# Finite State Machines

## Transducers

Chapter 5

## Deterministic Finite State Transducers

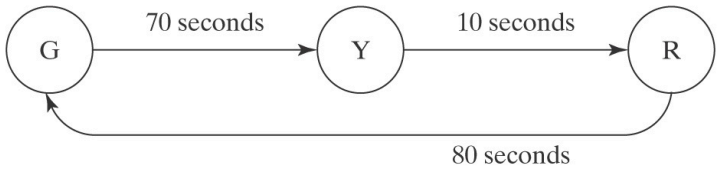
A ***Moore machine*** $M = (K, \Sigma, O, \delta, D, s, A)$, where:

- $K$ is a finite set of states
- $\Sigma$ is an input alphabet
- $O$ is an output alphabet
- $s \in K$ is the initial state
- $A \subseteq K$ is the set of accepting states,
- $\delta$ is the transition function from $K \times \Sigma$ to $K$,
- $D$ is the output function from $K$ to $O^*$.

*M* outputs each time it lands in a state.

A Moore machine *M* computes a function $f(w)$ iff, when it reads the input string *w*, its output sequence is $f(w)$.

## A Simple US Traffic Light Controller




## Deterministic Finite State Transducers

A ***Mealy machine*** $M = (K, \Sigma, O, \delta, s, A)$, where:

- $K$ is a finite set of states
- $\Sigma$ is an input alphabet
- $O$ is an output alphabet
- $s \in K$ is the initial state
- $A \subseteq K$ is the set of accepting states
- $\delta$ is the transition function from $K \times \Sigma$ to $K \times O^*$

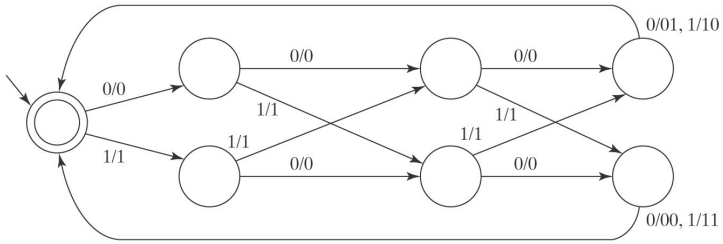
*M* outputs each time it takes a transition.

A Mealy machine *M* computes a function $f(w)$ iff, when it reads the input string *w*, its output sequence is $f(w)$.

# An Odd Parity Generator

After every four bits, output a fifth bit such that each group of four bits has odd parity.

0 0 1 0  1 1 0 0  0 0 0 0  1 1 1 1




# A Bar Code Scanner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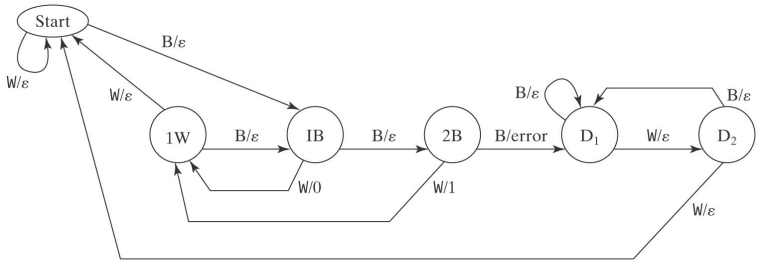


# English Morphology