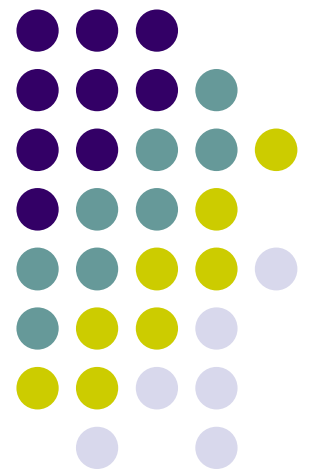


Hand Motion Control of an Audio Player

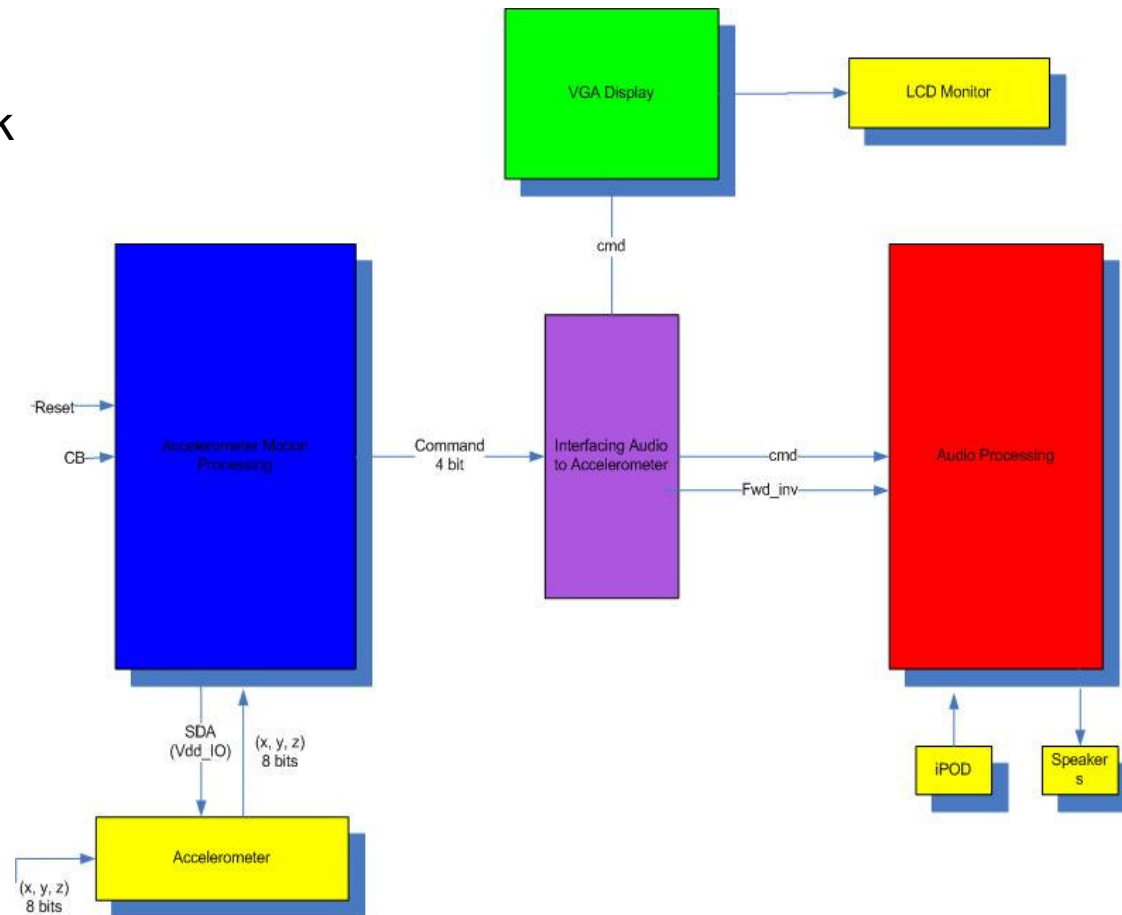
Diana Cheng
Doris Lin



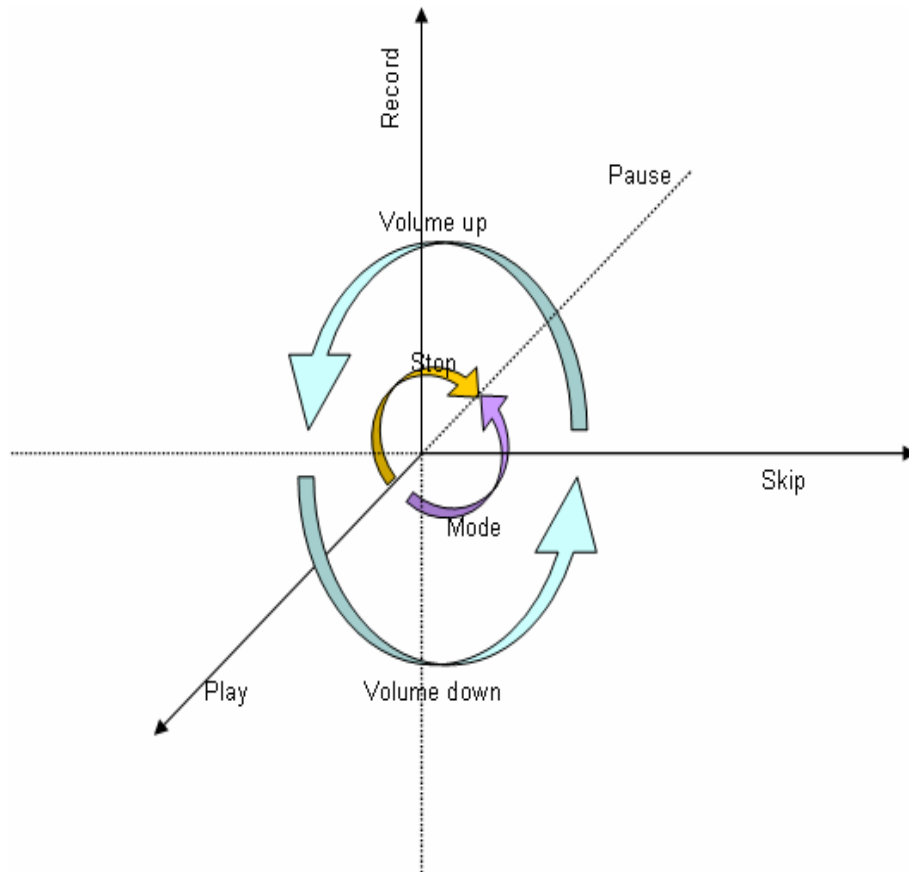
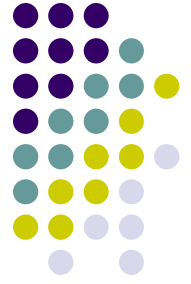


General Overview

- **Functionality**
 - Record/Playback audio based on given hand motions
- **Inputs**
 - Accelerometer
 - iPod
- **Outputs**
 - Speakers
 - Computer Monitor VGA display



Hand Motions

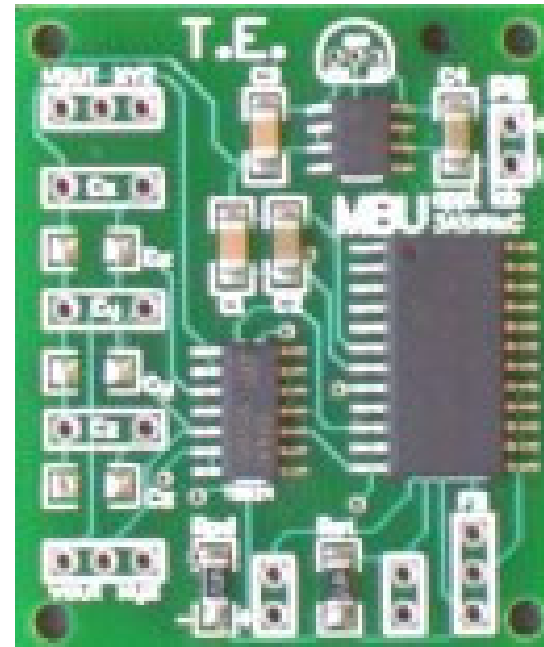


- Map hand motions to different functionalities of the audio player
 - Play
 - Pause
 - Record
 - Stop
 - Skip forward/back
 - Volume up/down
 - Playback mode (i.e. echo)

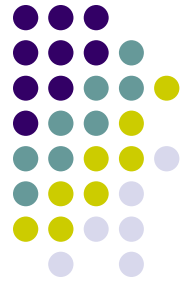


Accelerometer

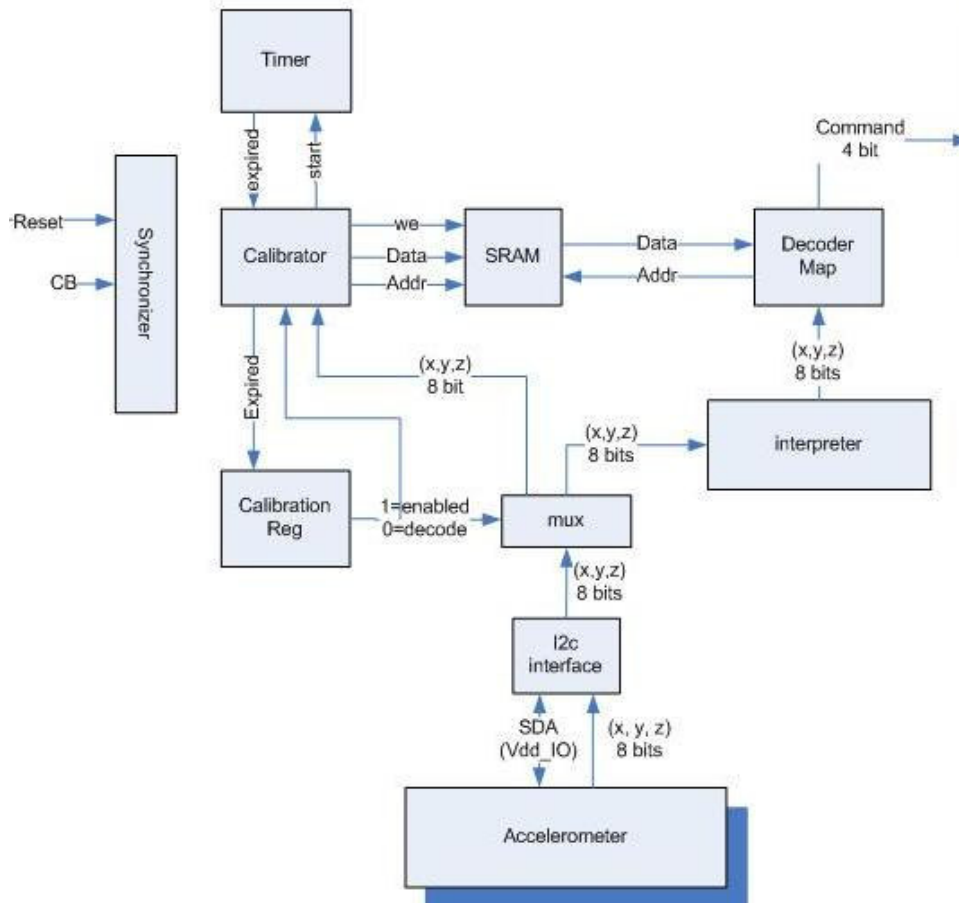
- LIS3LV02DQ
- Features
 - 3-axes
 - Digital output
 - 2g/6g
 - Linear



Interfacing/Interpreting the Accelerometer



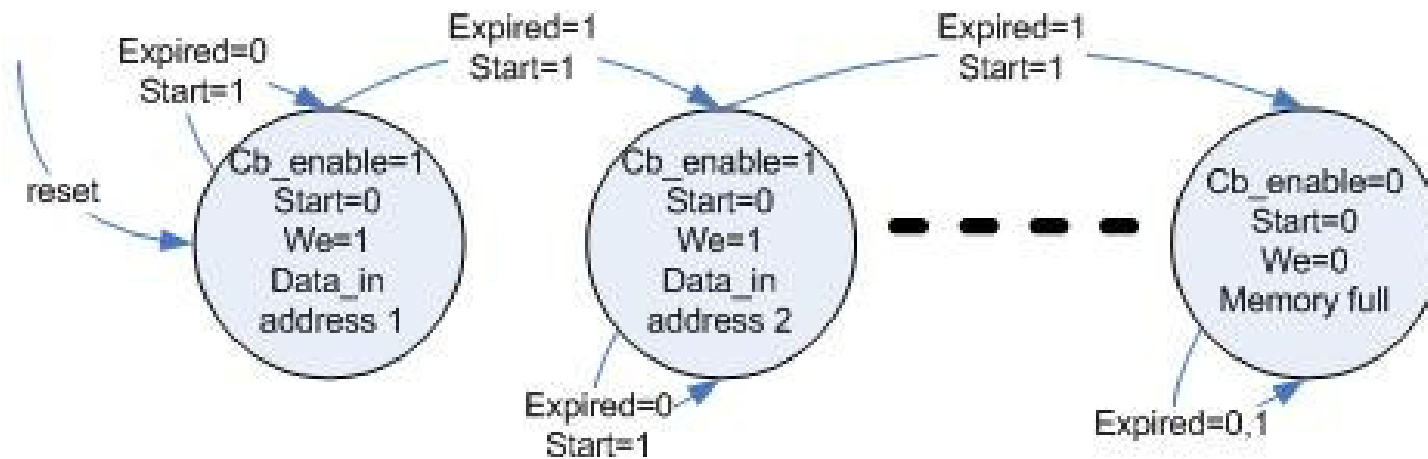
- Interfacing
 - I2C
- Interpretation
 - Calibration
 - Motion ROM
 - Motion decoder



Calibration FSM



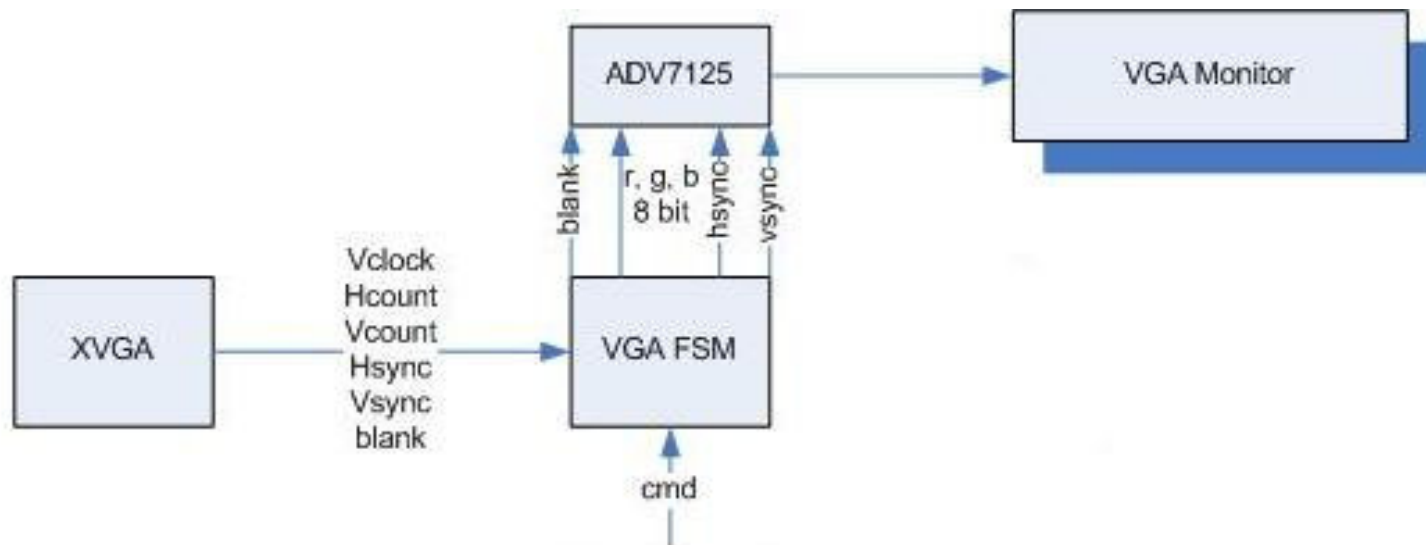
Calibration Write



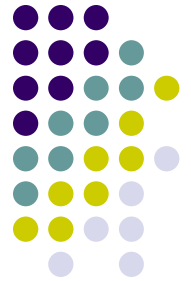


VGA Display

- Button display
- Mode display
- FSM
 - Based on the command, sets pixel colors of buttons/menu



VGA Display



Paused

STANDARD

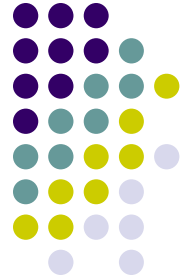
ECHO

ALVIN

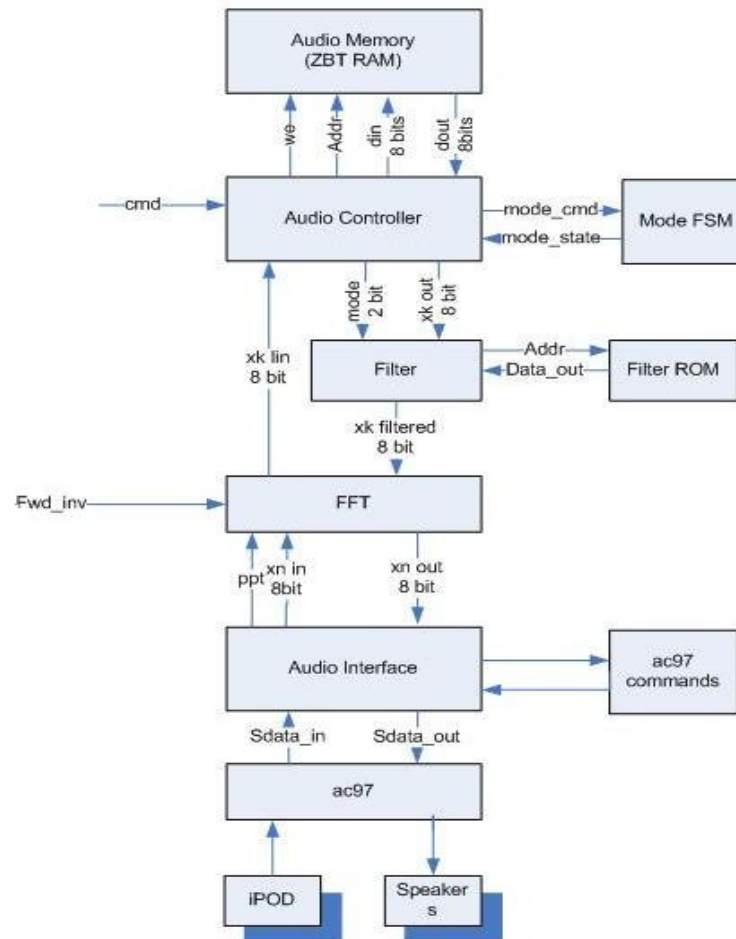
BARRY

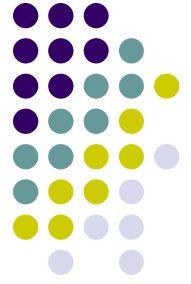
A set of media control icons on a light blue background. From left to right: a blue circle with a white play triangle; a blue circle with a white square; a green circle with a white pause symbol; a blue square with a white circle; a blue circle with a white left-pointing double arrow; a blue circle with a white right-pointing double arrow; a blue inverted triangle; and a blue triangle.

Audio Control



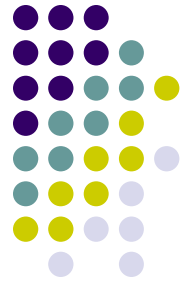
- ac97 chip
 - Input from iPod
 - Output to speakers
- Fast Fourier Transform
- Filtering
- Audio Memory
 - ZBT SRAM



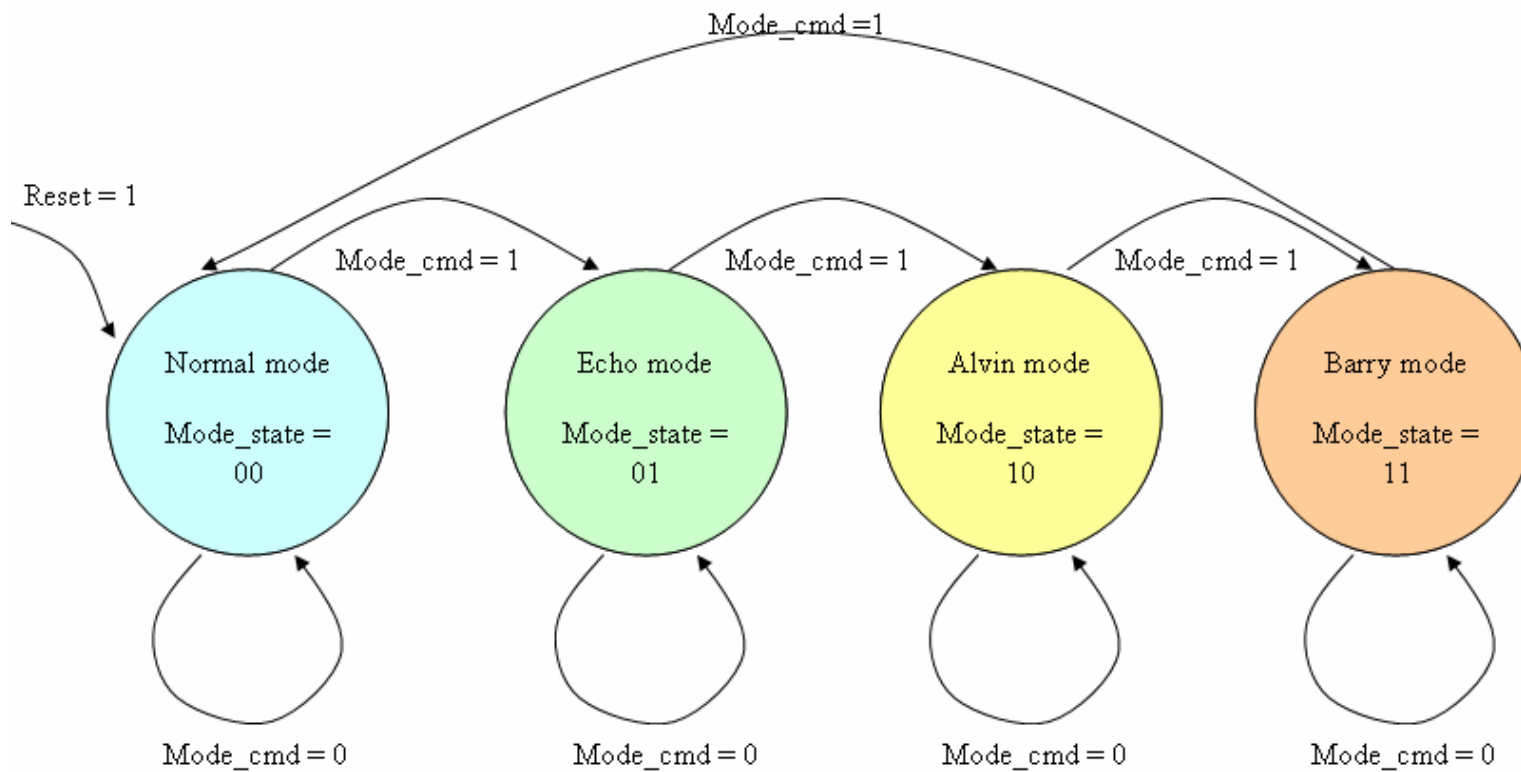


Playback Mode Selection

- Four modes
 - Normal
 - All pass filter
 - Echo
 - Superimpose smaller magnitude time-shifted output on normal output
 - Alvin the Chipmunk
 - Frequency shift up
 - Barry White
 - Frequency shift down



Mode Selection FSM



Hand Motion Controlled Audio Player Block Diagram

