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Physical Models and Finite State Machines

Abstract:

A Finite State Machine (FSM) has many applications in the real world, often used to represent a dynamic model of some object. Due to the constant increase in computer performance and capability, it has now become possible to create complex FSMs with a more personalized skin, or interface, for the user. This document will explain one such skin by giving a methodology for the mapping from the FSM to the target and by going step by step through an example of an FSM using this methodology.

Methodology:

Physical Model:

In order to understand the methodology used to create an FSM, a target (or in this case a physical model) needs to be chosen. The particular target chosen for this model is a house. Some properties of the house (needed to create a mapping from the FSM) are rooms and doors.

Map:

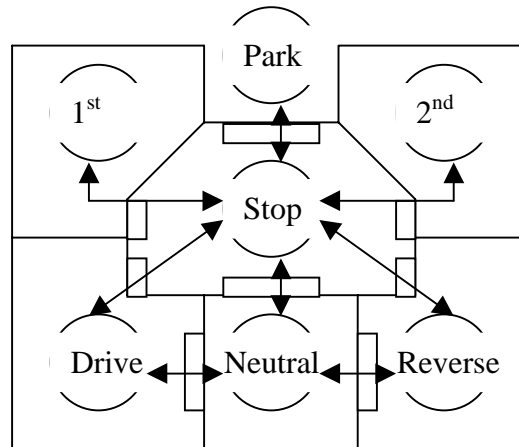
To create a methodology of an FSM, a map needs to be created connecting the components of an FSM to the components of a target and still maintain the properties of the components. As a result, the following map is used:

FSM	→	Target
States	→	Rooms
Properties	→	Decorations
Transitions	→	Doors
Directions	→	Doorknobs
Relations	→	Posters
Inputs	→	Locks
Data	→	Keys
Outputs	→	Radio/TV/Etc.
Data	→	Sounds/Images/Etc.

Example:

FSM: 1990 Toyota Corolla Automatic Transmission (Dynamics)

Target: House Methodology



Mapping:

Each state in the above FSM is given a room and arranged into a house. To differentiate each state, decorations within each room will hint to the function or properties of the particular state.

Each transition is the equivalent of a door with a poster on it explaining or hinting at the relation between the two states. Any inputs necessary to move on can be shown via a lock and key, in which the key would somehow represent the data being input. Output can be done via a TV, radio or some other device while the images or sounds somehow portray the output stream.

Conclusion:

The interface of user can become more complex than the physical model of a house, as demonstrated in this document, however it is the methodology of this paper that opens the doors to numerous possibilities. As computers become more efficient, engineers as well as the general public will be able to use a more personalized interface that they create to map various models in reality to a target of their choosing. Thus the possibilities for future modeling are endless.