with – what do people look at? Live generated 3D street model reduced in scale. Allows you to see what's happening in your street.



Storage and Display: The Surface Miner
Inquisitively obsess over the surface of a small object. It displays what it sees. Give people a digital microscope to play with – what do people look at? Auto-focusing robot arm. A miniature camera crawls around an object in order to displays the surface.



Links to the Outside World: The Vaulted Ceiling
Look up to the ceiling to see the lights of what is happening outside. Create experimental java version. Make retro fitted pinhole projectors for the home. Atmospheric ceiling display. Displays a mixture of traffic outside, above and below your house.



Storage and Display: The Whimsy Shelves
Reducing the scale or the representation of objects allows you to have and display more things. Object recognition of tiny objects triggering image or other media display. Pervades the rest of the house and allows the playback of other types of data.

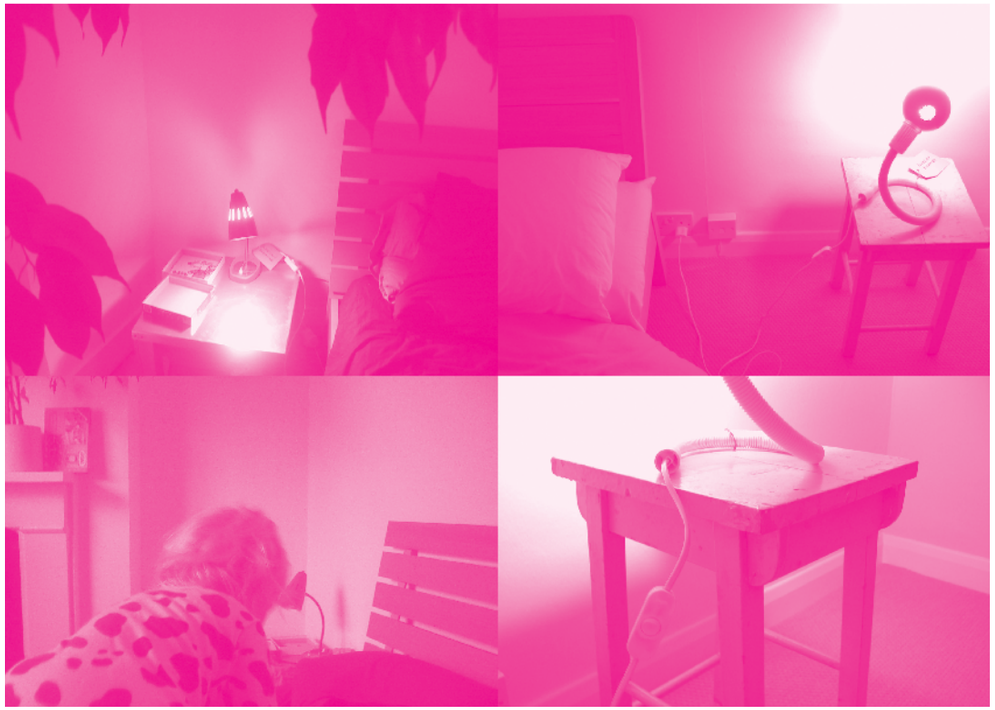
WORKBOOK 3

December 2003–February 2004

THIS WORKBOOK PRESENTS A SET OF IDEAS BUILT AROUND THE THEME OF THE CURIOUS HOME – A PHRASE WHICH WE FIRST BEGAN TO USE, AND TO EXPLORE, AT THIS TIME. THE THEME ACTED AS A CATALYST IN THE RESEARCH, DRAWING OUT ELEMENTS THAT WERE MERELY INCIPIENT IN EARLIER WORK, SUCH AS THE QUESTION OF HOW (AND WHEN) TO TRACK OBJECTS, AND WHAT WE MEAN BY (AND FEAR IN) THE WORD 'BOUNDARY' IN THE DIGITAL AGE.

WE ALSO DOCUMENTED VARIOUS EXPERIMENTS, SUCH AS THE LAMP EXCHANGE. TWO OF US EXCHANGED BEDSIDE LAMPS FOR ONE WEEK, JUST TO SEE HOW WE'D REACT. THE RESULT WAS EMOTIONAL TURMOIL! ONE TEAM-MATE'S PARTNER EVEN REFUSED TO HAVE THE LIGHT NEAR THEIR BED.

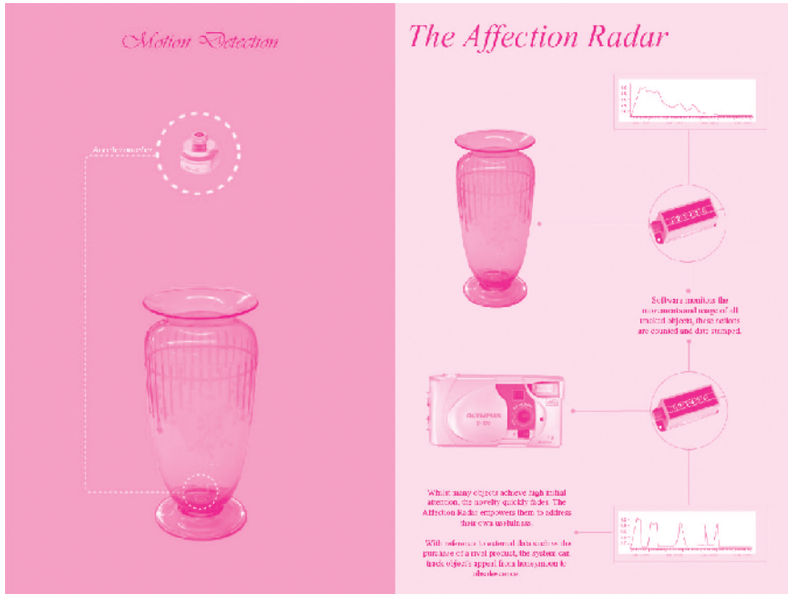
Sarah and Bill exchanged bedside lamps for a week



When Bills's 2 year-old spotted Sarah's lamp by the bedside, she yelled "Papa fixed it!" and started crawling towards it

Sarah's husband Chris refused to allow Bill's visiting lamp too close to the bed where he slept

Photographs from the domestic probes show the rich textures created by things people disply and store



Accelerometers could provide indicators of objects usage

Activity sensors allow tracking of our possessions changing fortunes

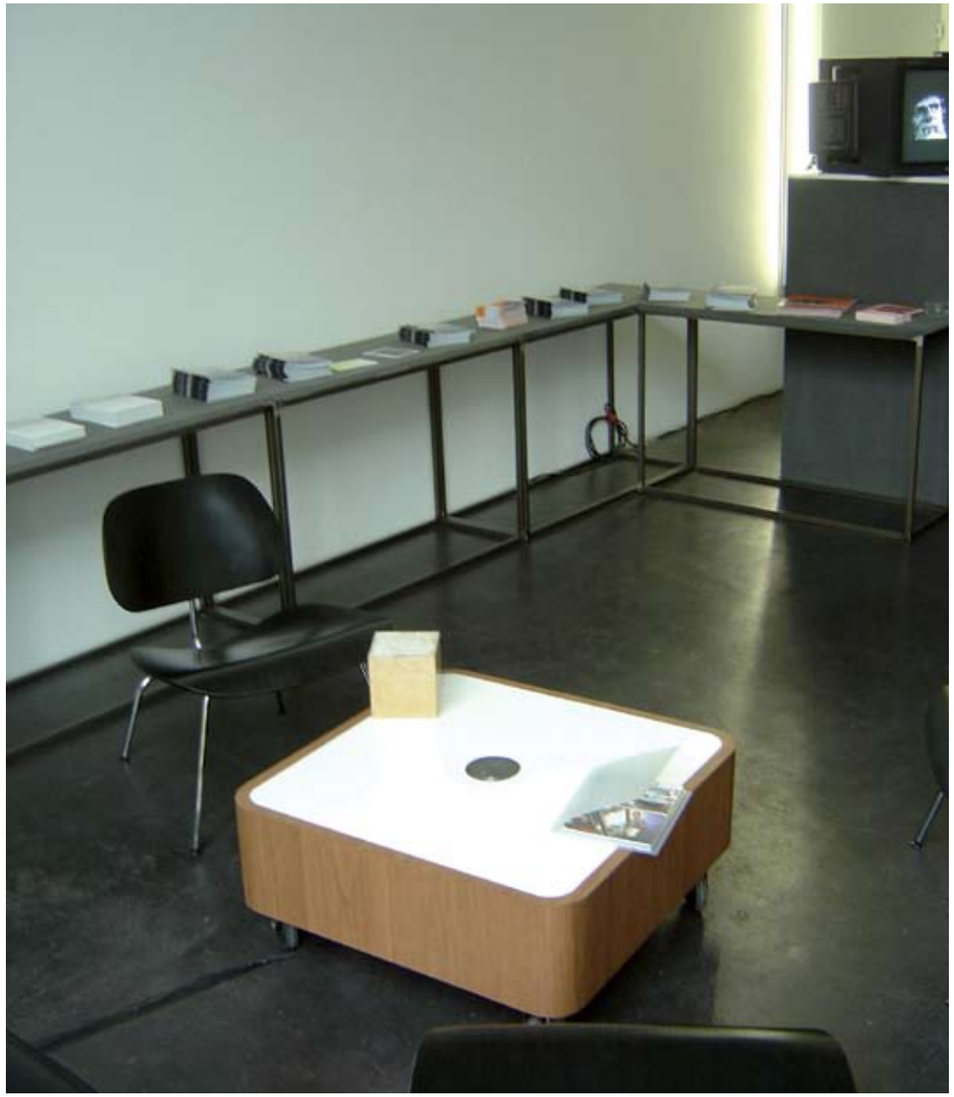
Carmeras, lights,tripods and electronic flash units create sets to transform the accumulation of objects into filmic still lives

Simple tests of photographing the inside of cupboards are only somewhat interesting

Observation technologies for the Smart Home include security systems, webcams, scanners and camera phones. Why not add other devices to these systems? For example, lighting, flash, 3D scanners, scopes, tripods, rigs and special effects machines *Images courtesy eliminator Lighting/Cyberware/Epson*

The Viper Festival, Basel, 22–24 November 2003

We were invited to exhibit the Drift Table at the Viper International Festival for Film, Video and New Media in Switzerland. The Drift Table was cased, collected and shipped a few days before we travelled to the festival. This time it survived the journey.

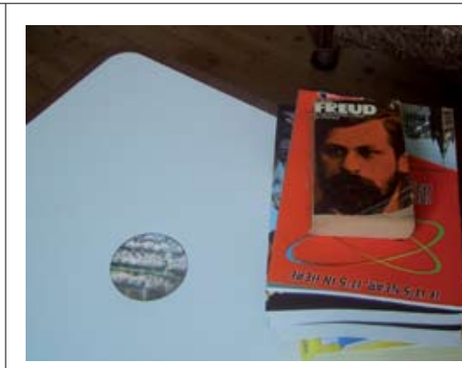


THE VIPER FESTIVAL NOVEMBER 2003

Installing the Drift Table in Zabie's house in north London, September 2003

This was the second time that we installed the Drift Table in somebody's home. Bill and Sarah are on setup duty.

DRIFT TABLE: INSTALLATION SEPTEMBER 2003



THE KEY TABLE GAUGES PEOPLE'S EMOTIONS BY THE WAY THEY PLACE THINGS ON IT. DROPPING STUFF IS EQUATED WITH STRONG EMOTION (AS IS A SLAMMED DOOR, GENERALLY), AND GENTLER ACTIONS SIGNAL MORE PEACEFUL MOODS – OR AT LEAST, THAT WAS OUR THINKING. THESE TRANSIENT ONSETS OF WEIGHT ARE REFLECTED IN THE POSITION OF THE PICTURE FRAME, WHICH SWINGS OFF-CENTRE, TO A GREATER OR LESS DEGREE. THUS AN EMOTIONAL ENTRANCE IS DRAMATISED, WARNING OTHERS TO TREAD CAREFULLY.

Installing the Key Table in Heather's House in North London, August 2003

This was only the second time that we installed a device in somebody's home, and we still had a lot to learn about installation-as-drama. The main problem was that we brought a documentary film crew with us, who attempted to heighten the drama to enliven their film. It helped them, but it had complex repercussions for everyone else in the house. Suddenly we all became actors, rather than people engaged in an interesting experiment.

In retrospect, it was a very useful experience because it helped us to see that the installation of a new device is a particularly delicate part of the research process, and requires careful handling. How much information should (and could) we share with the volunteers, when a device had no specific function? Since it wasn't *for* something, what to tell them? Nothing? Or perhaps everything?

KEY TABLE: INSTALLATION AUGUST 2003

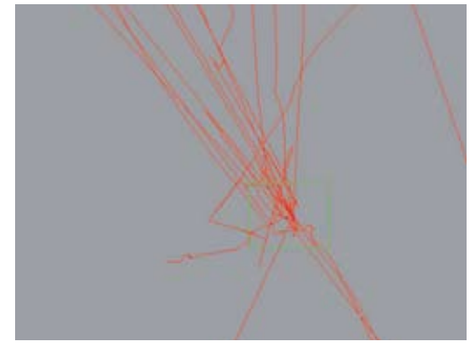
Installing the Drift Table in Steve's Flat in East London, May–July 2003

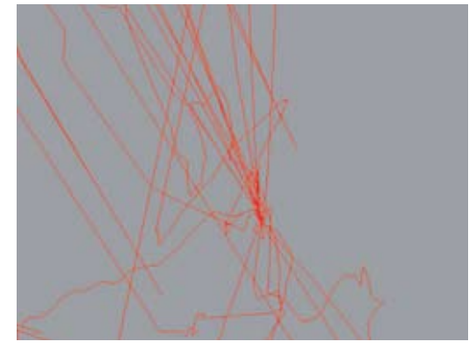
Our first installation. We kept thinking, 'Did we give him enough warning about what to expect? What if he takes one look at the device and tells us to get stuffed?'

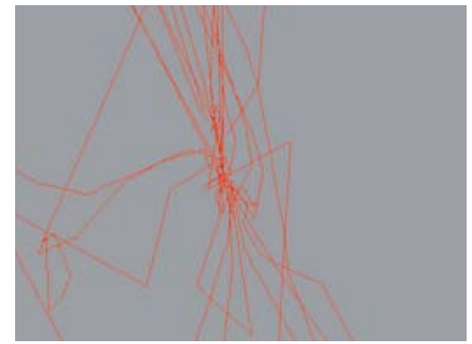
After a nervous ride in a taxi, we wheeled our very expensive and fragile coffee table into the lobby of the building. Fortunately, Steve seemed quite excited by what we were bringing him. The first job was to clear away his existing coffee table, and then we set up the system while Steve stayed in another room (because we didn't want the sight of all the technology in the table to affect his experience). Once the system was up and running, we gave Steve a short manual, and then went on our way, feeling rather relieved. Steve seemed quite taken with his Drift Table.

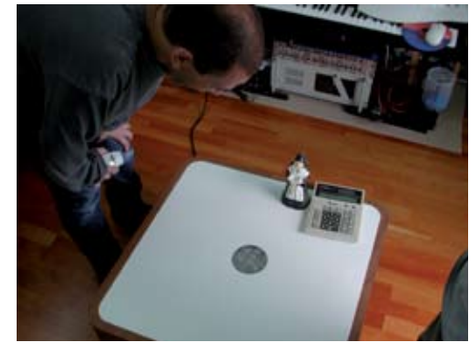
At the end of the trial, we converted the data log (or flight recorder) into a map of the UK showing all the journeys that Steve and his friends had taken. We were surprised by the amount of activity, and by the way that stretches of plain sailing were punctuated by bursts of navigation on all levels of scale.

DRIFT TABLE: INSTALLATION MAY–JULY 2003





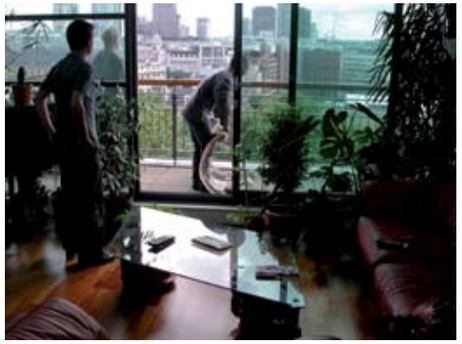
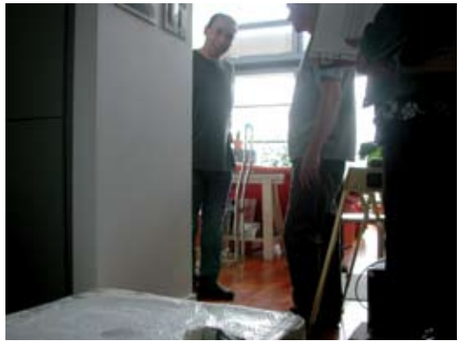




DRIFT TABLE: INSTALLATION MAY–JULY 2003





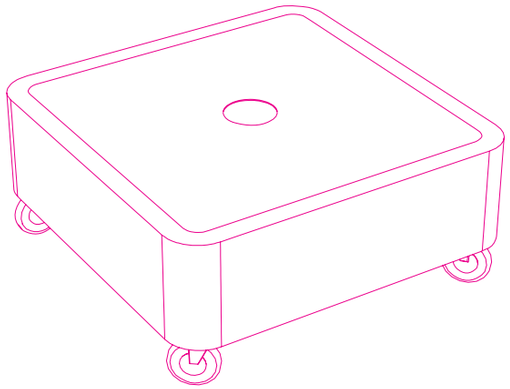



THE DRIFT TABLE

Orientation Guide

The Drift Table

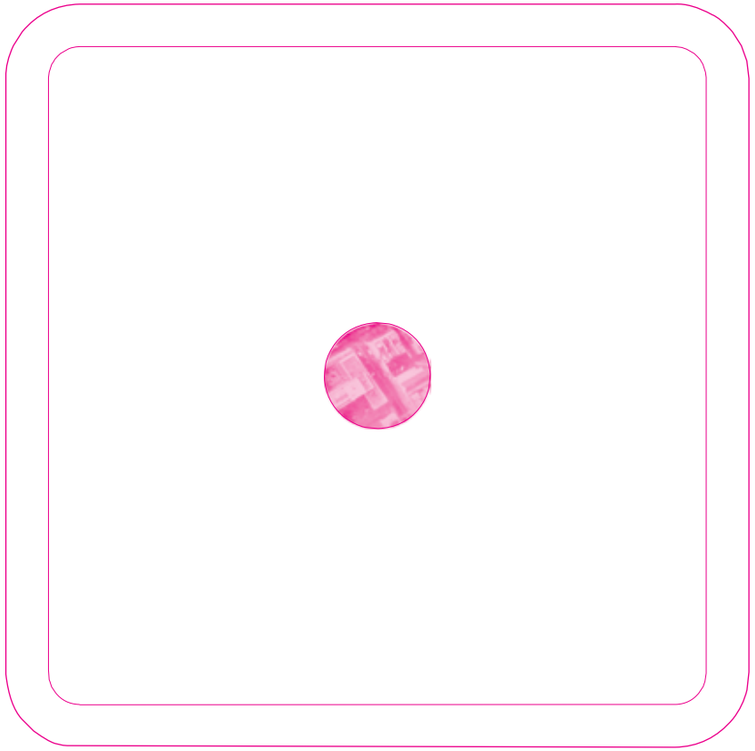
Orientation Guide



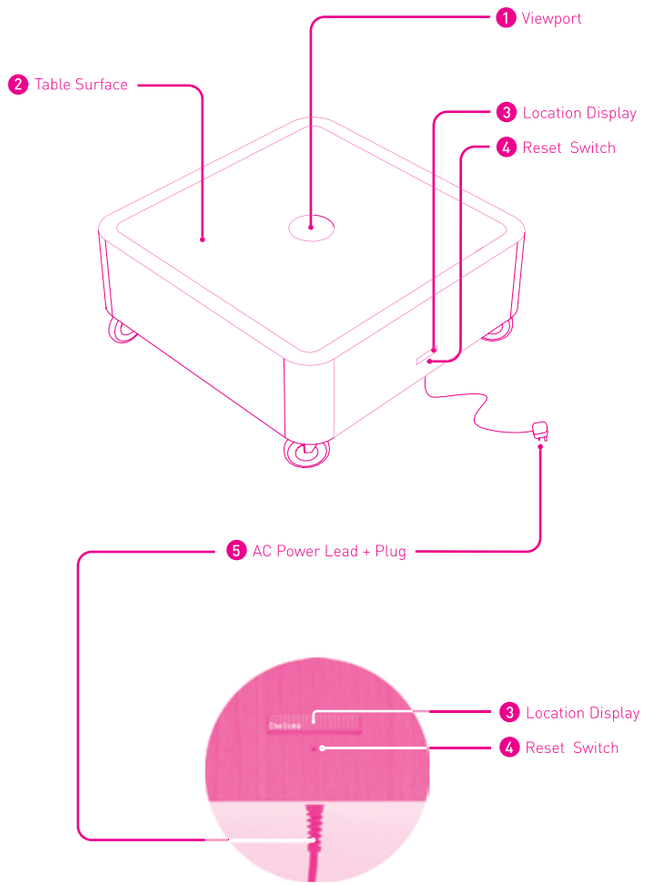
Welcome to the Drift Table!

The Drift Table shows slowly moving images of the British landscape controlled by how weight is distributed on it. You can use it to take a tour of the countryside, to visit favourite places, or simply to daydream as you watch the world go by.

The Drift Table is extremely simple to use. This guide will tell you everything you need to know.



Basic elements of the Drift Table



Operation

Main features

1. The Viewport: Observe aerial images here.
2. The table surface: Place things here to make the images move. Adding more weight makes the table go faster and also zooms into the scenes below. Removing weight makes the table go slower and zooms out. Note that the images will never entirely stop moving, even if there is no weight on the table.
3. Location display: This small screen shows where you are.
4. Reset button: Pressing this button will restart the table's journey from your home.
5. AC Power cable: Connect to mains outlet.

Hidden features

Internal compass: The Drift Table includes an electronic compass that will keep images aligned with true north no matter how you turn the table.

Backup power: There is an emergency power supply built into the table that will keep it running for approximately 3 minutes if the external power is cut. The table will beep if power is lost; if you don't reconnect the power the table will shut down after 3 minutes.

Some common questions:

What area is covered?

The Drift Table covers England and Wales. It is unlikely that you will ever see all of the scenery.

How much weight can I put on the table?

The Table can sense weights from about 500 grams to 50 kilograms. It reaches maximum speed at about 25 kilograms, after which adding more weight will not change the performance. Sitting on the table will not make it go faster - please don't!

How strong is the table?

The table is made to high specifications and should be as strong as most coffee tables. You don't need to treat it as especially fragile, but please avoid putting excess weight on it, or knocking it sharply.

How do I clean it?

The Drift Table should be cleaned with a dry cloth. Please avoid using large amounts of liquid, scrubbing, or using abrasives or solvents.

What should I do if I spill something?

Please wipe any spills as quickly as possible. The Table is designed to be fairly water-tight, but it does contain a lot of electronic equipment. This could be damaged if it gets wet, and might even become hazardous.

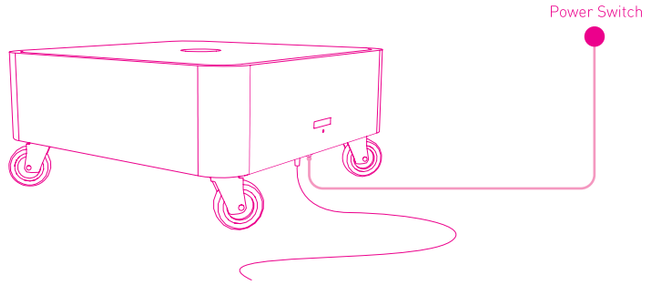
Can I take the cover off?

No. The Drift Table contains high voltage parts. Removing the cover may lead to electrical shock.

What if I need to switch the Drift Table off?

The Drift Table is designed to be permanently switched on. However if you need to shut the table down or restore normal operation after a power failure, please use the power switch located under the table just forward of the AC mains cable inlet.

Press once to switch off, and once to switch on. Please be patient, like a personal computer the table will take a few moments to respond.



What should I do if the Drift Table appears to stop working, or if I am worried about any aspect of its operation?

Please don't hesitate to call us on 020 7590 4296 or 020 7590 4574.

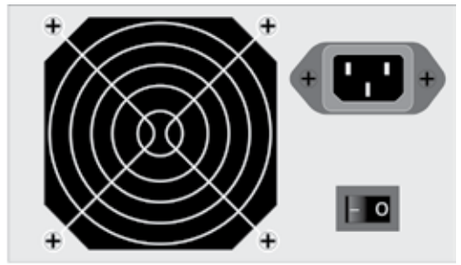
Drift Table Development, November 2002–May 2003

The key moment in the history of the Drift Table came when we discovered that a company called GetMapping had photographed the whole of the UK. This huge undertaking, initiated to mark the new millennium, had resulted in the most complete aerial imagery of the country that had ever been done. And the fact that GetMapping allowed us to use their entire data set is a mark of their generosity – and a tribute to the enthusiasm shown by Kirstie Richie, who then headed the Development Department at the Royal College of Art.

The challenge now was, how to pack into a small table all the necessary elements: load sensing technology, a screen, and a computer holding a terabyte of data (an awesome quantity in those days). Furthermore, we had to make the device waterproof, and safe, and reliable.

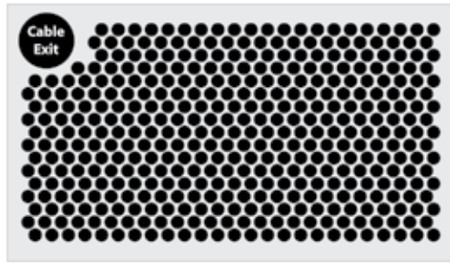
We quickly started to experiment with prototypes, initially concentrating on the screen. We didn't want it to be too dominant because the piece had to function as a coffee table; we also wanted to create the sense of peering into another world. After building numerous prototypes we decided that a round hole would work best, as it didn't favour any particular orientation or direction. We also decided to mount the screen at a slight distance from the hole. This arrangement allows the the viewer to peer inside and see more of the image. To obscure the edges of the screen, and thus maintain an illusion of depth, we added a Fresnel lens behind the hole.

With this solution in place, the design process became a story of packaging too long to detail here. There was the cooling system, the battery backup, multiple hard discs, the load cells... But the end result was a very simple device. The Drift Table has a viewing screen, a place-name display (showing the location of the image), a reset switch (which returns the view to their starting point, the location of their home) and the weight-sensing surface.

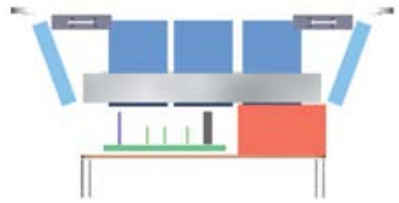


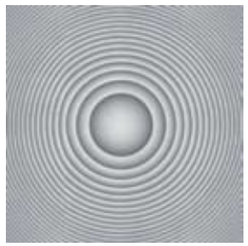
Back View (To Scale)

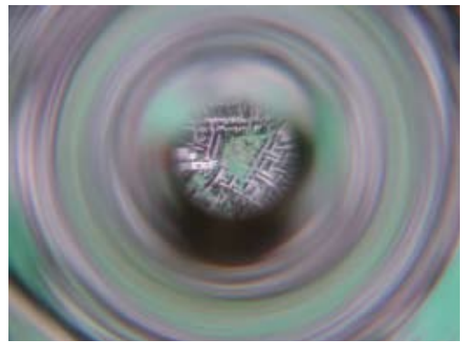
Socket and switch are not flush, fan grille slightly raised .



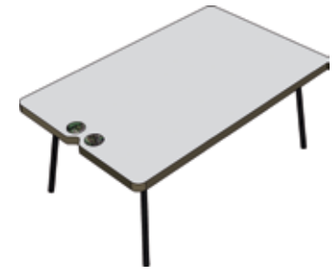
Front View (To Scale)







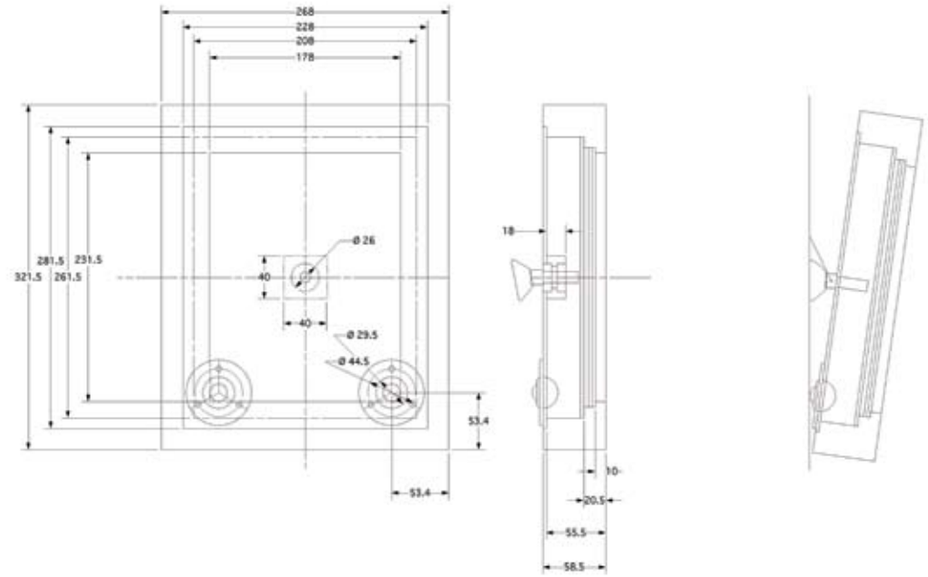
DRIFT TABLE: DEVELOPMENT NOVEMBER 2002–MAY 2003

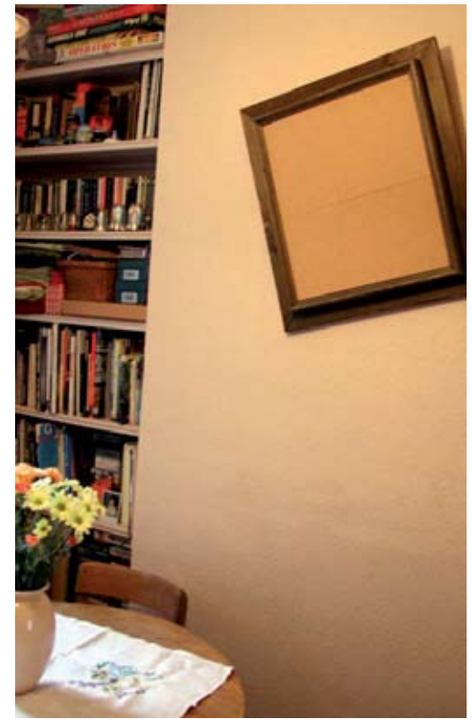


Key Table Development, August 2002–April 2003

Building the Key Table was fairly straightforward. We made a foam-core model and added load sensors, and this worked fine, so then we constructed the table prototype. Engineering the movement of the picture frame was more of a challenge, as was achieving the correct software mapping between load and movement.

KEY TABLE: DEVELOPMENT AUGUST 2002–APRIL 2003

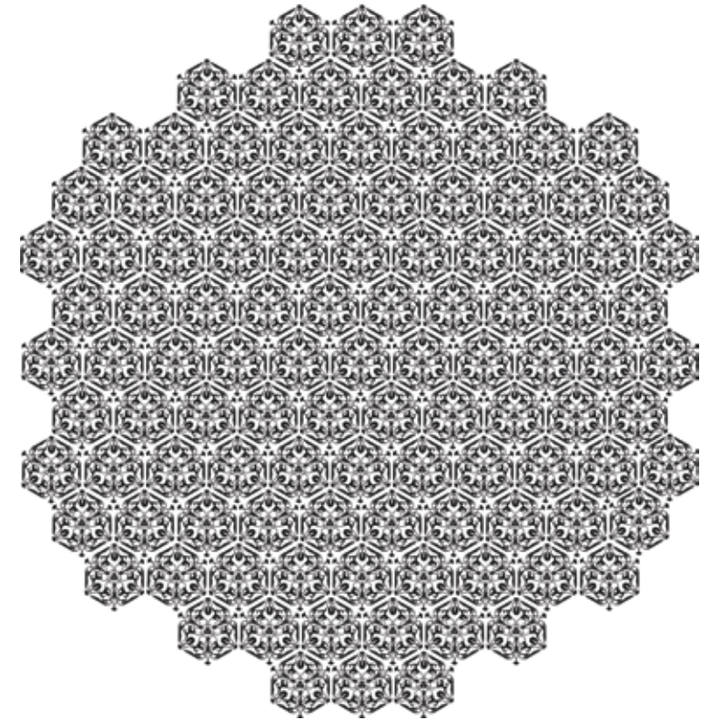


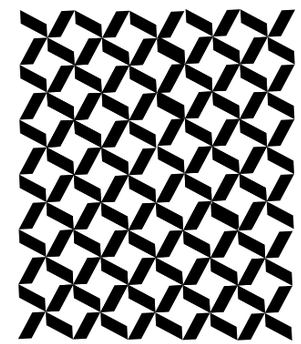


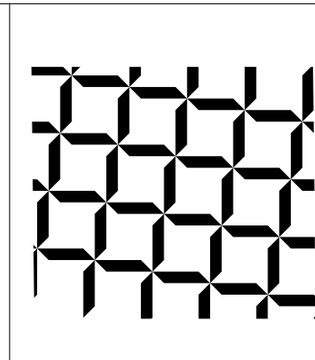
History Tablecloth Development, June 2002–April 2003

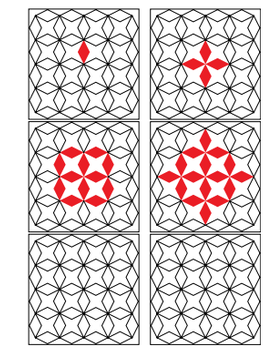
Initially, the History Tablecloth was conceived as a History Table. We envisaged a large dining table packed with LEDs, whose light would provide a halo under objects left on it. This would certainly have been a easier course to take, but we then became enchanted by electroluminescent material and the possibilities that it offered. Once we had decided to make a tablecloth, we began designing patterns that would exploit the potential of print-based interactive surfaces.

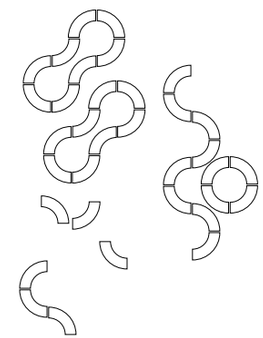
HISTORY TABLECLOTH: DEVELOPMENT JUNE 2002–APRIL 2003

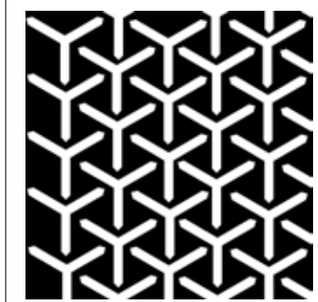




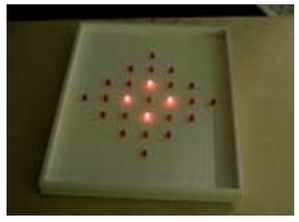
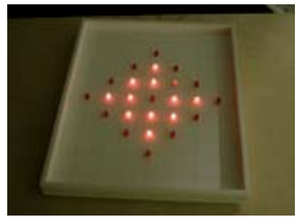
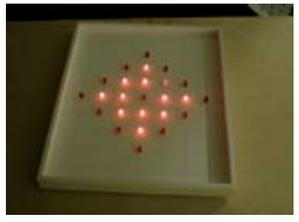








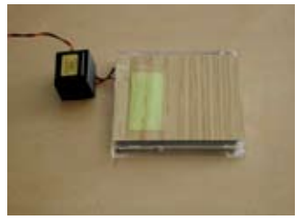
HISTORY TABLECLOTH: DEVELOPMENT JUNE 2002–APRIL 2003

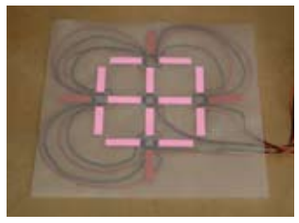
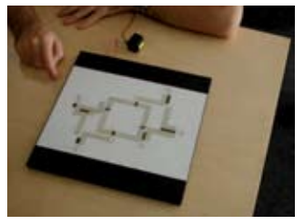
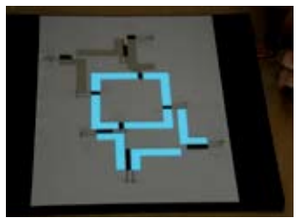
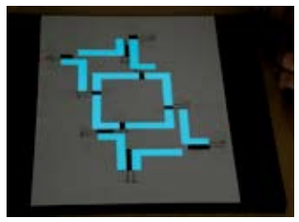














WEIGHT WORKBOOK

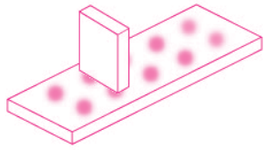
May 2002

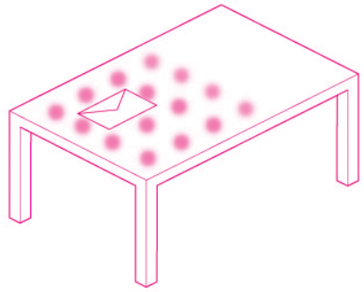
WE COMPILED THIS WORKBOOK IN RESPONSE TO NEW WEIGHT-SENSING TECHNOLOGY WHICH WAS DEVISED BY OUR EQUATOR PARTNERS AT LANCASTER UNIVERSITY, AND WHICH WAS ITSELF A RESPONSE TO SKETCHES FROM OUR FIRST WORKBOOK. OUR AIM WAS FIND DESIGN PROPOSALS THAT MADE EFFECTIVE USE OF THE NEW TECHNOLOGY (GIVING IT A GOOD WORKOUT), AND ALSO REFLECTED OUR OWN INTERESTS.

OUR PROPOSALS INCLUDED A DEVICE CALLED ARMCHAIR RACING, WHICH USES A CHAIR TO CONTROL A RACING GAME; A SET OF REACTIVE COFFEE TABLES; AND THE KEY TABLE, HISTORY TABLE AND DRIFT TABLE.

ROLLERBALL TABLE

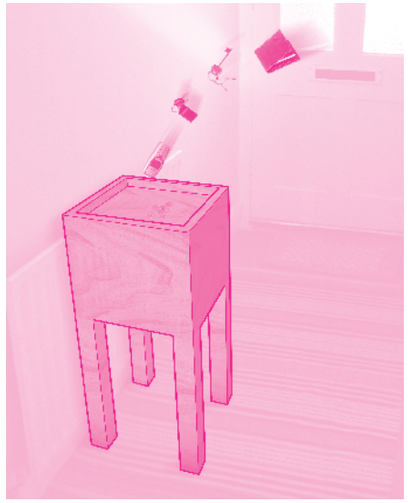
HISTORY TABLE

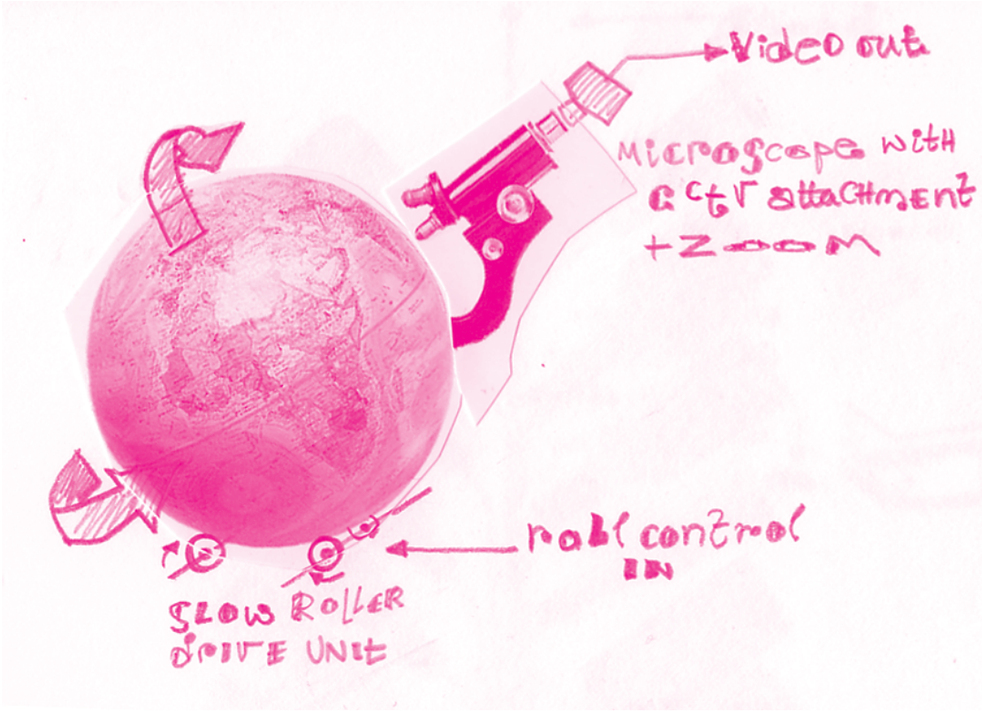




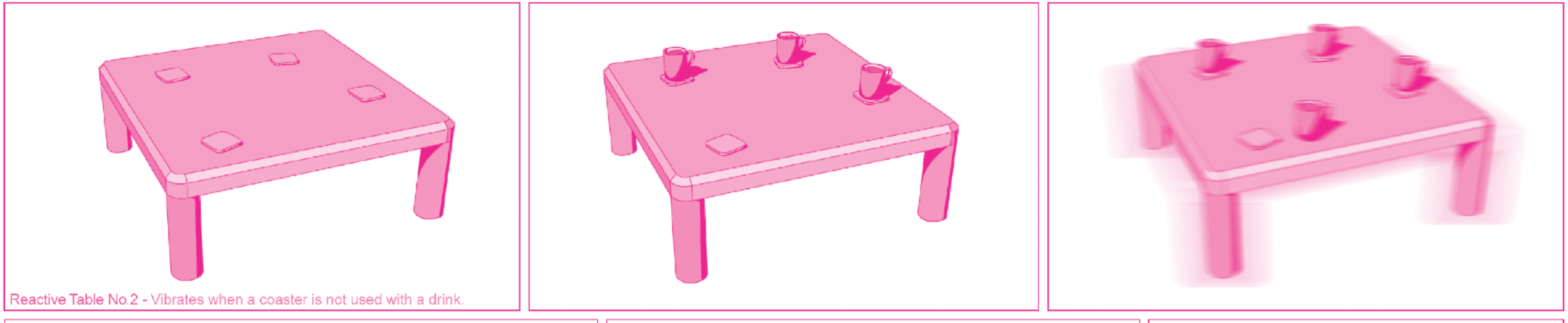
DRIFT TABLE

KEY TABLE

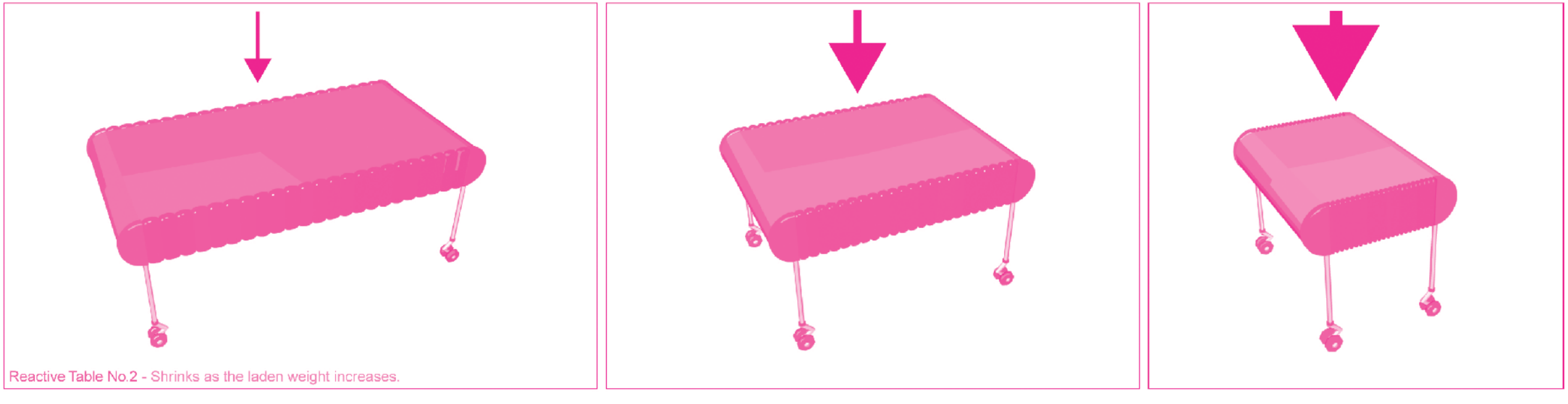




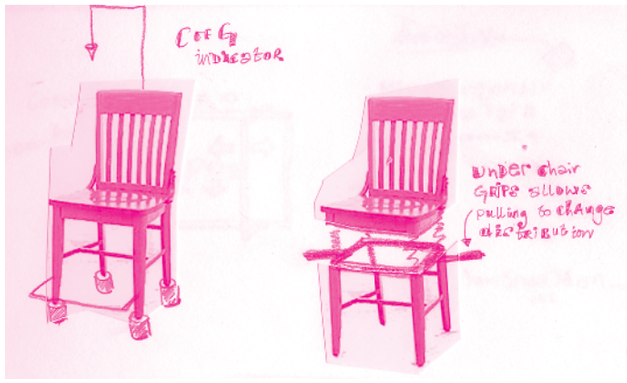
Reactive Table No.1 - Removes obsolete magazines.



Reactive Table No.2 - Vibrates when a coaster is not used with a drink.

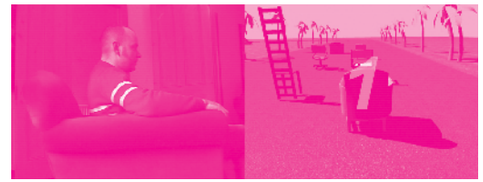


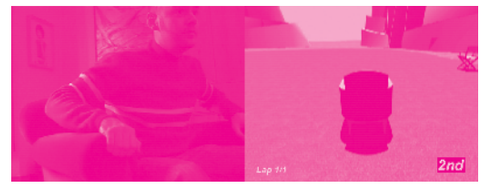
Reactive Table No.2 - Shrinks as the laden weight increases.



ARMCHAIR ★★★ RACING

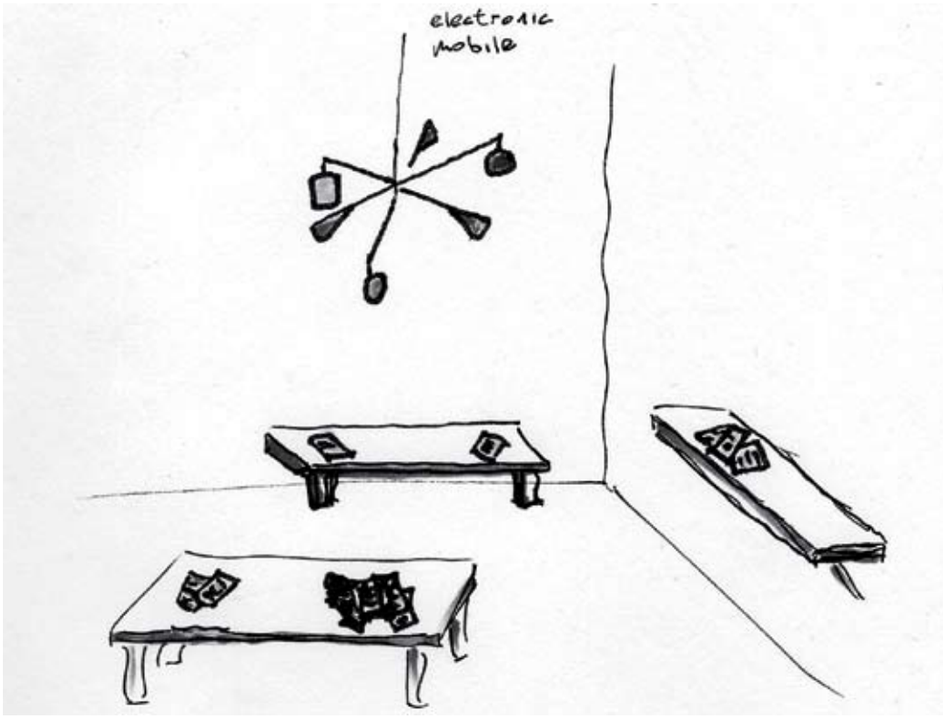
LOADING
0 %





Bill's Sketches, April 2002

These early ideas contain several hints of what was to come. It's uncanny to see large stretches of the design process foreshadowed, quite casually, on a few sheets of paper.


electronic
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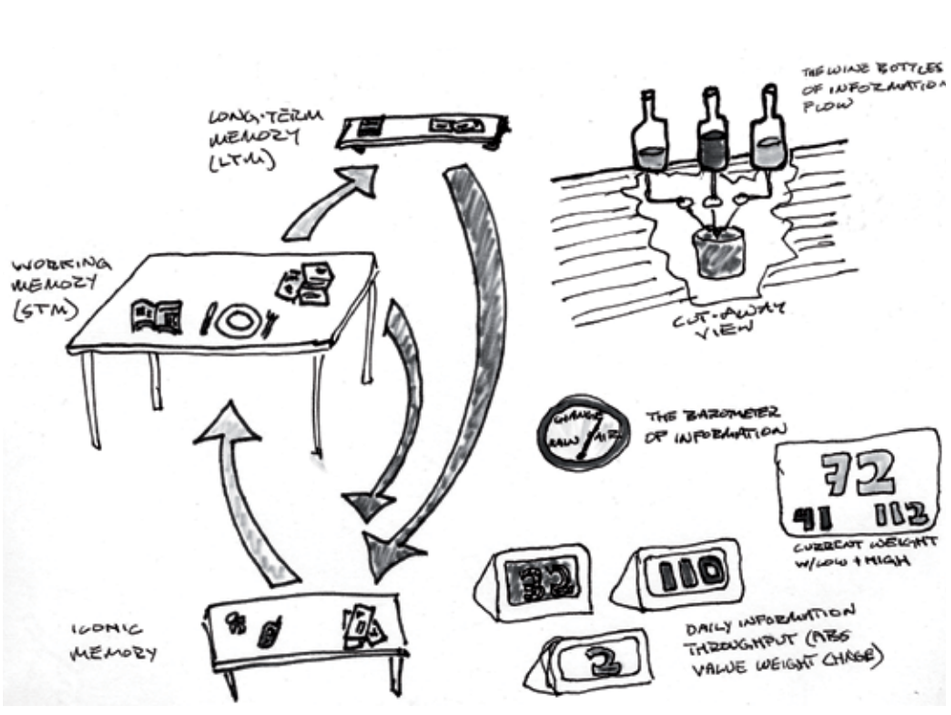
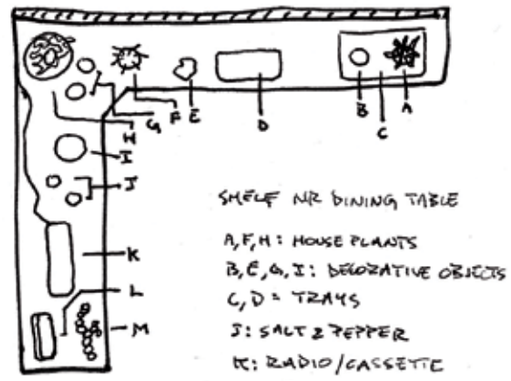

LONG-TERM
MEMORY
(LTM)
WORKING
MEMORY
(STM)
ICONIC
MEMORY
THE WINE BOTTLES
OF INFORMATION
FLOW
CUT-AWAY
VIEW
THE BAROMETER
OF INFORMATION
72
91 113
CURRENT WEIGHT
W/LOW + HIGH
32
110
2
DAILY INFORMATION
THROUGHPUT (ABS
VALUE WEIGHT CHANGE)


G
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SHELF NR DINING TABLE
A,F,H: HOUSE PLANTS
B,E,G,I: DECORATIVE OBJECTS
C,D = TRAYS
J: SALT & PEPPER
K: RADIO/CASSETTE
L: TELEPHONE
M: BABY PLAYTHING


SHELF LIFE NEWS
28 MARCH 2002
FRIEND OR FOE? NO ANSWER!
NEWCOMER TO M QUADRANT STILL UNI
WEIGHT SIGNATURE
"DOESN'T MATCH
BOOK" SAYS
OFFICIAL
STRANGE PROFILE
OF "M" INTRUDER
NO NEWS IS
GOOD NEWS
OBJECTS B, E, G
AND I STILL
UNTOUCHED AFTER
147 DAYS
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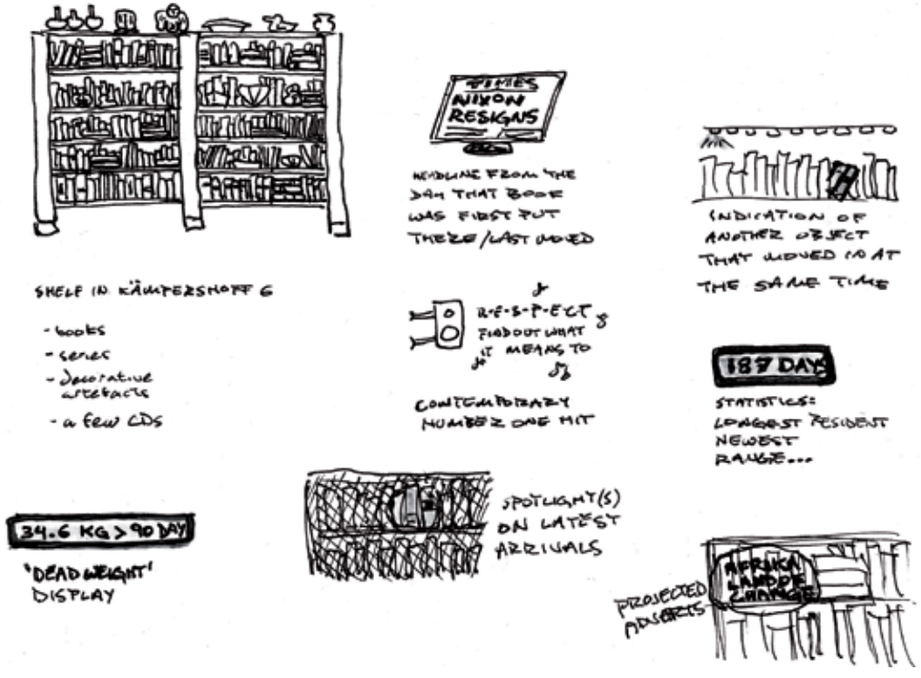
FROM N102
OFFICIALS HAVE
NO CLUES
7 DAYS AND NO
PERIODIC SHIFTS
"JUST THE CLEANER"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- series
- decorative
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- a few CDs
TIMES
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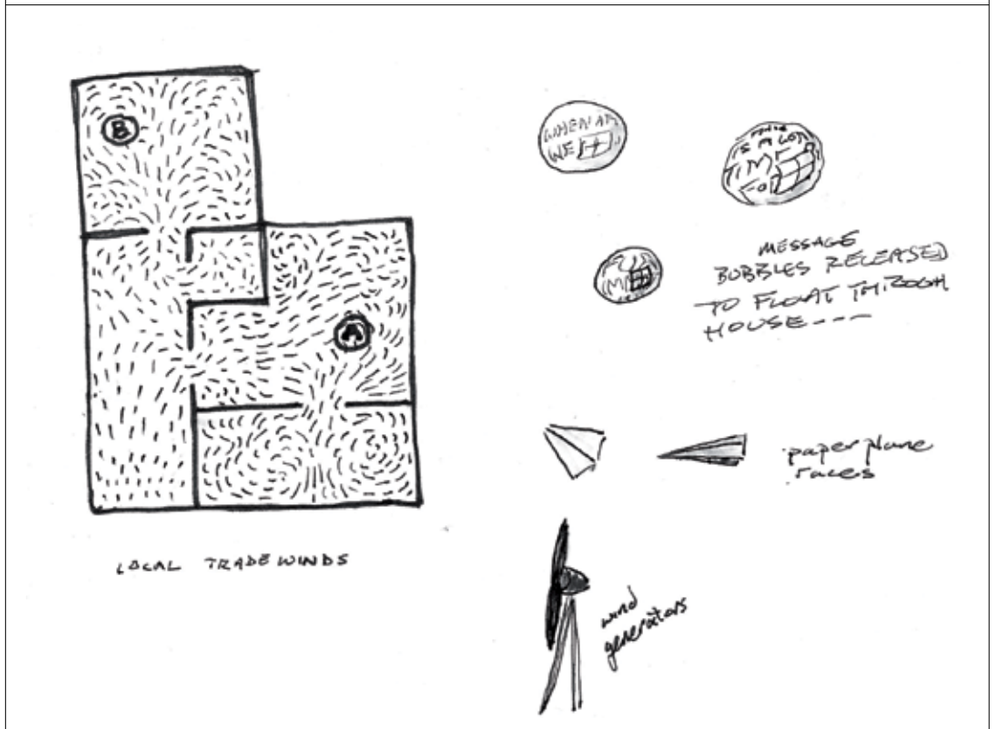
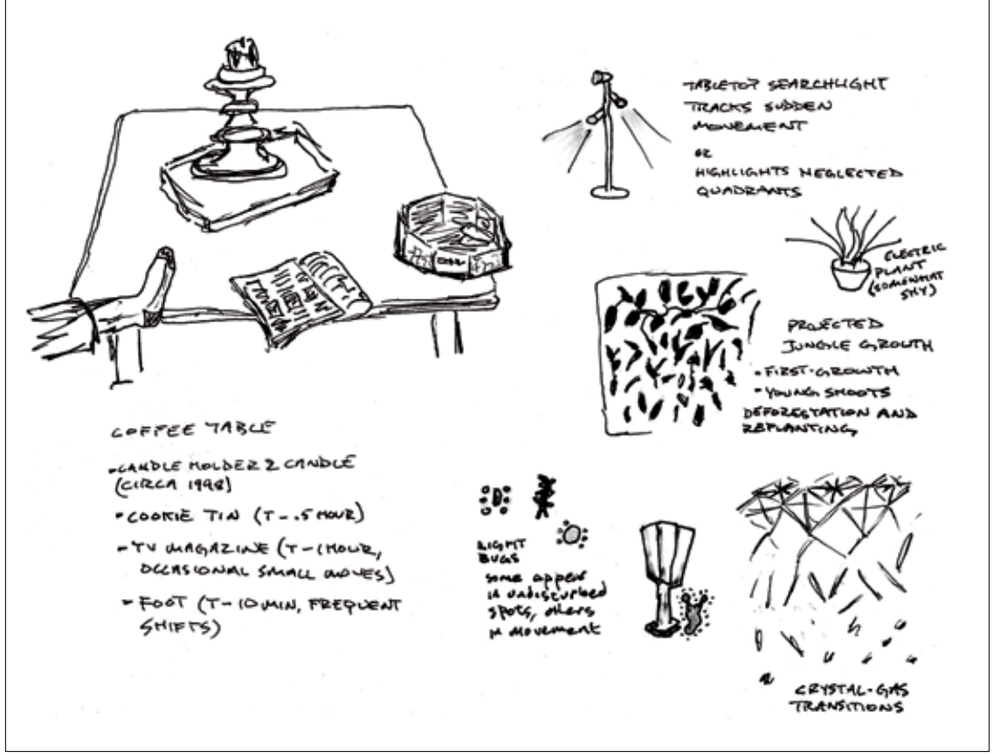
WAS FIRST PUT
THERE/LAST MOVED
R-E-S-P-E-C-T
FIND OUT WHAT
IT MEANS TO
ME
CONTEMPORARY
NUMBER ONE HIT
(INDICATION OF
ANOTHER OBJECT
THAT MOVED IN AT
THE SAME TIME
187 DAY
STATISTICS:
LONGEST RESIDENT
NEWEST
RANGE...
34.6 KG > 90 DAY
'DEAD WEIGHT'
DISPLAY
SPOTLIGHT(S)
ON LATEST
ARRIVALS
PROJECTED
ADDERTS
AFRICA
LANDSCAPE
2 MARCH

BILL'S SKETCHES APRIL 2002





WORKBOOK 2

December 2001

THIS WORK BUILDS UPON A PROPOSAL IN *WORKBOOK 1* FOR A HOME HEALTH MONITORING DEVICE, WHICH WOULD 'MEASURE' THE HEALTH OF THE HOME.

WORKING WITH THE VOLUNTEER WHO INSPIRED THE ORIGINAL SKETCH, WE DEVISED A SERIES OF VERY SIMPLE SENSORS, EACH OF WHICH GAVE VISUAL FEEDBACK ON THE ACTIVITY IT WAS SENSING. FOR EXAMPLE, WE REPACKAGED A TRUTH DETECTOR BOUGHT FROM THE GADGET SHOP, AND PLACED IT ON THE VOLUNTEER'S TV. A SERIES OF LEDS ON THIS DEVICE WOULD LIGHT UP IF ITS CIRCUITRY PREDICTED A LIE.
WE DIDN'T HAVE ANY DATA-LOGGING TECHNOLOGY FOR THIS EXPERIMENT, BUT INSTEAD ASKED OUR VOLUNTEER TO WRITE HER OBSERVATIONS OF THE SENSORS IN A COLLECTION OF DIARIES. WHAT MADE THIS EXPERIMENT INTERESTING WASN'T SO MUCH THE REACTIONS OF THE SENSORS AS THE REACTIONS OF THE VOLUNTEER.

Helens Bedroom

BEDROOM KIT:

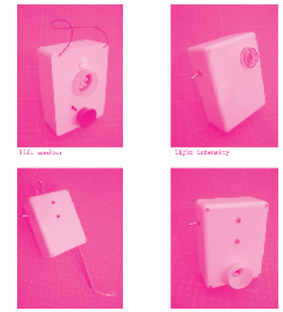
DAYLIGHT SENSOR

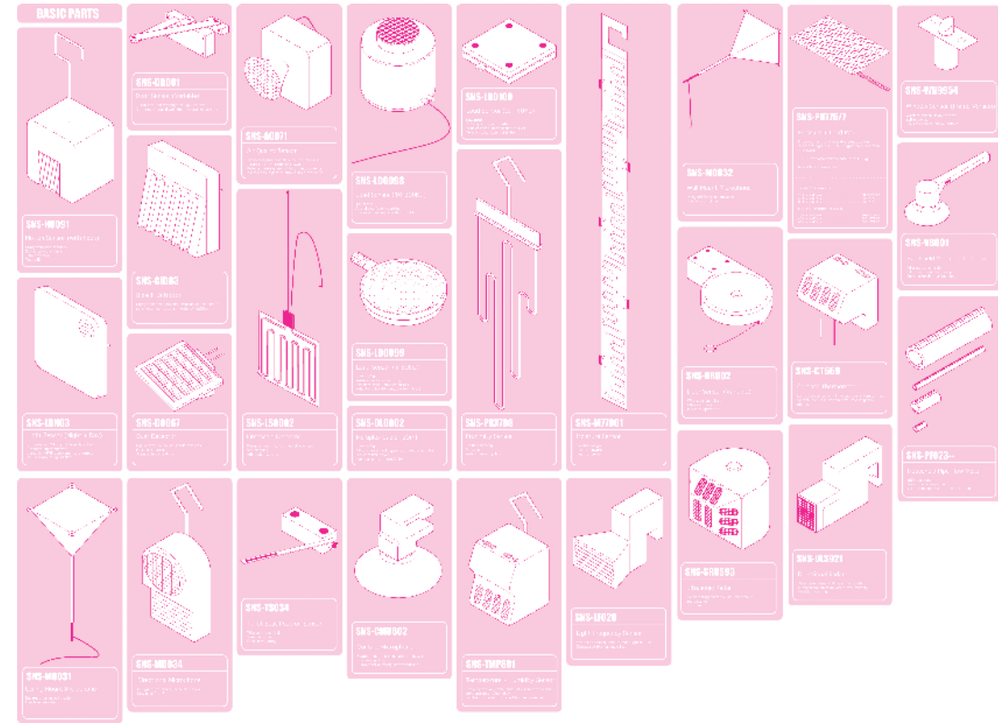
Date: 12. (15) 2001.

Time: 1 30

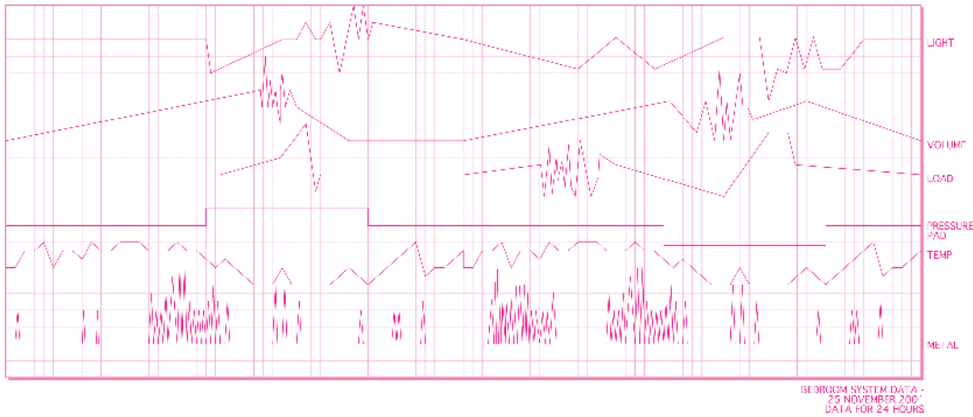
Your reactions...

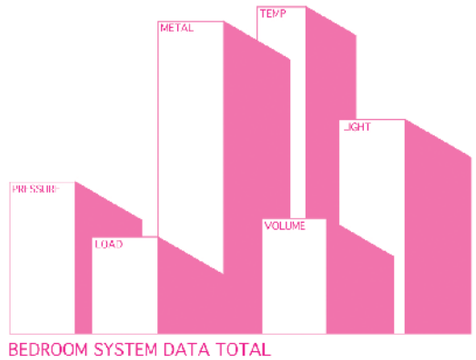
The Bedroom sensor was on the vidio it did not flash on and of very much when watching TV. It seemed to get redder when the T.V. was on or it just sat on a low light when the curtains were drawn however it did not react to the curtains shut or drawn any differently.



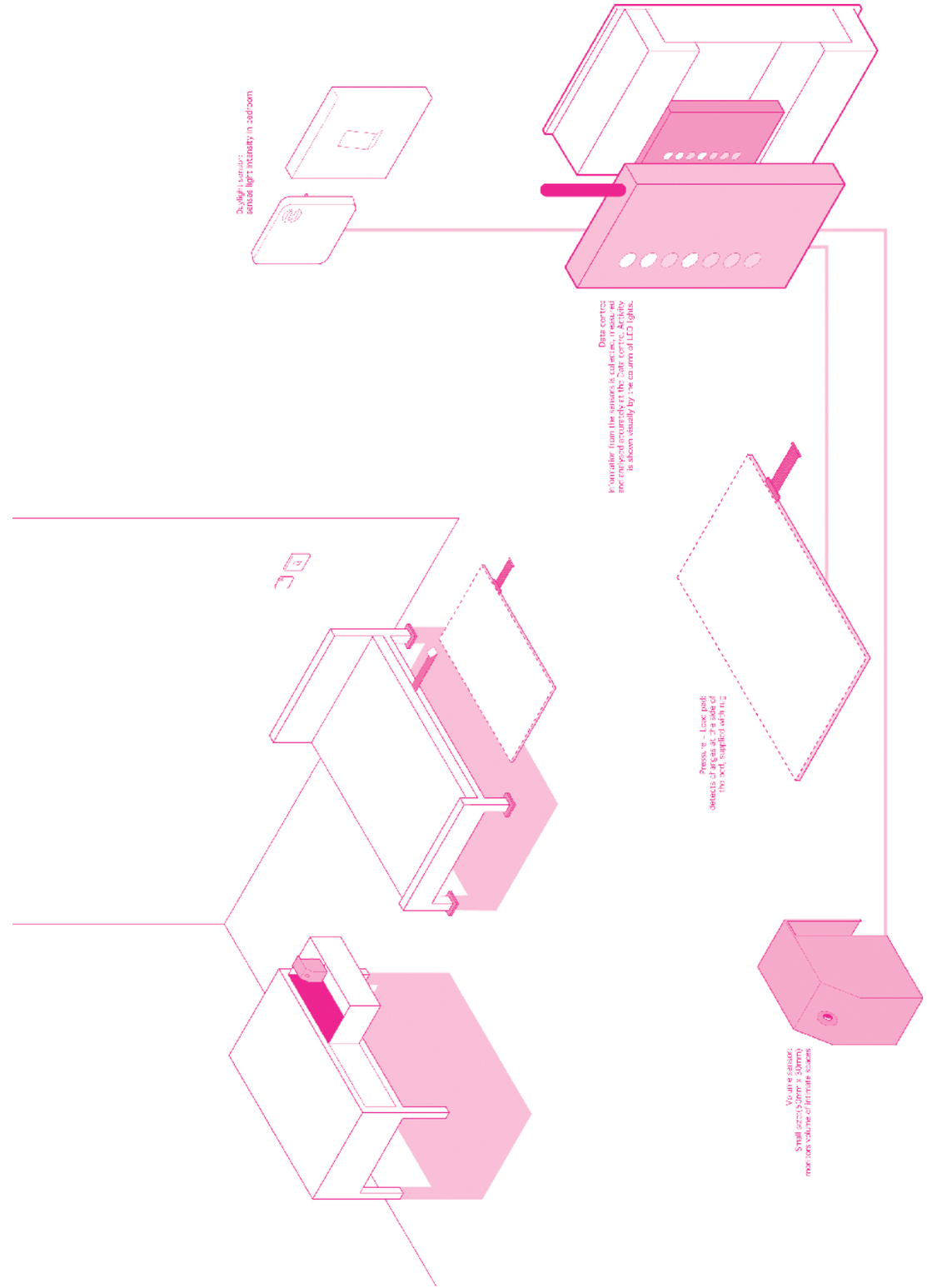


BEDROOM SENSOR KIT
A system of sensors in one room provides feedback on the surroundings and activities

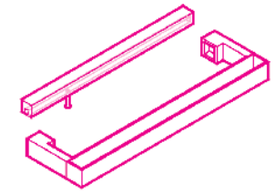




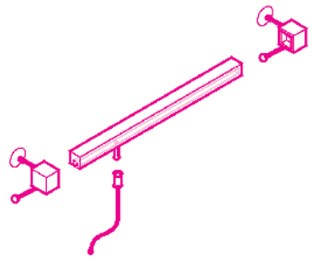
BEDROOM SYSTEM DATA TOTAL



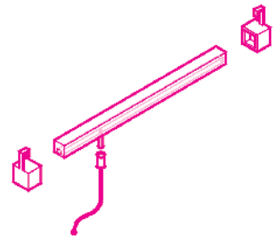
Based on the proximity sensors, each variation of the basic perch suggests detecting specific bird activities



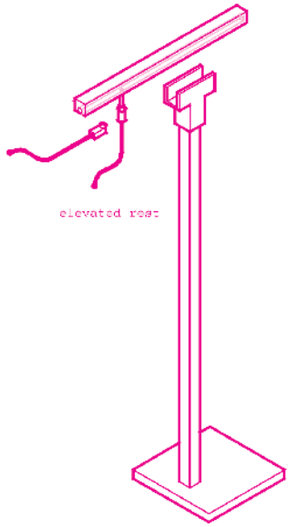
perch with feeder



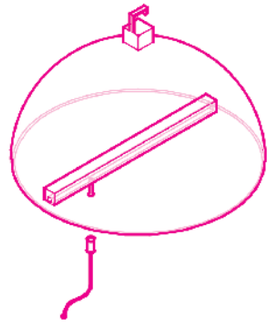
window view



hanging swing



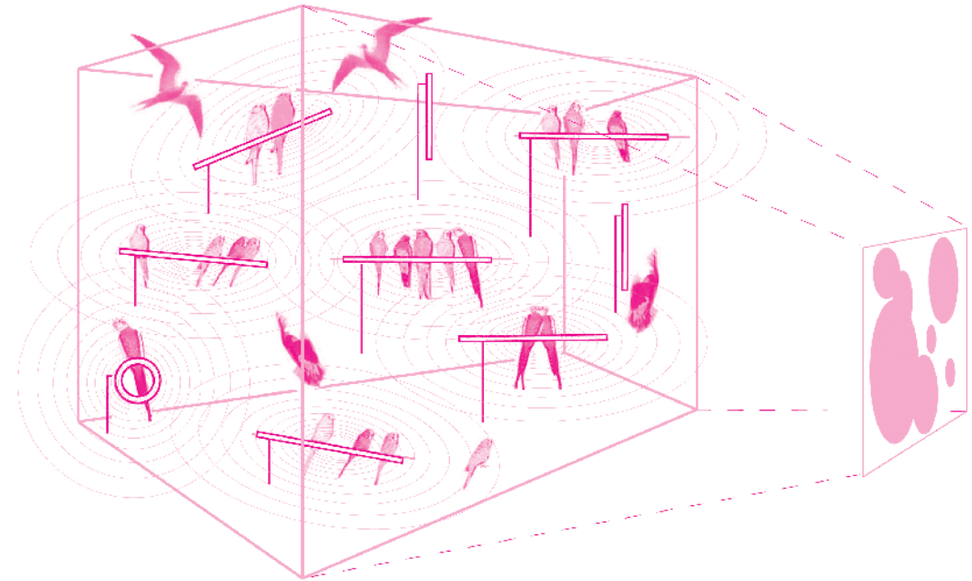
elevated rest



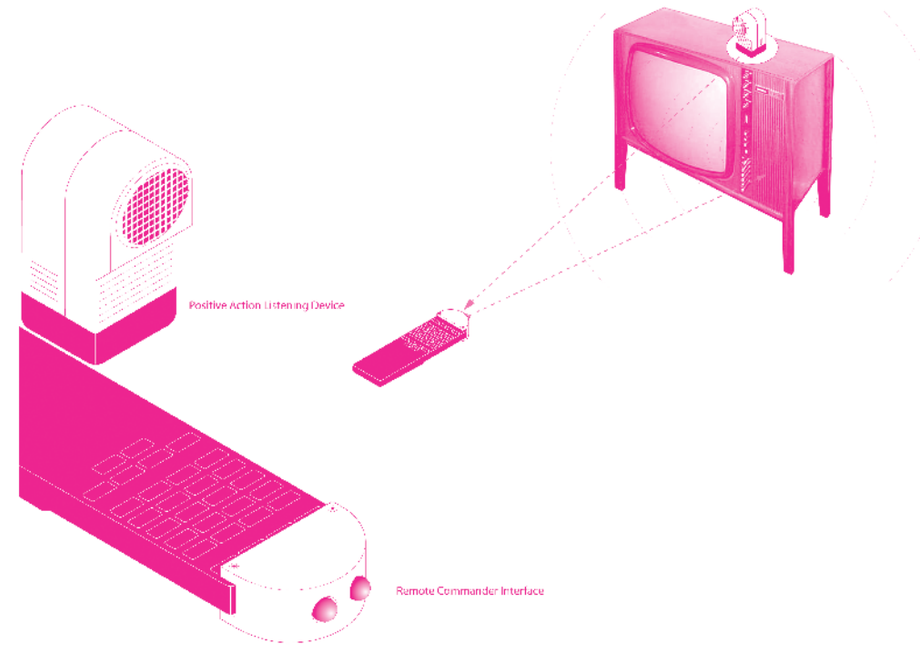
slumber dome

flight rest

READING BIRD ACTIVITY



POSITIVE ACTION CHANNEL CHANGER
Moderates programming output



WORKBOOK 1

August–October 2001

THIS WAS OUR FIRST SET OF PROPOSALS. THEY WERE INSPIRED IN PART BY OUR WORK WITH VOLUNTEERS DURING THE CULTURAL PROBE STUDIES,* IN PART BY THE EXPERTISE AND RESOURCES OF OUR NEW EQUATOR PARTNERS, AND IN PART SIMPLY BY OUR OWN INTERESTS.

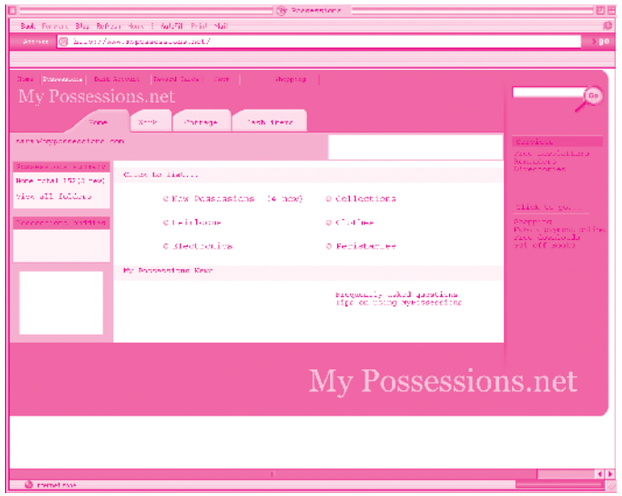
WHILE WE HAD YET TO COIN THE TERM 'THE CURIOUS HOME', IT IS STRIKING TO WHAT EXTENT THE VALUES, THEMES AND DESIGN APPROACHES – IN FACT, THE *STYLE* OF THINKING – OF THE NEXT SIX YEARS WERE ALREADY IN PLACE. THE CIRCUITOUS ROUTE THAT LED US TO THE PLANE TRACKER STARTED WITH A PROPOSAL HERE. LIKEWISE, THE HOME HEALTH MONITORING SKETCH LED TO THE HOROSCOPE PROJECT, AMONG OTHER THINGS.

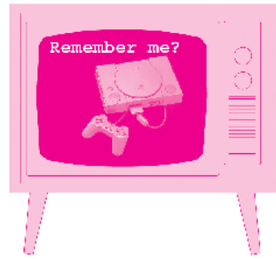
THESE PAGES ARE ONLY A SELECTION OF THE PROPOSALS IN *WORKBOOK 1*, BUT IDEAS LIKE THE LEAKING ROOF, HEART OF THE HOME, AND THE INFORMATION WELCOME MAT, SIMPLE THOUGH THEY BE, ALL DISPLAY, IN RETROSPECT, THE SAME CONCEPTUAL HALLMARK THAT CHARACTERISES THE LOCAL BAROMETER.

* SEE 'CULTURAL PROBES AND THE VALUE OF UNCERTAINTY' BY W. GAVER, A. BOUCHER AND S. PENNINGTON [WWW.GOLDSMITHS.AC.UK/INTERACTION/PUBLICATIONS.HTML].

PRODUCTS THAT KEEP YOUR ATTENTION

When you buy a new product, this purchase information is automatically transfered from your bank, credit or reward card and logged in your possessions database. Items bought with cash can be entered manually.



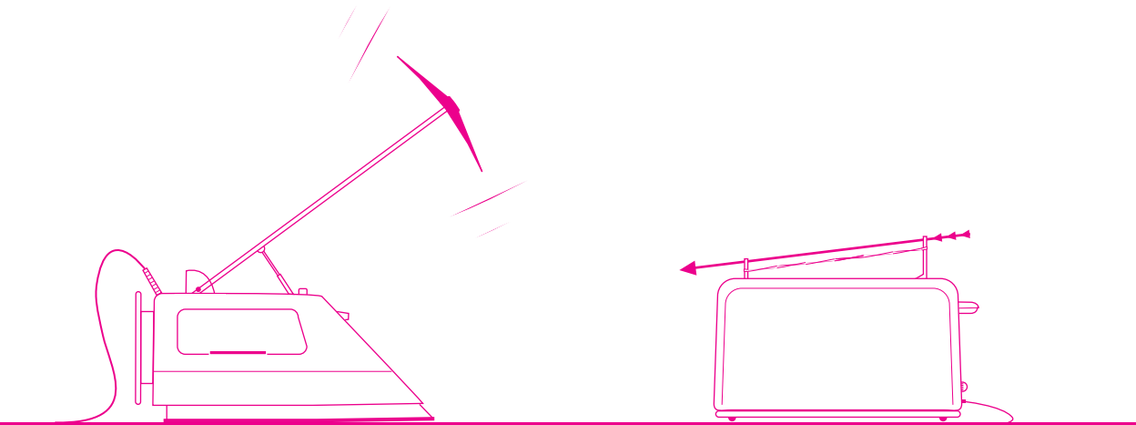


Possessions that are old or services that have become unused are able to re-advertise themselves to youthrough channels in your home, such as the TV and mailshot

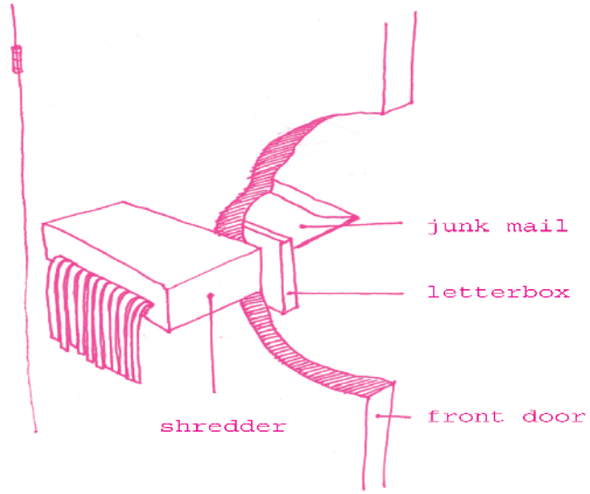
PRODUCT WARS

Objects that battle for their owner's affection

Sometimes improved functions and operation are not enough, try as they might some products are just ignored. This calls for drastic action. A Playstation 1 declares war on a Playstation 2. With the help of a Sinclair Spectrum 48K, analogue cell phone and a radio controlled car the PSX 1 might just win.

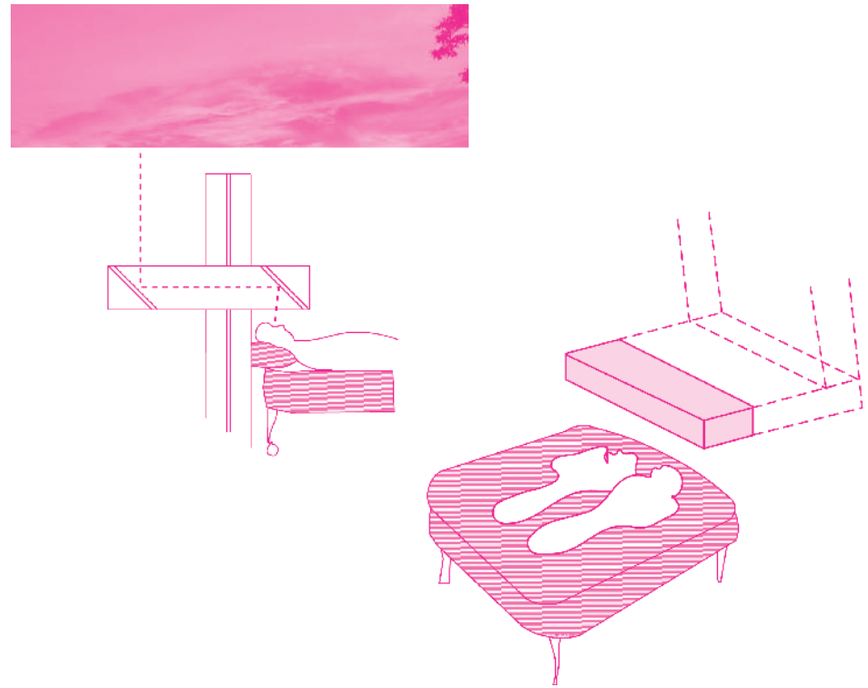


LETTERBOX FOR UNWANTED POST

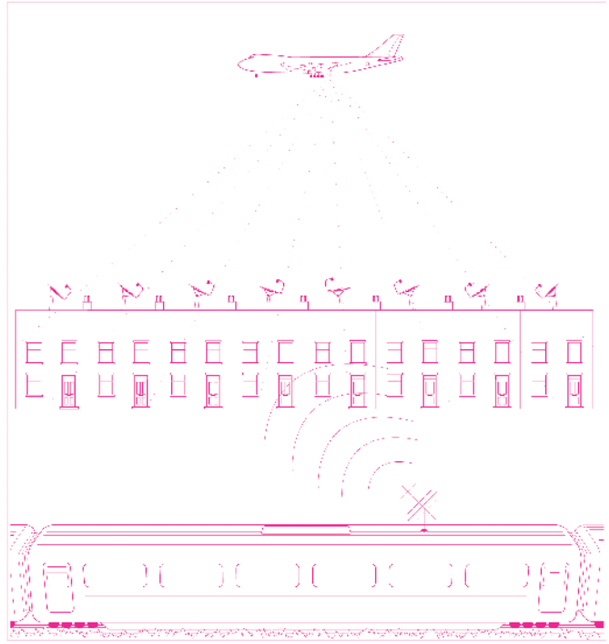


LEAKING ROOF

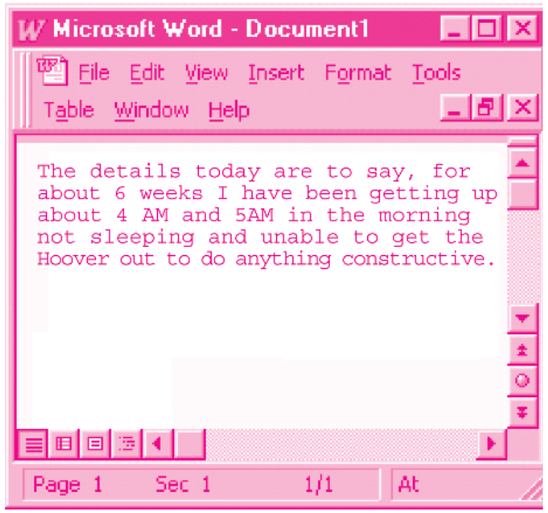
Holes on the roof to let the water in



COMPENSATIONARY DATA

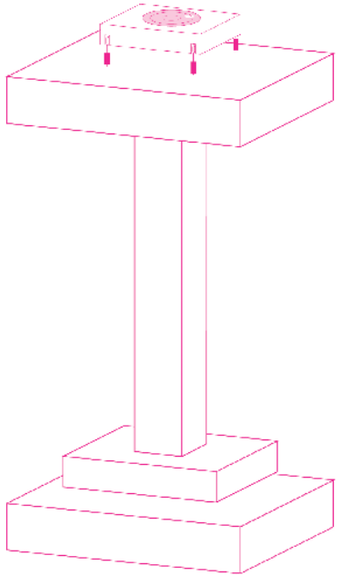


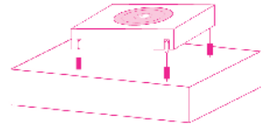
TWEET TO TEXT



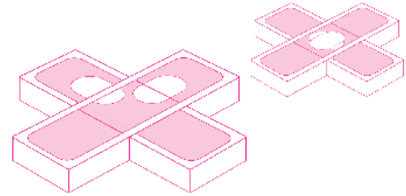
SELF-LEVELLING PICTURE FRAME

SPIRIT LEVELS REPRESENT THE HEART OF THE HOME





Pneumatics raise the spirit level coordinating with the heart of the home to create an accurate read-out.

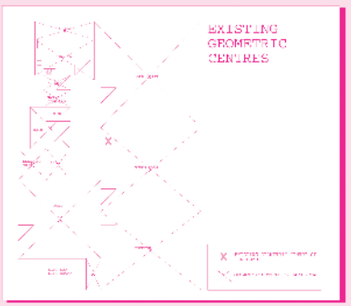


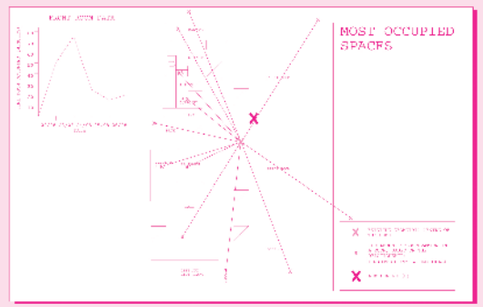
AS THE CENTRE SHIFTS:

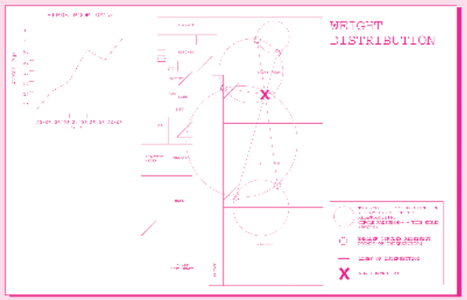
> Move devices according to monitor the shifting centre

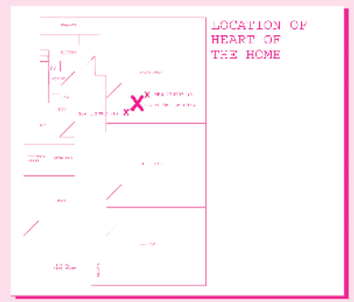
> Change patterns of activity to align the heart ofthe home

FORMULA TO DETERMINE THE HEART OF THE HOME

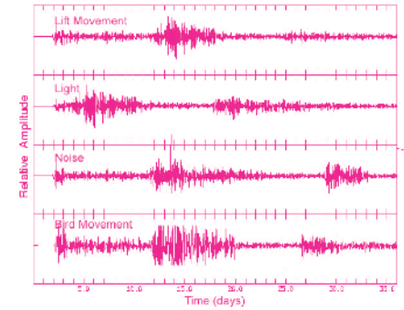


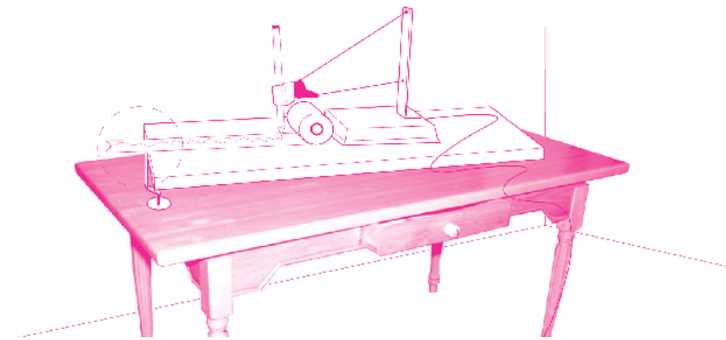


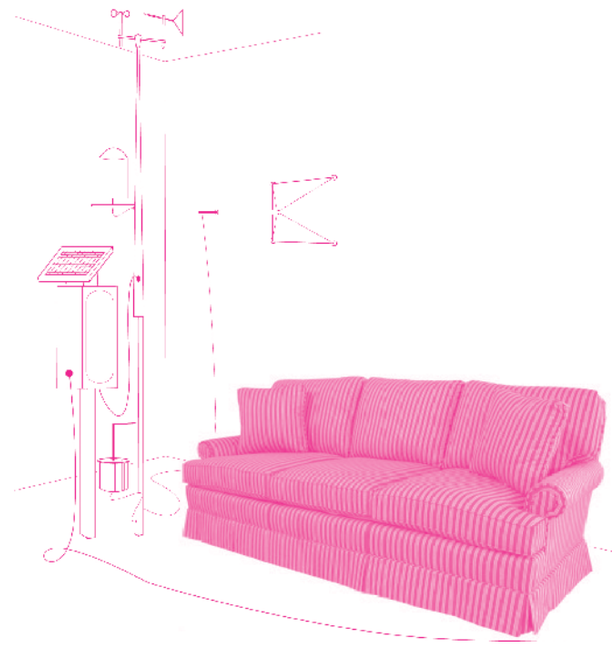




HOME HEALTH MONITORING DEVICE







Introduction: There's No Place Like *Illam*, *Casa*, *Batch*, *Haupt* ... Home

Genevieve Bell, Director of User Experience, Digital Home Group, Intel Corporation

Ghar. 결승점. Illam. Council flat. *Casa*. Semi-detached. 回家. *Haupt*. Town house. *Rumah*. Apartment. Sanctuary. Place of one's birth. RV. Refuge. *Danwei*. Purity. Modesty. A structure in which one lives. Simplicity. *Batch*. Family. Site of power. Memory. That there are so many words, metaphors and images for home should serve to remind us not only that homes exist within a wide range of physical, infrastructural and legislative contexts, but also that they are embedded within highly varied systems of meaning. Indeed, the world's 1.6 billion homes are as different from one another as the countries and cultures within which they were built.

The challenges of designing for these many homes are immense. First, there are the practical considerations: size, density, scale and history. The extraordinary variability in physical housing structures and types, from the vastness of American homes with the average footprint of 200-220 square meters to more modest homes elsewhere in the world, creates infrastructural, service-provisioning, networking and device challenges. Increasing rates of urbanisation worldwide, with its concomitant high density dwellings, means that more than fifty percent of the world's housing stock is shared wall! Second, homes are the sites of a range of social and cultural practices, dysfunctions and aspirations. Additionally, there is a myriad of patterns of occupation, floor plans, household sizes and compositions. Single occupants, extended intergenerational families and all points in between use the space within the home in complex, fluid and culturally specific ways: 'front room', 'salon' and 'parlour' might suggest one kind of hub within the home, '*anbang*' and 'antechamber' another. Third, few homes operate in a vacuum or

complete isolation – they are part of larger social, cultural and sometimes physical institutions. Homes are connected up to other homes, some by proximity, others by shared infrastructure and resources, and still others by lines of affection and relationship. Lastly, and complicating the picture further, because of the great variety of metaphors and symbols for home, the things we wrap around design, or that we imagine design might implicate – ideas about security, trust, the future, and even the relationship between public and private – are all flexible.

All this complexity seems to be at odds with current, deceptively simple visions of the 'digital home'. Not only is the home in these visions always singular, it is nearly always unrealistically large, frequently freestanding, connected to the rest of the world only for the provisioning of services, and newly constructed – without legacy hardware, infrastructure or quirks. It is also almost always occupied by a nuclear heterosexual family, who are remarkably accident- and trouble-free, and who are perfectly happy to perform daily tasks and rituals in series or parallel, and entirely without incident. The technology that makes this digital home 'smart' is imagined to be seamlessly connected, robust, proactive, rational and rationalising, and ultimately delivering compelling experiences to its residents.

In the rush to sell a vision of the home as a site in which experiences could be enhanced through technology, the messiness of daily life was replaced with a vision of technological order. In some ways, this notion of the home as a site of enhanced experience is nothing new; nearly a century ago, Christine Frederick, Lillian Gilbreth and Margarete Schütte-Lihotzky all concerned themselves with reimagining the home as a place of greater health, leisure time and opportunities for self-improvement. This vision would be achieved through the principles of domestic science and home economics, which brought scientific rationality to the home in the form of labour-saving devices. If labour in the home could be rationalised, these women argued, then we would free ourselves of all kinds of drudgery. The more subtle logic of capitalism, of implicit ideas about productivity and time, still pervades contemporary digital home visions.

Over the last decade, there have been a number of 'smart home' and 'digital home' installations and experiments in the United Kingdom, Europe, the United States and Asia. With one or two notable exceptions, these have been visions of domestic life that celebrated technology and its transformative power at the expense of home as a lived and living practice. I would argue that to design meaningful and meaning-making domestic technologies, one must begin with an awareness of cultural context, accrued social meanings and everyday experiences. Furthermore, one must also begin with the home as it is currently built and experienced. In this approach, rather than viewing the home as a merely another site of technology implementation, running in parallel to the office, one starts with the lived home, and augments it with digital technologies and infrastructures. Taking full and creative advantage of recent advances in technology and infrastructure – the proliferation and price stabilisation of high-speed data connections, location-sensitive devices, smaller form factors and underlying silicon advances (lower power requirements, the continuing velocity of Moore's Law) – Goldsmith's Interaction Research Studio has developed and deployed the first in what one hopes will be a larger portfolio of elaborations of, and interventions in, 'home' as it becomes increasing digital.

The Curious Home, as these researchers so wonderfully label their direction, represents a fascinating reworking of the smart/digital home space – one in which technology serves to create wonderment, fascination and an enhanced sense of belonging. The Video Window, Lamp Share, Local Barometer and Plane Tracker all offer the possibility of connecting those within the home to other places, experiences and people. For instance, there is, for me, a clear and provocative trajectory from the early Drift Table – with which one could float over the British countryside, through aerial photographs displayed in a coffee table – to the new Video Window, where instead of floating over the countryside, one is offered a glimpse of unexpected views from one's own home. Here, encounters with new vistas are highly localised and specific, and represent, I suspect, another shift away from utopian narratives

of technologically powered globalisation (in this case, aerial photography of the British countryside) to something far more specific and local. The Local Barometer offers another kind of hyperlocality: local weather information drives data displays within the home. The Plane Tracker and the Lamp Share also play on the notion of what is local: in the former, planes passing overhead create traces that track around the globe; in the latter, households are connected to one another through more prosaic and mundane objects.

To develop a new vision of the digital home requires a willingness to take as one's starting point a rich range of cultures, meanings and experiences. This new collection of design directions, under the 'Curious Home' umbrella, does just that! Not only does it build on early work that embodied whimsy, ambiguity and a strong notion of playfulness, but it also turns on a renewed sense of locatedness, of the home as being placed in a set of social networks, events and activities that extend far beyond the actual walls of the home. It is this attention to place and place-fulness that is in some ways the unique contribution of this work, for it suggests that home is always already connected, not in the technical infrastructure sense, but in a larger social sense. Homes, in the Curious Home sense of that word, are part of neighbourhoods, districts, zones, social movements, population trends, desires, relationships and even flight paths.

About Equator

This book describes the work done by the Interaction Research Studio in the Equator Project.

Equator was a six-year Interdisciplinary Research Collaboration, funded by the Engineering and Physical Sciences Research Council (EPSRC), that brought together researchers from eight British institutions and a variety of disciplines. The project ended in June 2007 and involved:

University of Bristol
University of Glasgow
Lancaster University
University of Nottingham
Goldsmiths, University of London
University of Southampton
University of Sussex
University College London

With thanks to

All our Equator partners, in particular: Tom Rodden, Jan Humble, Stefan Rennick Egglestone, Steve Mills, Tony Pridmore, Mark Paxton and Hazel Glover at Nottingham University; Nicolas Villar, Hans Gellerson and David Molyneaux at Lancaster University; Anthony Steed at UCL; and Mark Stringer and Eric Harris at Sussex University.

Home Health Horoscope collaborators: Phoebe Sengers, Jofish Kaye and Eric Chen at Cornell University, and Jay Melican, Brooke Foucault, Scott Mainwaring and Terry Dishongh at Intel.

Our volunteers: Heather; Steve; Zabie; Guy and Bal; Roy; Gweni, Paul and Tommy; Fru and Zac; Celia and John.

Gillian Crampton Smith, Rory Hamilton, Tim Olden, Bas Raijmakers, Inge Daniels, Martin Watmough, Kirstie Richie, Crispin Jones, Michael Golembewski, Gianni Tozzi, Rachel Wingfield, Jo Longhurst, Shahram Izadi, Francis Li, Mikkel Crone Koser, Casey Reas, Ben Fry, “KjH” at ACARSD, Anab Jain, Steve Jackman, Tom Streithorst, James Davis, Shaun Cole, Stella d’Ailly, Maja Sten, Philip Thwaites, Thomas Thwaites, Genevieve Bell, Maria Fusco, Ann Schlachter, Marie Fallon, Linda Agili, Royal College of Art and Goldsmiths, University of London.

And finally, thanks to our sponsors and supporters: Hewlett Packard, Getmapping, Intel Corporation, Ove Arup, NASA, Google, Loot, Stewart Aviation, 2MZ Machining, Tate Britain, V&A Museum and The Pacific Playhouse.