Material Presented by Lab:USE at Ciência Viva (Living Science) Lisbon, 22-23 Nov. 2008

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Lab:USE
Laboratory for Usage-centered Software Engineering

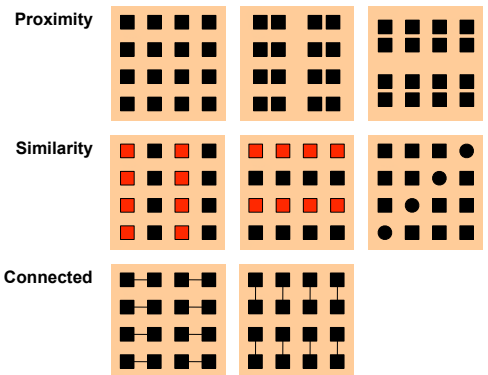
Information and Communication Technologies Institute
Carnegie Mellon | PORTUGAL
AN INTERNATIONAL PARTNERSHIP

What is Human-Computer Interaction?

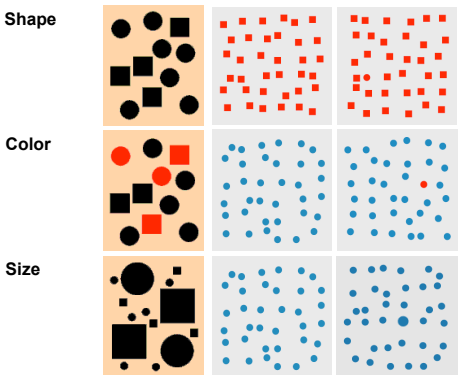
Human Computer Interaction

Human-computer interaction is a discipline concerned with the **design**, **evaluation** and **implementation** of *interactive* computing systems for *human* use and with the study of major phenomena surrounding them.

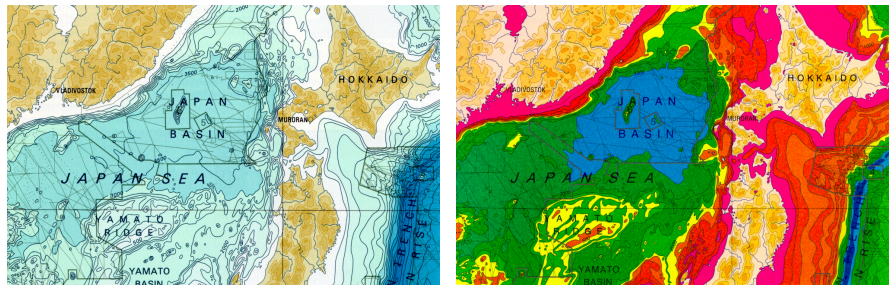
Grouping things



Making things distinct



Intensity vs. Hue



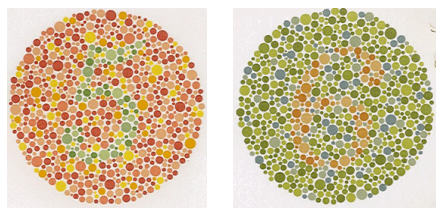
The human eye has 10 times more rods than cones. This means that humans are better at interpreting changes in intensity rather than changes in color.

Affordances

A system should take advantage of users' real-world knowledge.

Mapping controls to functions

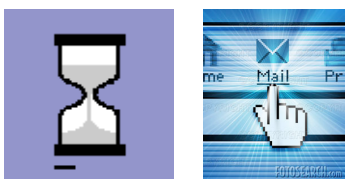
Colour blindness



Focus

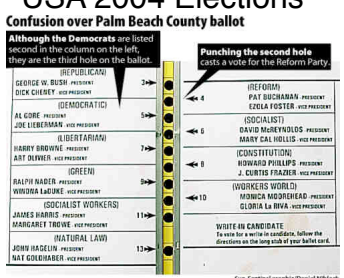
Humans find it difficult to perceive simultaneously highly saturated, spectrally extreme colors.

Feedback / Feed-forward



The system should give a response to the users, and indecate its state. It should also help users predict what will happen next.

USA 2004 Elections



Memory

617459176 vs. 617-459-176

NMIYMSBO vs. SONY-IBM

Humans have a limited short term memory. We can remember 7±2 "things" or "chunks".

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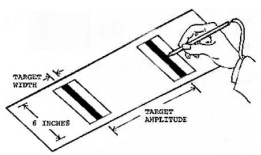
Fitts' Law

Fitts' Law is a model to account for the time it takes to point at something, based on the size and distance of the target object.

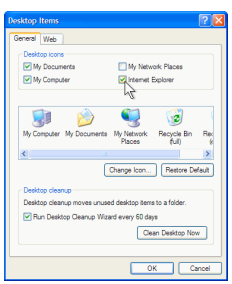
$$MT = a + b \cdot ID \qquad ID = \log_2\left(\frac{A}{W} + 1\right)$$

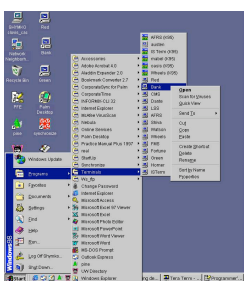
MT: movement time
a, b: constants
ID: Index of Difficult
A: target Amplitude
W: target Width



Fitts' Law and variations of it are used to model the time it takes to use a mouse and other input devices to click on objects on a screen.

Broadly, Fitts' Law can be applied by designers to suggest moving target buttons closer and making them larger for extremely commonly used buttons. In detail, applying the formula can be extremely useful for exact design of time-critical applications.





Try it yourself!

For each pair of circles, try to touch each circle consecutively.
Be as fast as possible without making any mistakes.

Easy

Medium

Hard

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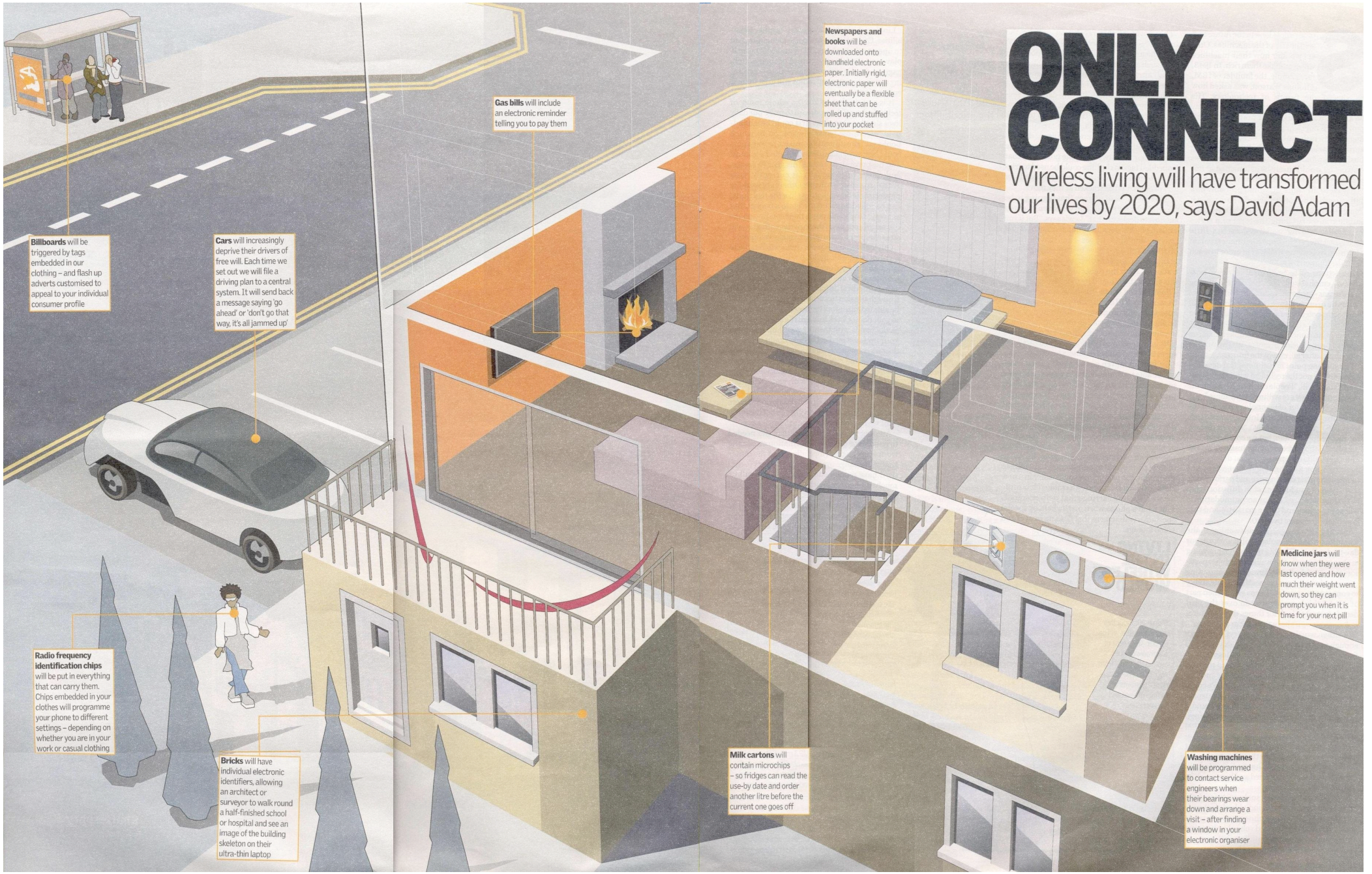
ONLY CONNECT
Wireless living will have transformed our lives by 2020, says David Adam
Billboards will be triggered by tags embedded in our clothing – and flash up adverts customised to appeal to your individual consumer profile
Cars will increasingly deprive their drivers of free will. Each time we set out we will file a driving plan to a central system. It will send back a message saying 'go ahead' or 'don't go that way, it's all jammed up'
Gas bills will include an electronic reminder telling you to pay them
Newspapers and books will be downloaded onto handheld electronic paper. Initially rigid, electronic paper will eventually be a flexible sheet that can be rolled up and stuffed into your pocket
Medicine jars will know when they were last opened and how much their weight went down, so they can prompt you when it is time for your next pill
Radio frequency identification chips will be put in everything that can carry them. Chips embedded in your clothes will programme your phone to different settings – depending on whether you are in your work or casual clothing
Bricks will have individual electronic identifiers, allowing an architect or surveyor to walk round a half-finished school or hospital and see an image of the building skeleton on their ultra-thin laptop
Milk cartons will contain microchips – so fridges can read the use-by date and order another litre before the current one goes off
Washing machines will be programmed to contact service engineers when their bearings wear down and arrange a visit – after finding a window in your electronic organiser

Barcodes

NFC & 2D

URL:

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Trailer 1

Trailer 2

Trailer 3

Lab:USE posters

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Professional Master in Human Computer Interaction

Master HCI...
in Europe and the United States

The Human-Computer Interaction Institute (HCII) at Carnegie Mellon University and the Mathematics and Engineering Department (DME) at the University of Madeira are proud to announce an international partnership under the CMU/Portugal agreement and the Information and Communication Technologies Institute (ICTI).

This unique 16-month interdisciplinary program is the first of its kind in Europe. Beginning in September 2007, this joint-degree program offers students an opportunity to study on both campuses in computer science, design, psychology and social sciences and to work in teams on an extended applied HCI project in industry.

More information can be found at **http://mhci.dme.uma.pt/**

① HCI/CMU
Sept. - Dec.
Pittsburgh, USA

05-600 HCI Pro Seminar

05-610 Intro to HCI Methods

Elective 1 (Communication Design Fundamentals)

Elective 2

Elective 3

② DME/UMa
Jan. - May
Madeira, PT

05-650 Interface and Interaction Design

05-631 Software Architectures for User Interfaces
OR
05-630 Programming Usable Interfaces

Elective 4

05-671 HCI Project I

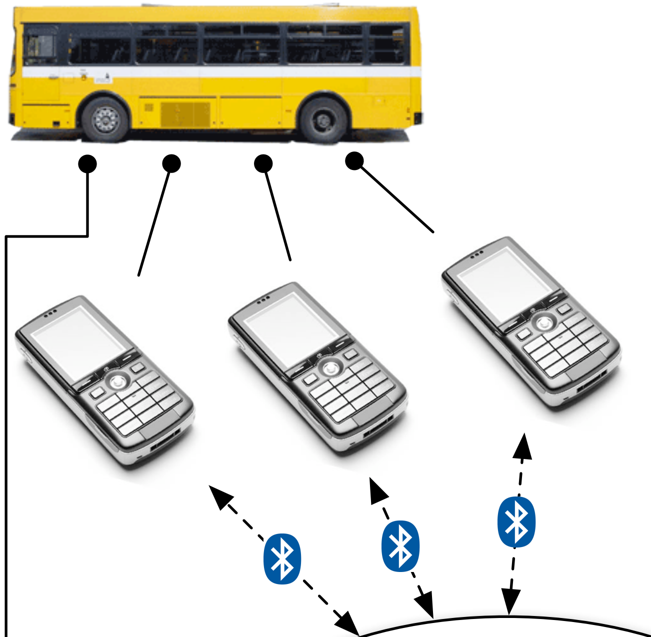
③ DME/UMa
June-July, Sept. - Dec
Madeira, PT

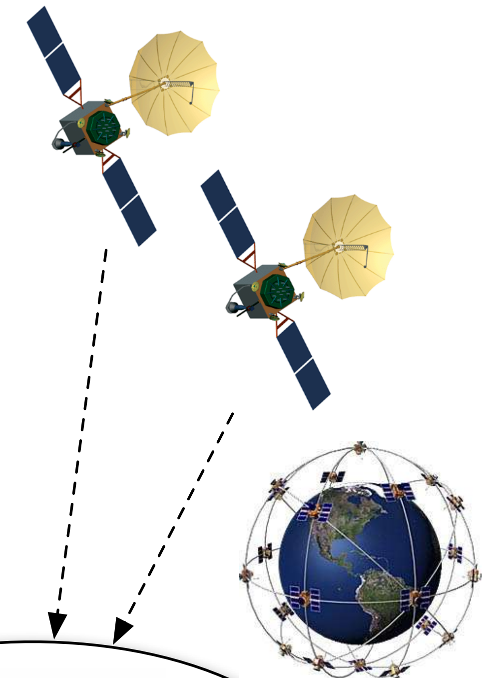
Elective 5

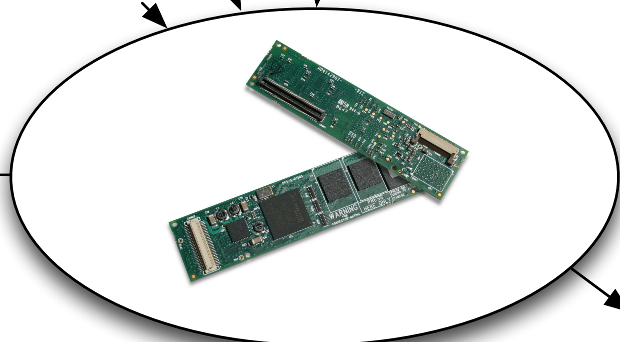
Elective 6

05-672 HCI Project II

Counting people on the bus

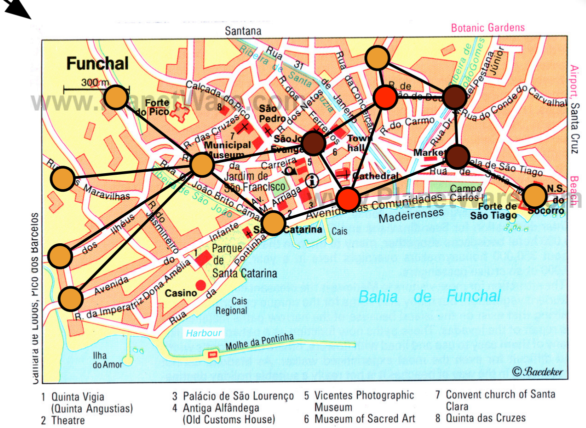






Gumstix Computer
Basix 400xt-bt
CPU: Intel 400 MHz PXA255
RAM: 64 MB
Storage: 16 MB Flash
Connectivity: Bluetooth

GPS Module
32 Channels
Bluetooth



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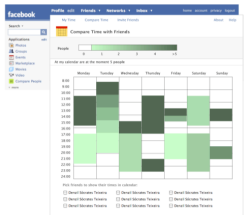
HORÁRIOS DO FUNCHAL Transportes Públicos, S.A.

Student Projects

Student Projects

GATHERTIME FOR FACEBOOK

Denzil Ferreira (lizned.arierref@gmail.com)
Emanuel Fernandes (emanuel.m.fernandes@gmail.com)



Nowadays with the increasing of collaborative working, the task of scheduling meetings with a group of people is still a problem we have to handle. This task is even more difficult in an environment where the persons that are meeting only do that occasionally, like students in a university. This project presents a way to resolve the problem of scheduling meetings in a university context. We developed an application on Facebook, GatherTime, with the goal of quickly gathering the time slots of all the participants for a meeting and then let them know when can they schedule their meeting.

Many tools exist already that let people to schedule meetings. Still, most of them require that almost all of the participants use the same software and to have their calendar filled with updated information. This works well in enterprise environments where companies have calendars used by all employees that are updated with regularity. On other environments where people just meet occasionally, like students that gather together to work for an assignment, this does not work very well. Why not take advantage of social network to solve this problem? Our idea is to have a facebook application where users can quickly enter their available time for a week and then compare it to their friends available time. This is not a calendar where users normally describe in detail what they are doing during the week. Our goal is just to show the available time slots for all participants in the meeting. We have two main goals to our application: quick entry of

available time slots and quick and efficient visualization of available time of all the participants. To succeed our application must allow the users to quickly enter their available time slots in the week calendar. This week calendar does not represents a week in a certain month and year, it is just an abstract representation of the time.

JOB INTERVIEWER WITH A TWIST

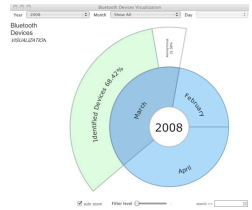
Maria Freitas (carmofreitas@gmail.com)
Tiago Camacho (tcamacho@netmadeira.com)

We built a Facebook application that helps users prepare for a job interview. The idea of this application is that it gives users questions that might come up during an interview, and records users' answers. The social twist is that your network of friends can then comment on your answers, give you tips on how to better answer similar questions, and even let them take the test.

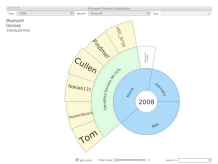
In addition, the program features a number of interviewer personalities, each of which gives different types of questions.

BLUETOOTH PIES

Tiago Camacho (tcamacho@netmadeira.com)
Emanuel Fernandes (emanuel.m.fernandes@gmail.com)



The rapid increase of information has lead to an array of problems that sometimes are difficult to handle. In the world of information that we live in today, it's become essential to find ways to filter information and present it in a meaningful and clear way. In this paper we present a way to collect data from Bluetooth devices and represent that data using a pie based chart. We will differentiate between devices that are identified and those who aren't. We will also try to define various time frames in which to present the information, so the user can have different perspectives of the information that he is viewing.



The current type of visualization works by reading information from a CSV type file. This file, which will be written by the Cityware application, contains a set of information related to the discovery of Bluetooth devices on a certain location. The file is written in a CSV table format and needs to be translated to a graph form in order to be usable by our application. In order to achieve that we use a certain class that manages to parse the file and create a graph by selecting certain fields and computing useful information. After that computation has been performed, the application will create a visualization that consists on a pie based chart. This pie based chart has a set of time values that be chosen. When chosen, the visualization will present the amount (in percentage) of the named and unnamed Bluetooth devices. When choosing the slice that corresponds to the named devices, we are presented with another set of slices that contain the concrete names of the devices, and where the height of those slices is propositional to the number of occurrences of a certain device. We have based our work in two specific existing

WII R FREE - GOOGLE EARTH IN YOUR HANDS

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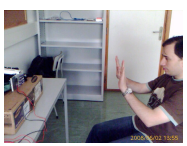
Maria Freitas (carmofreitas@gmail.com)
Tiago Camacho (tcamacho@netmadeira.com)

Recently the Wiimote has been used for exploring a new set of uses besides its original intent, gaming. With the built-in infrared (IR) and accelerometer capabilities, the Wiimote provides different ways for interacting with computers. Taking advantage of the Wiimote IR camera, we can use our fingers to interact with a map application, With the proliferation of Wii devices in the market and due to its low cost hardware, there has been an increasing creation of applications that take advantage of its built-in IR and accelerometer capabilities. We chose Google Earth, because it's an application that requires commands that can be more intuitive to be performed with hand gestures (panning, rotating and zooming). such as Google Earth.



We used an electronic board with LED's emitting IR light that would reflect in users hands (using a reflective material). The Wiimote detects these points and then our plugin maps these gestures to Google Earth commands. This approach ended not to be the best one, due to the sensitivity of IR reflection point's detection. The area of detecting was very small and the robustness of point's detection was poor. Using an IR LED pointed directly towards the Wiimote seemed to be better than reflection because it was easier to keep it directed to the camera.

The zooming action required a bigger area for the hands gestures that was not available with our hardware setup. This revealed that the zoom action when performed as a gesture without any surface support can only be achieved using a larger detection area.

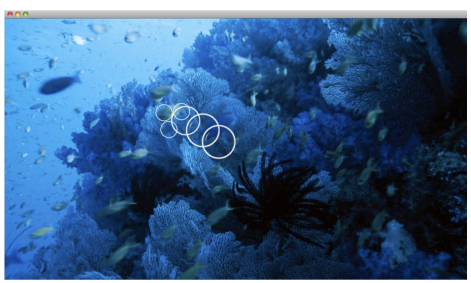
As future work a different approach to gestures detection should be explored to uncover if they can be more robust. Perhaps taking advantage of the accelerometer on the Wiimote for Google Earth rotation and panning and instead of using reflective material and the LED's board, we should use LEDs in the fingers. Also gestures could be triggered by voice instead of relying on mid-air gesture recognition, or using a combination of both.

BLUETOOTH BUBBLES

Denzil Ferreira (lizned.arierref@gmail.com)
Maria Freitas (carmofreitas@gmail.com)

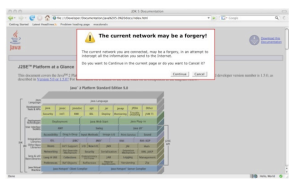
The Cityware framework studies and analyses social networks online and offline. It uses Facebook for spreading the word on how your social network can go beyond the internet realm, reaching out to the real world. By itself, Cityware already stores devices connections, but there aren't any ways to visualize this data. So, as requested, we imagined a way to visualize the connections between users, by providing a different approach. No boring graphs or tables, but something new, people become bubbles on an endless ocean.

Everyone likes attention. We notice someone that's active if it stands out in the middle of a crowd. In our visualization, the devices that are active on the past 5 minutes become brighter than the ones that are away for more than 5 minutes, becoming a fading bubble. In order for them to stand out again, they just have to come back online and eventually they become bigger.

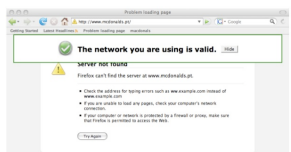


SECURING WIFI COMMUNICATIONS USING AUDIO

Emanuel Fernandes (emanuel.m.fernandes@gmail.com)



This Firefox extension when made active (using the menu item Verify Network in Tools) listens to a sound using the computer laptop and decodes a string from that sound. Afterwards compares the decoded sound to the current URL in the browser. Depending on the result of the comparison, gives contextualized messages to the user.



This system can be used in situations where users are trying to access suspicious WiFi networks in cafes and other public spaces. The computer can verify if the wireless network the user is trying to access matches the Teletext-like information encoded in the sound playing via the speakers in the cafe. If the information matches, then the user knows that the WFi network is provided by the same people in charge of the physical space (i.e. the speakers and music). This helps reassure the users that the WiFi network is unlikely to rogue and malicious.

VISUALISING BLUETOOTH ENCOUNTERS

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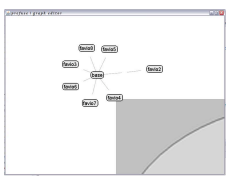
Mara Sofia Gomes Dionisio (a2014604@hotmail.com)

The purpose in this assignment is to build an visualization that takes input from the Cityware application and also uses the Prefuse class to create that visualization. The visualization will offer users to possibility of interpretation information about the devices around us that Cityware will detect.



The main idea that we have for our visualization is that in the center we will have our device that detects the others and then as the time goes by and the Cityware detects the devices they will appear connected do our device in a kind of graf. And in the background we will have circles that will represent the time that the device in on. Witch means the more close to the center the device is the less time he is on. And if some of the device has turn off it will appear more fainted that the others (see the sketch). With a visualization of this kind we could retrieve informations like how many devices were connect with mine, who connect in itch "leaf" we will have the name of the device. How much time did the device was connect and what hour was the busiest.

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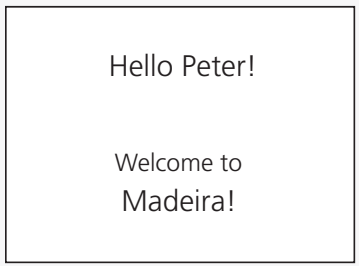
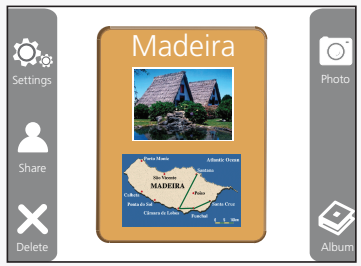
iTrail - helping tourists find their way

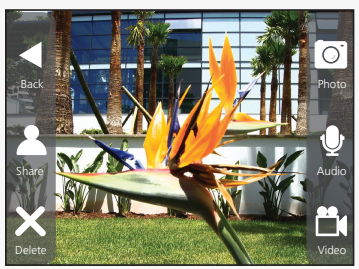


Detects where you are

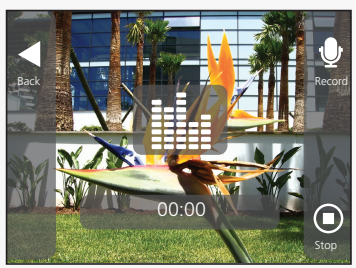


Automatically creates an album

Helps you organize your memories



Takes photos and saves them in the album



Records audio

Gives suggestions based on your photos/place

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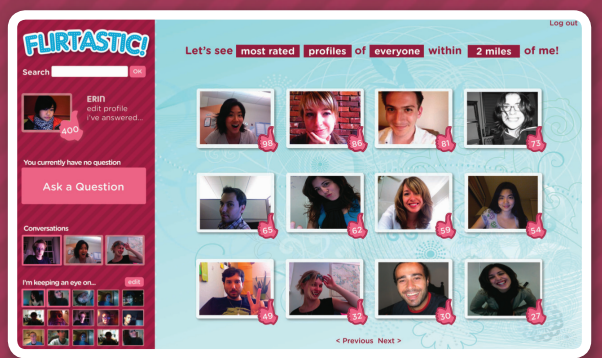
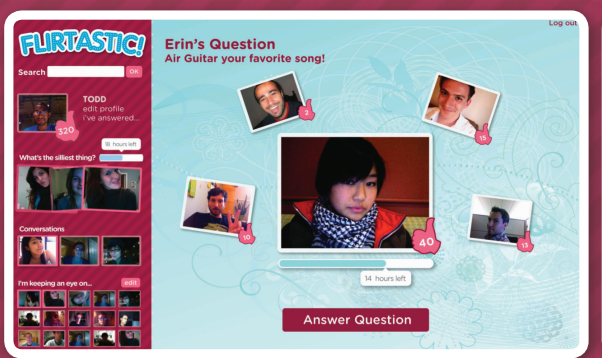
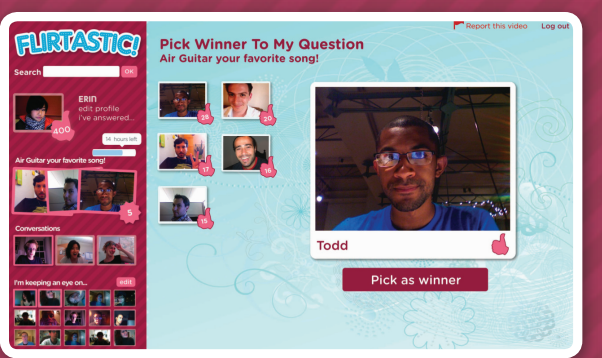
Creators:
Filipa Jervis | Denzil Ferreira | Eduardo Silva
filipa.jervis@gmail.com | zeon@madtech.com.pt | tronkill@hotmail.com

FLIRTASTIC!

A fun new way to flirt online.







Adobe Design Awards Finalist 2008
Designer & Developer Collaboration

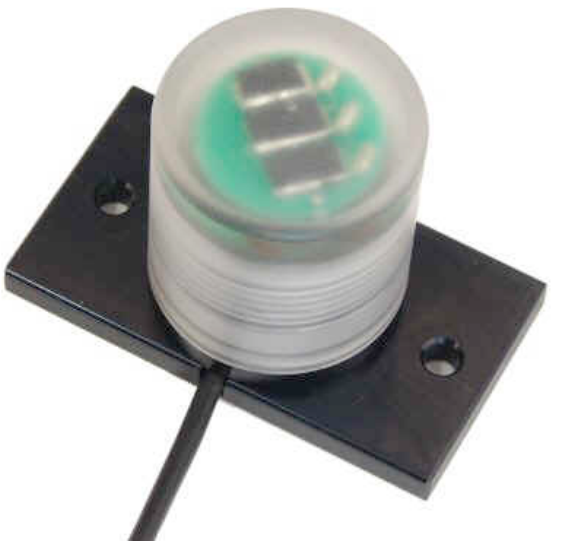
www.goflirtastic.com

Team
Catarina Pereira - Chris Michaelides - Lee Byron - Paul Robare - Steve Won

The Future

Make Computers Invisible

Speaker & Sensors



Speakers are used to communicate with the user (using sounds or speech). Sensors, such as microphones, light sensors and temperature sensors, are used to determine the environment in which the users is currently.

Human Sensors

Using Bluetooth or Infrared, the system can detect if there are people nearby by "scanning" the environment. The same can be achieved by analysing the ambient noise of the microphone.

Power

Shoes will act as power generators converting mechanical movement to electricity. The soles can also be fitted with batteries to store energy. This energy powers the body-area network.

Vibro-Tactile Feedback

Vibrating belts or jackets can be used to give subtle instructions to users. For instance, your belt can guide you to the nearest ATM by vibrating towards its direction.

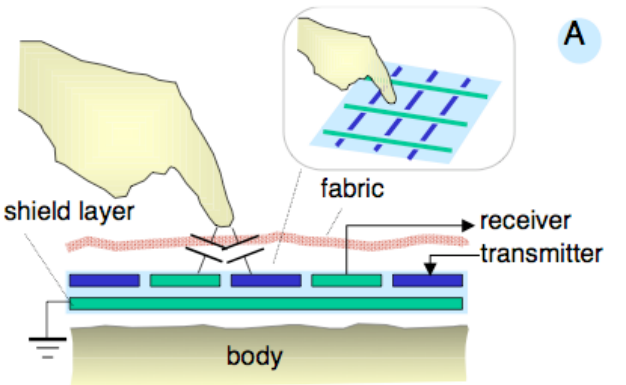
Heads up displays

Heads up displays (HUDs) are useful for delivering visual information to users. They are also useful for overlaying data to real-world objects - Augmented Reality.

Hand gestures

Using smart gloves or wrist bracelets, humans can control their devices using hand gestures.

Body area networks



Advances in fabric manufacturing and electronics allow for clothes to be used for networking, and for gesture detection.

Memory & storage

Shirt buttons can be used for storage.

Visual input

Tiny cameras embedded in our clothes can help the system guide us through streets, remind us the name of the person we are talking to, and remind us to buy milk when we go to the supermarket.

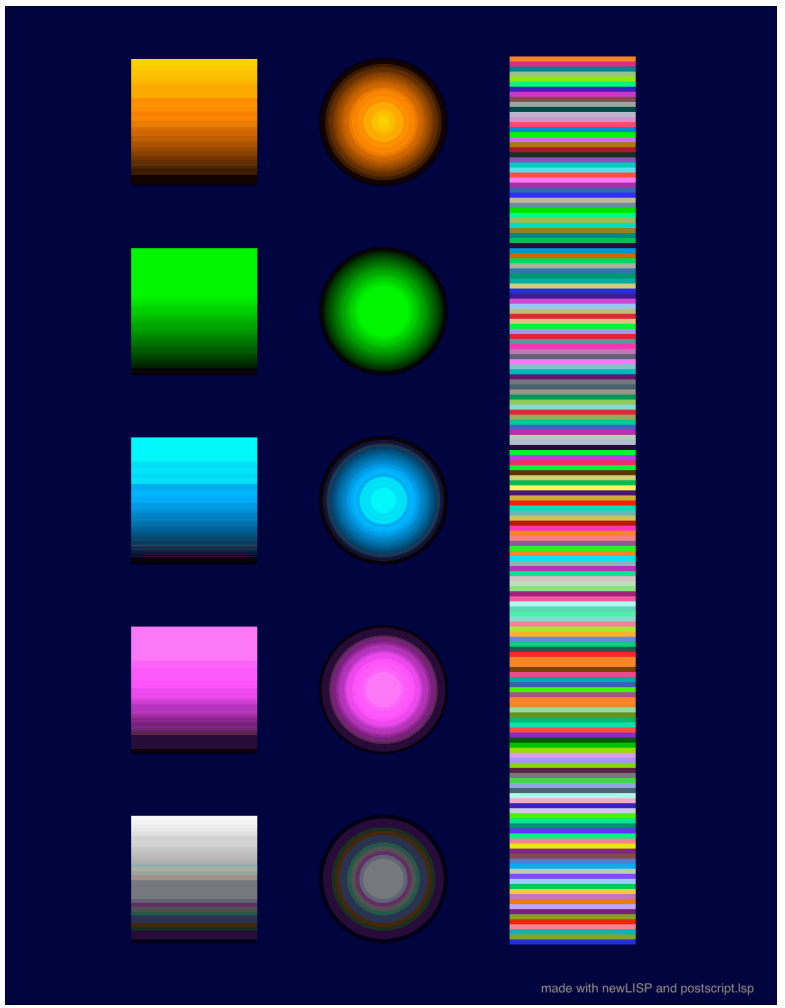
Tags

Tags can be embedded in everyday objects, and can help us find our things when we lose them.

Mobile devices

Users will carry mobile devices that let them interact with the world intuitively.

Ambient information



By changing their colour, bracelets and clothes can implicitly notify their users about the weather, traffic conditions, or their friends' feelings