Ruairi Glynn: January 2011

PHYSICAL COMPUTING WORKSHOP

> "*We will talk only about machines with very simple internal structures, too simple in fact to be interesting from the point of view of mechanical or electrical engineering. Interest arises, rather, when we look at these machines or vehicles as if they were animals, in a natural environment. We will be tempted, then, to use psychological language in describing their behavior. And yet we know very well that there is nothing in these vehicles that we have not put there ourselves...*"
>
> *"...It is also quite easy to observe the full repertoire of behavior of these machines--even if it goes beyond what we had originally planned, as it often does. But it is much more difficult to start from the outside and try to guess internal structure just from observation of behavior. It is actually impossible in theory to determine exactly what the hidden mechanism is without opening the box, since there are always many different mechanisms with identical behavior... A psychological consequence of this is the following: when we analyze a mechanism we tend to over estimate its complexity*."
>
> Valentino Braitenberg, 1984, Vehicles: Experiments in Synthetic Psychology.

Learning from our natural environment.

A strange animal like character is often the unintentional by-product of objects with the ability to sense, make decisions and act on the world. We will celebrate this as a potentially powerful aesthetic and functional opportunity, exploring the design of interactive architecture.

From the simplest bacteria, crustaceans, arachnids, plants and insects, right up to fish, birds, amphibians, reptiles and mammals; from individual creatures to whole social communities, we will begin by investigating how the natural world uses its ability to sense, think and act on the world. Consider the following examples: Birds of paradise mating rituals, firefly's synchronous light pulse dances, inter-continental whale songs, pheromone releasing ants, bioluminescent Angler fish... There's a lot of inspiration out there to extend our understanding of how intelligence, even very simple intelligence can be both beautiful, functional and inspirational.

We will explore how our understanding of behaviour can inspire new design and research opportunities and the creation of ecologies of intelligent environments that communicate and interact with each other and the world around them. Think about how nature moves, Interacts, Attracts, Repels, Feeds, Fights, Hides, Adapts, Thinks, Mates, Cares, Shows Emotion, and Plays.

> *Some insects demonstrate a simple type of learning that has been dubbed "learning by instinct". It is hypothesized that honey bees for example are pre-wired to learn how to. distinguish certain classes of flowers, and to learn routes to and from a home hive and sources of nectar. Other insects, butterflies, have been shown to be able to learn to distinguish flowers, but in an information limited way [8]. If they are forced to learn about a second sort of flower, they forget what they already knew about the first, in a manner that suggests the total amount of information which they know, remains constant.*
>
> Rodney Brooks, 1987, Intelligence without representation

Our Focus

While there's a growing body of architectural research exploring formal biomimetic logics, little research has been given to the complex and intriguing adaptive behaviours the natural environment displays. Greater understanding could provide critical knowledge to the design of ecologically responsive and sustainable systems within the built environment as well as suggest new forms of engaging and personalised human-architecture interaction. We will explore these ideas though a Cybernetic framework and look at the sciences that came out of Cybernetics including Artificial Intelligence, Robotics and Computer Vision. In parallel we will look at the leading architects, artists and designers who are engaging with these technologies forming new hybrid art & science practices.

Brief

Find interesting natural systems and look at how these systems are all goal directed, performing continual exchanges of information between themselves and the world they inhabit. Some of the most interesting systems will adapt their exchange based over a history of previous exchanges. Use your research as a starting point for generating design proposals for responsive architecture. Unlike the predominantly formal and static approaches architects take when borrowing from the natural world, we will be more concerned with behaviour over time. In groups of three or four you are expected to build a responsive object/s.

It could have some of the following characteristics

1. Capacity to react/interact with human beings

2. Capacity to react/interact to the environment that it is situated within.

3. Multiple agents with capacity to react/interact between each other.

4. Demonstrate adaptive behaviour through use of coding strategies.

Thoughts of Designing Interaction for People

Invitation and incentive play on motivation, and the role of the designer is to help the players envision the experience take-out. In presenting incentives, the designer needs to manage expectations and provide an interesting reward to keep people engaged.

The sense of impact deals with awareness in the engagement. Players need to know they are active agents, that they are changing a narrative. The design of the interaction must comprise a response to the act of participation and this response must be understood as such. These feedback mechanisms are therefore key to sustaining the engagement.

From seconds to months or years, consideration of timing addresses both the immediacy of feedback mechanisms and sustaining momentum over different periods of time.

Planning contact in an interaction affects the level of engagement. A multi-sensory approach enhances the level of engagement and can make the experience more memorable.

Designers provide the medium for the players to create their own stories within the grand narrative of a project. Rules affect the overall structure of the exchange and will directly impact the level of authorship given to participants. They facilitate lines of communication and help to establish clear roles for the players/participants.

Authorship is the subject of a negotiation between the players. The more authorship is shared, the more it allows for many stakeholders to appropriate the piece, making it more customisable, and fostering a sense of belonging, empowerment, and responsibility.

Schedule

Monday 10th January
10.00 Welcome
10.30 Installing Arduino & Introductory Film
11.30 Arduino Fundamentals
13.00 Lunch
14.00 Arduino Fundamentals
15.30 Lecture Ruairi Glynn
16.30 Project Brief Presented & Rapid Research
17.00 Lecture Prof. Stephen Gage
18.00 Dinner/Groups Develop Project

Tuesday 11th January
10.00 Arduino Advanced
13.00 Lunch / Group Prep for Initial Crit
14.00 Crit
16.00 Techniques for Rapid Development
17.00 Workshop Induction
18.00 Evening Project Development

Wednesday 12th January
10.00 Arduino Advanced
11.00 Personal Project Development
16.00 Laser Cutter Slots 2.30 - 4.30

Thursday 13th January
All Day Personal Project Development
Laser Cutter Slots 9.30 - 4.30

Friday 14th January
Morning Personal Project Development
Laser Cutter Slots 9.30 - 10.20

Final Presentation 5pm Friday