



ECE 281

Lesson 19 Notes

Objectives:

- Know the three main parts of any FSM
- Understand the differences between Mealy and Moore machines
- Know the five steps in FSM design and analysis, and be able to apply them
- Demonstrate the ability to use various state encodings in FSM design, but particularly on-hot encoding and binary encoding

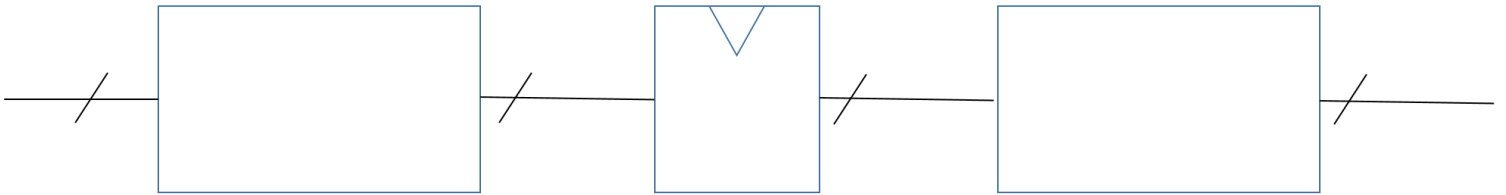
Finite-State Machine (FSM) - an FSM is an abstract machine that can be in exactly one of a finite number of states at any given time. The FSM can change from one state to another in response to another in response to some input. A FSM is defined by a list of states, its initial state, and the inputs that trigger a transition.

The behavior of state machines can be observed in many devices in modern society that perform a predetermined sequence of actions depending on a sequence of events when they are presented. Can you think of any examples and their associated inputs:

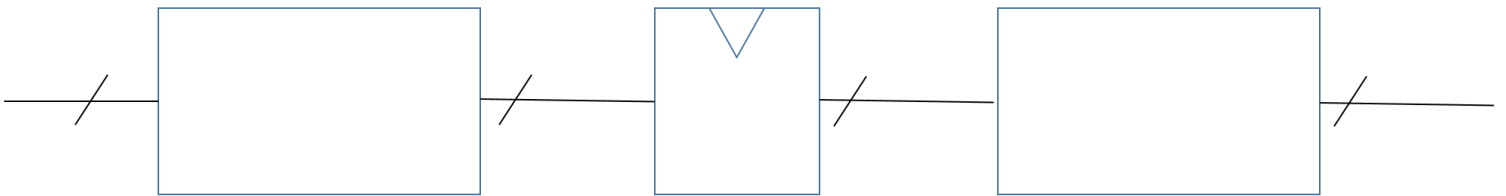
What are the three main inputs for any FSM?

- 1.
- 2.
- 3.

Moore Machine –



Mealy Machine –



How to design a state machine:

- 1.
- 2.
- 3.
- 4.
- 5.

Example Design Problem: Design an FSM that represents a very simple soda machine that will only accept quarters and only sells Mountain Dew. As soon as you put in the proper amount of money, the soda machine will spit out a soda. The soda machine will not give change.

Before we get started, let's answer a few questions:

- How many states are there in this system?
- What are the FSM inputs?
- What is the FSM output?

State Transition Diagram:

State Transition Table & Output Table

Output Table		
Current State		Output

State Table				
Current State			Next State	

Next State and Output State Equations

Schematic

Practice Design Problem:

- A snail is crawling across a sequence of numbers and he smiles if the last two numbers are "01"
- Sequence: 0100110111
- Draw a picture of the Moore State Transition Diagram
- Create the State Transition Table and Output Table
- Create the Next State and Output State equations
- Draw the schematic