

FSM-Example

Finite State Machines



Finite state machines (FSMs) are powerful design elements used to implement algorithms in hardware.

An FSM is a 6-tuple, $\langle Z, X, Y, \delta, \lambda, z_0 \rangle$, where:

Z is a set of states $\{z_0, z_1, \dots, z_l\}$,

X is a set of inputs $\{x_0, x_1, \dots, x_m\}$,

Y is a set of outputs $\{y_0, y_1, \dots, y_n\}$,

δ is a next-state function (i.e., transitions), mapping states and inputs to states, $(Z \times X \rightarrow Z)$

λ is an output function, mapping current states to outputs $(Z \rightarrow Y)$,

and

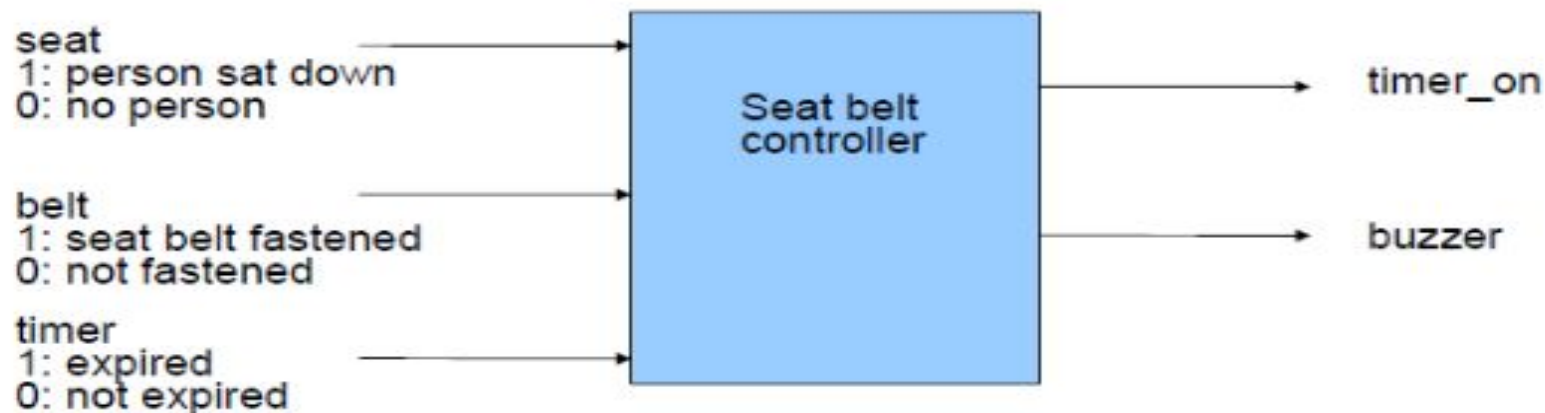
z_0 is an initial state.

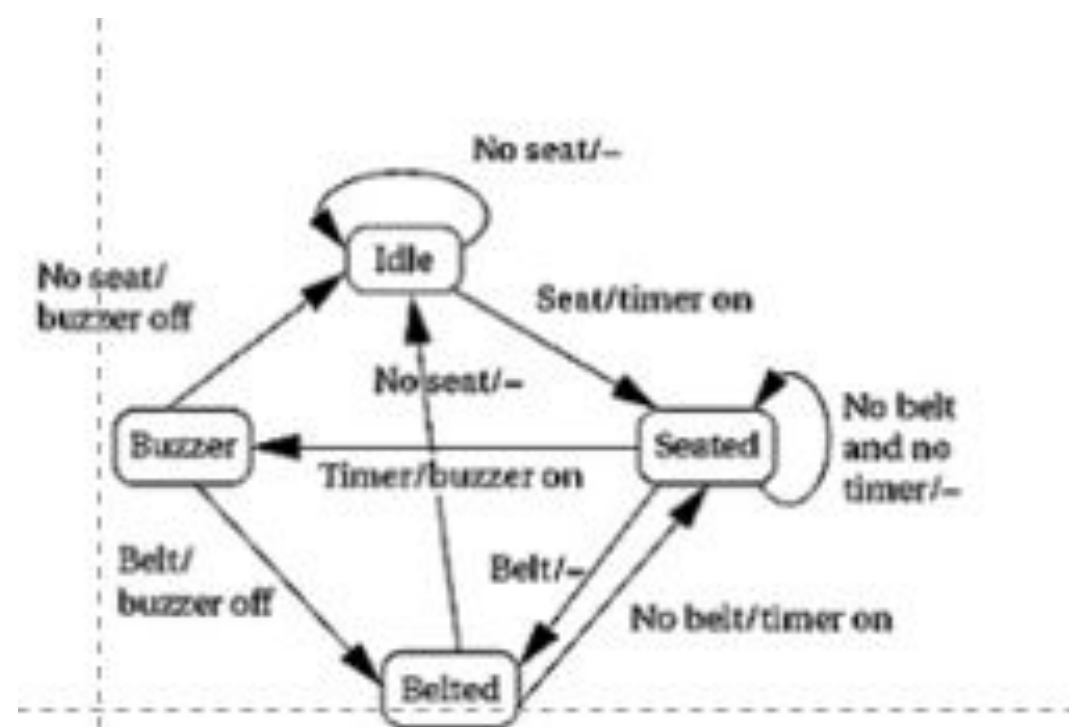
State Machine Example

Design a Simple Seat Belt Controller:

The controller's job is to turn on a buzzer if a person sits in a seat and does not fasten the seat belt within a fixed amount of time. This system has three inputs and one output.

The inputs are a sensor for the seat to know when a person has sat down, a seat belt sensor that tells when the belt is fastened, and a timer that goes off when the required time interval has elapsed. The output is the buzzer





State diagram