

ECSE-211

Lecture 3

11 January 2016

Design II

Labs - pre-lab 19th } → Groups
 lab 20th }
 ↓
 4th floor

Design Methods

Java + Eclipse - W/F. *

Lab1 - Theory M/W

Design - Engineering → Problem Solving
 Exercise

Design

- Engineering involves solving a presented problem – could be design, could be diagnosis
- Problem solving requires a formal process...

?
① STARTS

GOAL ?

Design

- Engineering involves solving a presented problem – could be design, could be diagnosis
- Problem solving requires a formal process...
 - This does not mean removing creativity.. ✓
 - It does mean managing the process to have the best chance of reaching a solution..
 - So

Design

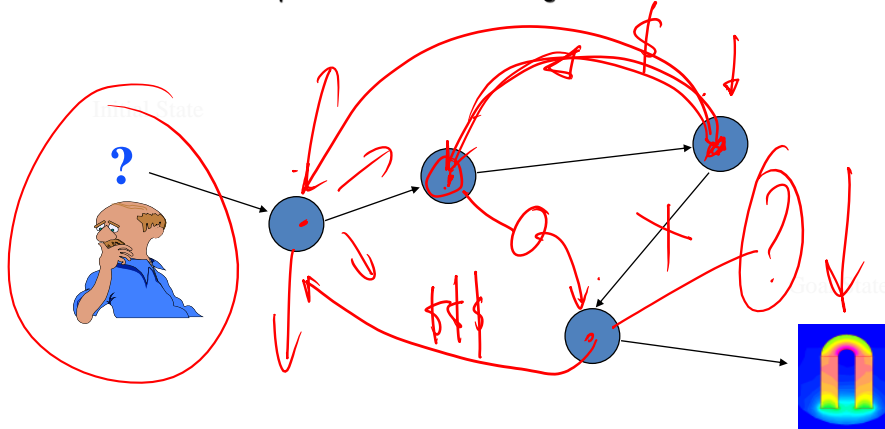
- Engineering involves solving a presented problem
 - could be design, could be diagnosis
- Problem solving requires a formal process...
 - This does not mean removing creativity..
 - It does mean managing the process to have the best chance of reaching a solution..
 - So
 - A series of steps need to be defined ✓
 - Each step should be completed before the next one can occur
 - The output of each step is the input of the next one..

Design

- Design is a process ✓
- The process needs to be managed ✓
- By controlling what is happening,
 - the probability of success is increased ✓
 - The cost of creating a design can be controlled ✓
 - The current state and estimated time to finish is always available... ✓
- But is it not infallible...

The Design Process

- Design can be considered as
 - A set of steps from an initial state to a goal state



The Design Process

- Back to the maze...
 - How do you find your way to the end of the maze? ✓
 - How do you continue if you make a mistake? |

The Design Process

- Back to the maze...
 - How do you find your way to the end of the maze?
 - How do you continue if you make a mistake?
 - How do you know where to start? |

Design – A Set of Questions

- How do you start? ✓
- Where does creativity come in? ✓
- What is creativity? |

Design – How do you start?

- OK – so what is the problem?
- What are we given?

Design – How do you start?

- OK – so what is the problem?
- What are we given?
 - A set of requirements ←
 - What is this?

Design – How do you start?

- OK – so what is the problem?
- What are we given?
 - A set of requirements
 - What is this?
 - A description, in some form, of the desired product/system

 document

Design – How do you Start?

- Let's consider a design problem (last semester's):

“Design an autonomous robot capable of finding and manipulating Styrofoam blocks while navigating within an enclosed area populated with known obstacles randomly placed....”



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“Design an autonomous robot capable of finding and manipulating Styrofoam blocks while navigating within an enclosed area populated with known obstacles randomly placed....”

- Now what?

Design – How do you Start?

- Now what?
 - The first issue is to UNDERSTAND the requirement
 - What does it mean? 
 - What is really required? 
 - ...?

Questions?

Design – How do you Start?

- Now what?
 - The first issue is to UNDERSTAND the requirement
 - What does it mean?
 - What is really required?
 - ...?

Write out everything – make a list – Document!
Create a Set of User Requirements

Design – How do you Start?

- Make a list of questions...
 - Where do the questions come from?

The Research and Development Phase

- It is unlikely that you have all the information to solve the design problem
- The questions lead to a need for research
 - Documents, books, papers, web ~~X~~
 - Experiments –
 - What is possible? ←
 - What are the sources of error? ←
 - Design the laboratories... ←

The Research and Development Phase

- The Labs...
 - Investigate the capabilities of Mindstorms ✓
 - Understand the theory behind the processes needed to solve the problem... ←
 - Implement some experiments to gain knowledge..

