

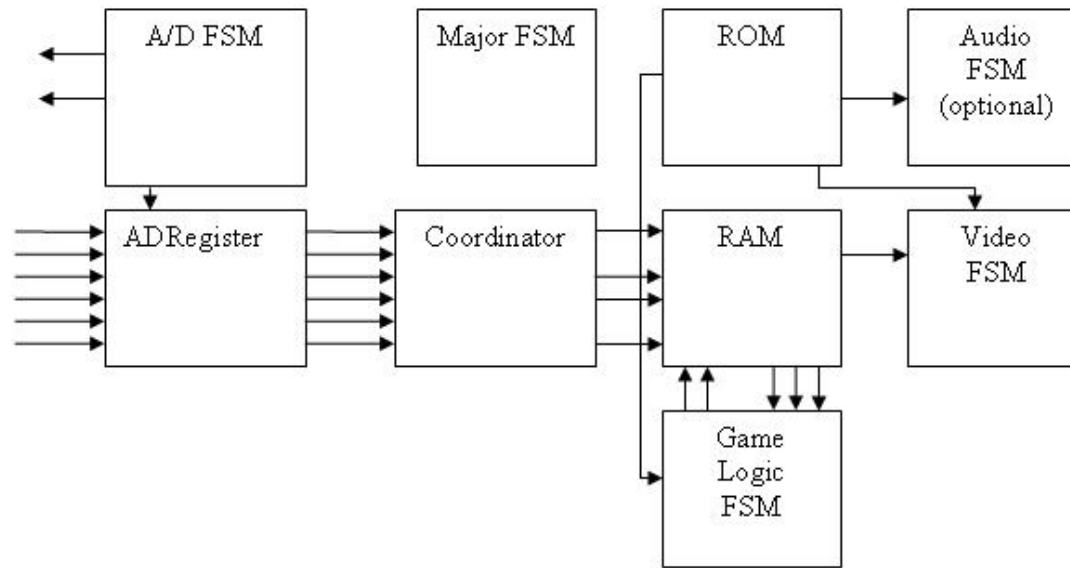
# 6.111 Final Project

A motion sensor baseball game  
By Chris Felling and JinHock Ong

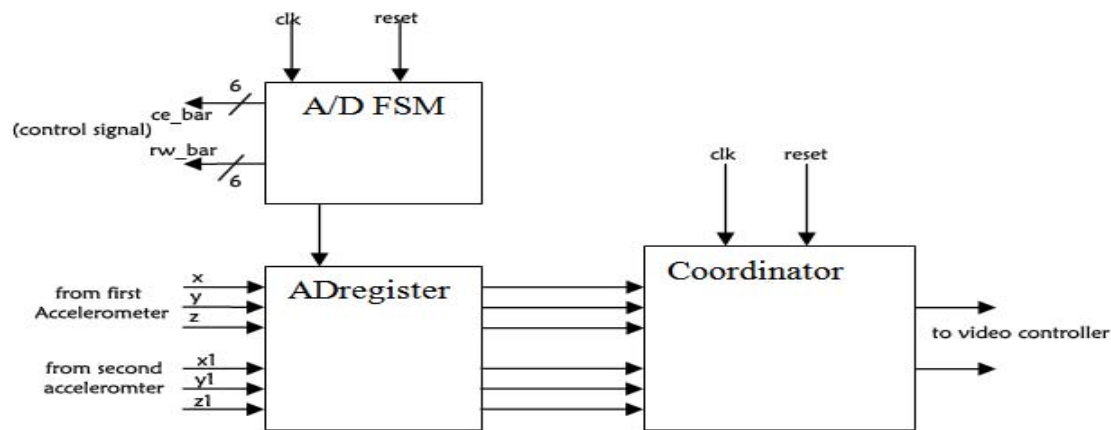
# Overview

- Implement a baseball batting practice type game.
  - Tracking the mechanics of a rod simulating a baseball bat will be done with accelerometers
  - Video will be generated on the fly based on the state of the game recorded in a RAM encoded on the FPGA
  - The major / minor FSM paradigm will be used to decompose this game into modules.

# Overall Block Diagram



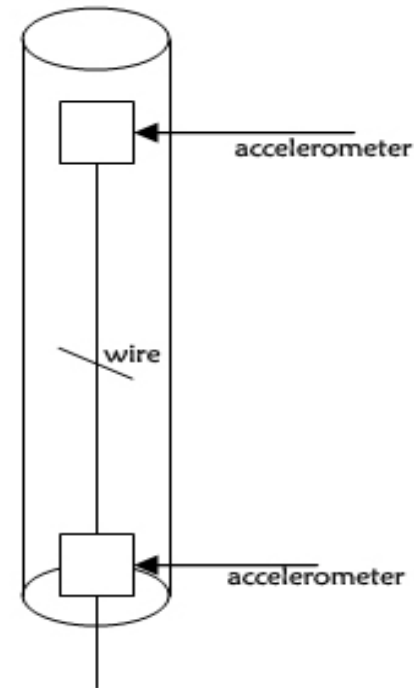
# Motion Sensor Controller Block Diagram



- Using two LIS3L02AQ 3-axis accelerometers, the simulated baseball bat can simulate a swing and provide information to the game to determine trajectory and speed of the ball.

# Implementing the motion sensor controller input: Hardware

- The signal from the accelerometer will be amplified and filtered (to avoid noise) before being sent to AD670 chips.
- By placing the accelerometers strategically in the rod, we will make use of gravity acceleration to determine the angle of the rod (whether if it is completely horizontal, tilted, or completely vertical)



# Module description: A/D FSM

- Need to convert analog signals from accelerometer to digital signals
- A/D FSM will control the six AD670 chips in parallel
- Since the data bus is only used as an input bus, there will be no data contention issues

# Module Description: Coordinator

- Will be implemented as FSM
- Responsible for convert the digital signals from AD670 to meaningful signals that can be understood by the game and store the game's state in a combination of RAM and registers.
- The video FSM will also query the RAM locations set by this module to keep track of the coordinates of the baseball bat.

# Video Controller

- Graphics will be generated at run time based on a static background with overlays corresponding to the game elements.
- The video control FSM will pull the correct pixel from the appropriate game element based on game state as well as X and Y location.
- Initial resolution 800x600 using external xtal oscillator. Later enhancement could include increasing resolution and graphic detail.



# Milestones and Timelines

- Development of basic video interface with background, ball and bat drawings. April 26.
- Development of basic game state using simple button inputs from the 6.111 lab kit April 28.
- Integration of accelerometers. Initial phase April 30.
- Enhancement using different styles of pitches as well as hit locations and power. May 7.
- Optional enhancement of game with audio cues based on game state.