DESIGN #2
Typical engineering interfaces are “designed badly… look like databases with lots of tabs” (Steinfeld, 2004, ICRA)
ViGIR DRC Team (cica 2015)
Strategies

Design Patterns

Design the interaction before the interface

Mode choice
The elements of this language are entities called patterns. Each pattern describes a problem that occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice.

— Christopher Alexander

Successfully adapted to programming and HCI

Kahn, et al: we should adapt this concept for Social HRI
1 Ideal level of abstraction
Abstraction

Mimic vehicle dash boards for driving interfaces
(Steinfeld, 2004, ICRA)
Plan a path for the rover

- **Direction:** Click on the panoramic image to select a target rock.
- **Distance:** Click 'clear' if you want to recalculate distance.

**Rover Mission**
- **Rover is standing by...**
- **Direction:** 81° right
- **Distance:** 108-118 cm

**Finish**
Send your mission to the rover now!
Alexander Design Patterns

2 Patterns can be and often are combined (modular)

Nav systems near steering controls
3 Hierarchical nature of patterns

Cockpit composed of:
  Windshield
  Dashboard
  Lateral Steering
  Etc
Alexander Design Patterns

4 Design patterns are of human interaction with the world
Kahn, et al: Large Body of Prior Work

Kahn

Kanda

Ishiguro
Kahn, et al: Proposed Design Patterns

The Initial Introduction
Didactic Communication
In Motion Together
Personal Interests and History
Recovering from Mistakes
Reciprocal Turn-Taking
Physical Intimacy
Claiming Unfair Treatment or Wrongful Harms
Robot Introduction

Appearance
Feature
Capability

(Min, et al 2015)
Moving Together

Autonomous Human-Robot Proxemics

Ross Mead
Advisor: Maja J Matarić
Interaction Lab
University of Southern California
Design Patterns Example: Tank

Introduction
Joint motion
History & interests
Turn taking
Error recovery
The Trap of Fancy/Clever Graphics

Probably only effective when paired with brain interfaces

Matrix Reloaded
Can Achieve A Lot With Low Res

Distance to nearest target for each lane with respect to plow

Centerline tick

2 foot offset ticks

Position 20 meters ahead

2 meter "lane" width

Current lateral position

Distance to nearest target in feet (300 foot range)

Road section nickname
Even Lower Resolution
Lowest Resolution

Drivers' seat with displays and controls. Diagram shows forward alert and imminent alert with driver sit positions.

Aaron Steinfeld (with parts from Illah Nourbakhsh) | CMU Robotics Institute | Grad HRI
Design From the Right Mode Choice

Efficiency
Safety
Precision
Human skill
Understandability
Cost effectiveness
Required proximity
Social characteristics
Physical Training
Physical Training, by Humans

Positive effects
- Safety
- Precision
- Motivation
- Camaraderie
- Attachment

Potentially negative effects too
Next Class

Ethical Considerations in HRI Design

Class reading