COMP140: Creative Computing Hacking

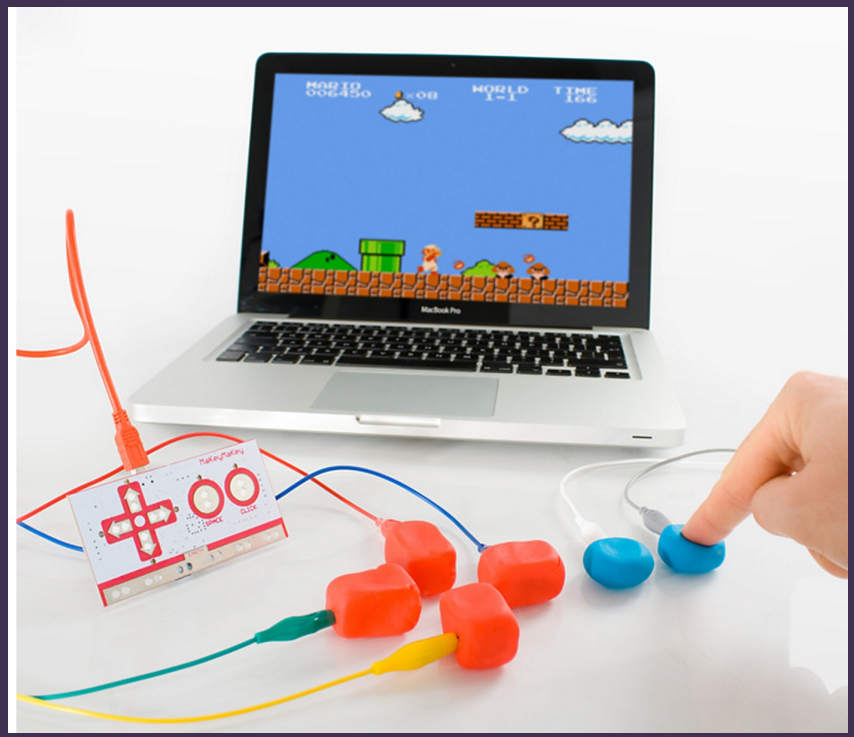
Introduction to HCI for Games

Course Objectives

The following three lectures have been designed to provide an introduction to and provide support for your next creative computing project:

- **Design and Prototype** a novel game controller.
- **Evaluate** the role of your controller in one of the games being developed by students on the BA Digital Games course; **or** the game you developed in COMP130 last semester.

Important Notice



Remember to bring your *Makey Makey* kit and associated materials to these lectures for practical support toward the end of each of these sessions.

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HCI and Interactive Systems

Learning Outcomes

In this section you will learn how to...

- **Describe** the increasing role of interactive systems in computing
- **Describe** the role of HCI in system design
- **Demonstrate** an awareness of the HCI viewpoint which places the player at the centre of design
- **Describe** HCI's component disciplines and the contributions they make to it

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What is Human-Computer Interaction?

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Why is HCI relevant to games?

HCI and Interactive Systems

It is...

- An academic discipline: studying people interacting with technology
- A design discipline: designing interventions for systems involving people and technology

HCI and Interactive Systems

It is important to distinguish between **the subject of human-computer interaction** and the notion of **a human computer interface**:

- Human-computer action is "the disciplines concerned with the design, evaluation, and implementation of interactive computer systems for human use and the study of major phenomena surrounding them" (Dix, 1998, xi). It involves understanding, analysing, and implementing computer systems for human use.

HCI and Interactive Systems

It is important to distinguish between **the subject of human-computer interaction** and the notion of **a human computer interface**:

- The human-computer interface involves those aspects of a system that users interact with. That is, the *zone of interaction*. It is the part of the computer system that provided access to a computers internal resources. This is a technology, rather than a discipline.

HCI and Interactive Systems

In the early era of computing, the `ease of use' of interfaces was given little attention:

- Restricted access
- Specialist users
- Very specific use-cases for computers

HCI and Interactive Systems

Now that technology has matured enough for games to evolve into a mass-market phenomena, it is now a goal for computer systems to be made more accessible to a wider range of users for a greater variety of interaction styles.

- This is only possible by designing for the needs of such players
- Expecting players to adapt is inappropriate, they simply won't buy your games
- Incompetence-inducing controls are linked to aggression (Przybylski *et al*, 2014)

HCI and Interactive Systems

For interactive systems such as games this has come to mean designing the user interface.

- The part of the system which the user is in immediate contact
- This includes input and output devices.
- Estimates suggest anything up to 80% of the code supports the interface (Perry, 2006)
- A great deal of development time and effort is required working with people to achieve high usability — very different to the `being a basement code monkey' myth

HCI and Interactive Systems

Many highly successful consumer products were so because of their human-centred design focus. This is exemplified through *Apple's iPod*.

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List examples of effective design in Apple's iPod.

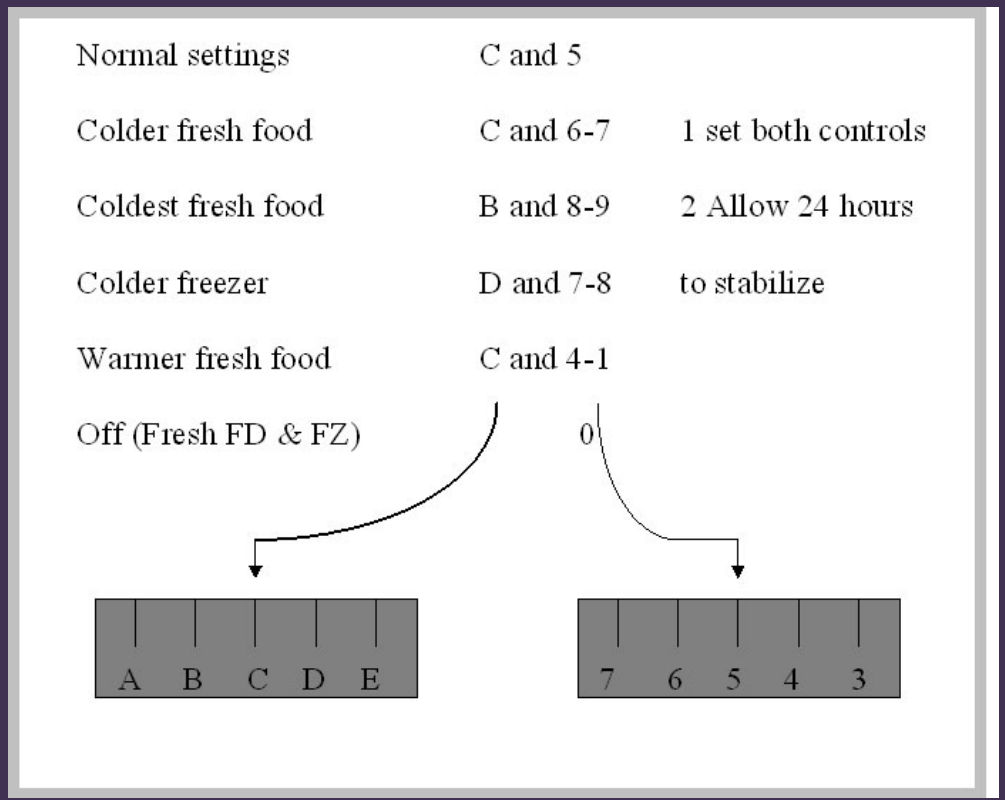
HCI and Interactive Systems

Interactive systems include more than just tech gadgets:

- Wristwatches
- Mobile phones
- Smart Televisions
- Microwave ovens
- etc.

Donald Norman's Refridgerator

In an ages gone, even refridgerators had design flaws (Norman, 1992, p. 14-15):



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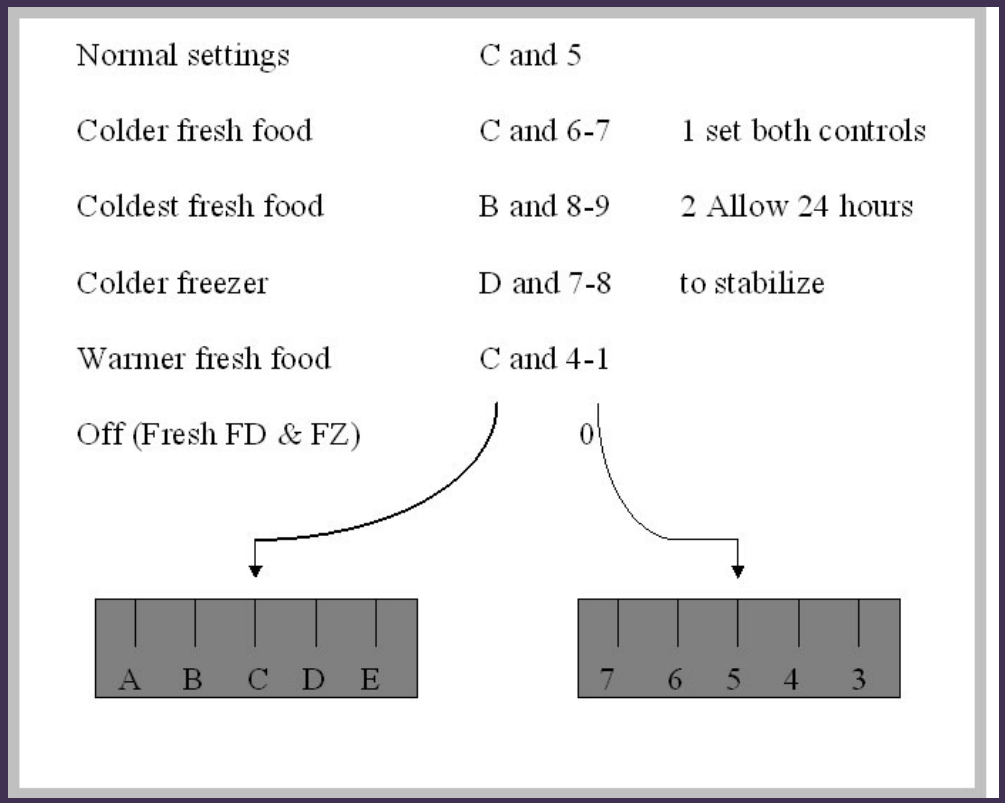
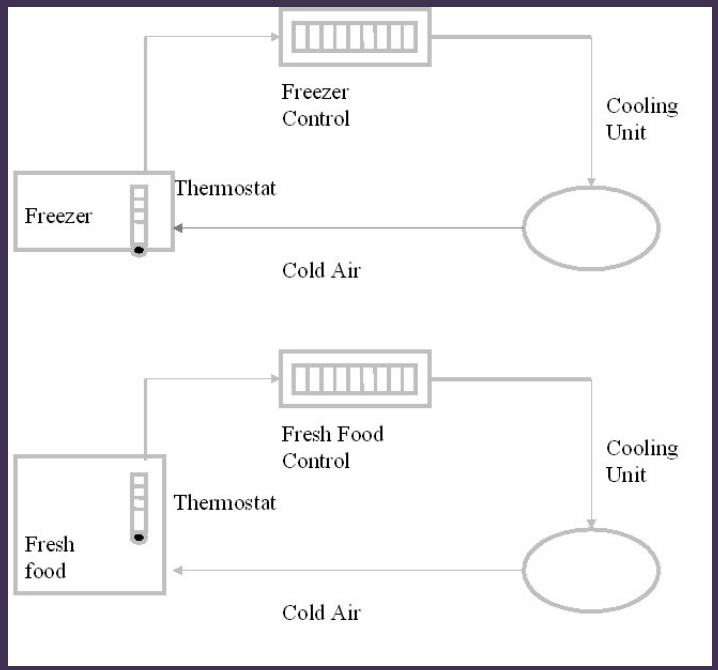
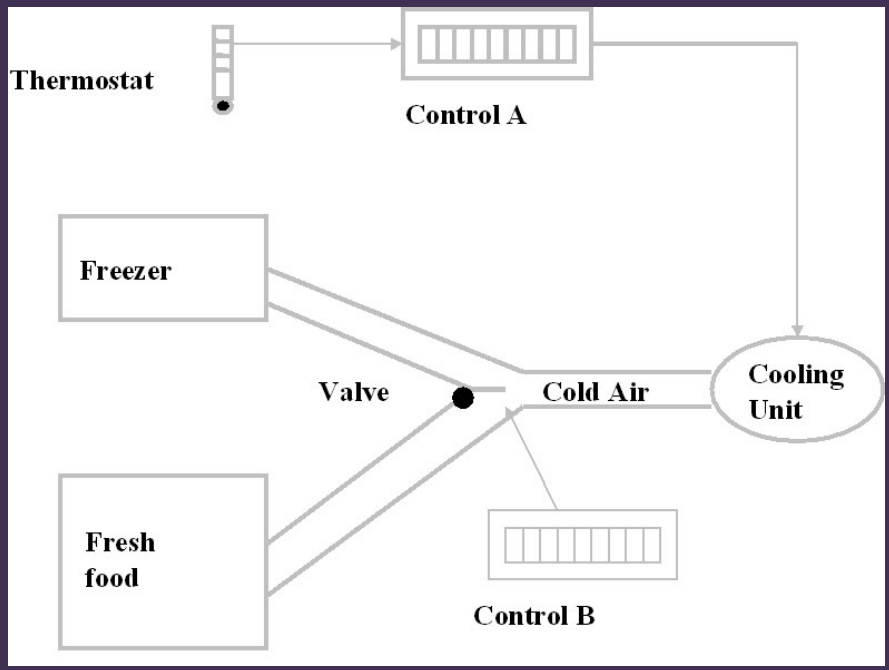


Illustrate how you believe this fridge works. Post your diagram on Slack. You have 8 minutes.

Donald Norman's Refridgerator



Option A



Option B

HCI and Interactive Systems

"Usability is a quality attribute that assesses how easy user interfaces are to use".

(Neilsen, 2012)

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- A key concern of game designers, is of course, the usability of their design.
- Discuss usability flaws in games with the person sitting next to you for 5-minutes.
- **List** examples for why usability is important in games.

HCI and Interactive Systems

Interaction is the key to understanding the role of HCI in designing usable user interfaces (and, thereby, successful games). Such interaction assumes two forms of communication:

- Player to Game (i.e., pressing buttons, pointing the mouse, typing, etc.)
- Game to Player (i.e., displaying information, tactile feedback, etc.)

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List examples of player-to-game communication.

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List examples of game-to-player communication.

HCI and Interactive Systems

- This two-way interaction is critical to the design and play of games.
- It is what makes their design particularly challenging and interesting for computing professionals.
- ...

HCI and Interactive Systems

- As players of games, we have become engaged more and more with this two way process of providing the system with input, interpreting the output of the game, and responding accordingly with new input.
- This forms the **interaction cycle**.
- However, we need to take a step-back, as professionals, to be able to analyse the accordances of such a cycle.

So, What Is Human-Computer Interaction?

Human-computer interaction is the name of the approach we use to study and improve interactive systems. It is concerned with:

- The joint performance of tasks by humans and machines.
- The structure of human-machine communication.
- Social and organisational interaction with machines.
- Human capabilities in machine use.
- ...

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Human-computer interaction is the name of the approach we use to study and improve interactive systems. It is concerned with:

- ...
- Interface mechanisms.
- Interface specification and implementation
- Design trade-offs.
- and many other concerns (see Dix, 1998 for further notes).

So, What Is Human-Computer Interaction?

- It lies at the intersection between the social and cognitive sciences, on the one hand.
- and Computer Science and technology, on the other.

So, What Is Human-Computer Interaction?

The three main roles of HCI are:

- Analysing and designing specific interaction technologies (e.g. displays, pointing devices, user agents, etc.)
- Studying and improving the processes of technology development (e.g. usability quality assurance, design methods, evaluation techniques, etc.)
- Developing and evaluating new applications (e.g. multimedia, mulsemedia, other immersives, etc.)

So, What Is Human-Computer Interaction?

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- ...with the engineering goal of improving usability of computers.

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- Scientific research concerns...
- ...with the engineering goal of improving usability of computers.
- That is, improving the 'fit' of games to their players — and it is obviously easier to change the design of a game than it is to change its player.
- Or, to create both useful and usable computer systems.

So, What Is Human-Computer Interaction?

Interactive system designers (e.g. game designers) study and apply techniques from HCI in order to provide support for human activity:

- Making system use faster
- Less prone to error
- Require less learning or less explicit instruction
- Enable higher quality work
- Increase satisfaction
- and so on...

So, What Is Human-Computer Interaction?

- This leads to a more principled approach to interactive system design that 'fits' into the software engineering approaches
- This may follow **a formal methodology** or, as is the case for the game controller project, follow **a parallel approach** which loosely informs the software engineering

So, Who Are HCI Professionals?

There is a whole family of disciplines and job titles asspoated with HCI. Some examples include:

- Information Architect
- Usability Engineer
- User Experience Architect
- Web Designers
- Ergonomists
- Cognitive Engineers
- HCI Consultants
- User-Centred Designers
- GUI Designers
- Interface Engineers

Slack Discussion

- **Who** contributes to HCI in games?
- Spend 10-minutes researching these role and post any interesting link between these disciplines and games development.

Designing for Usability in Games

- The difficulty of designing good interactive systems lies in matching **usability** (i.e., the fit fo the system to its users) to their **functionlity** (i.e., the technical features of the interactive system.
- Although it is critical to consider 'use' as an important feature of design, it is of equal, if not greater, importance to consider functionality. Games are *supposed* to be challenging.
- We are, therefore, faced with a trade-off; something we will visit later because there are no right or wrong answers, only good or bad decisions in particular contexts.

Designing for Usability in Games

It is also important to consider the contributions of the various areas of HCI to effective user intefaces for games (adapted from Preece *et al*, 1994):

- **cognitive psychology**: understanding all forms of mental behaviour; used, for example, in the design of in-game menues, placement of components in the HUD, and sequencing of interface events (e.g. when issuing commands to soldiers in an RTS). It also provides methods for the study of interaction, such as experimental design, and the construction of (testable) cognitive models to predict activity in an interface.

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- **philosophy**: forming the theoretical underpinning of the sciences and social sciences;
- **engineering and design**: in the sense of applied science and the actual practices used to develop games and game interfaces.

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Practical Activity

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- **Read** the assignment brief on LearningSpace.
- **Identify** the game for which you intend to create a novel game controller for.
- **Visit** `falmouthgamesacademy.com/11s1_2015.html` and **download** some games to try out. You do not need to make your final choice today!
- **Analyse** the accordances of the game and its required forms of interaction.
- **Note** them down and **start prototyping** a control scheme using your *Makey Makey* kit.