

# ECE 511 Project

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# MP3 Boombox with remote and display

- Major Features:
  - Ability to decode MP3 files stored on an SD card
  - Ability to pause, play, stop, and fast forward tracks with IR remote control.
  - Ability to amplify audio output and play through speakers
  - Ability to analyze music being played and display frequency spectrum on LCD
  - Create a light bar of RGB LEDs to also display signal levels
  - Ability to show name of current artist and song title on LCD

# Major Components:

- MSP430 Launchpad (available from GMU) \$7.50 (2)
- MP3 Trigger (<https://www.sparkfun.com/products/11029>) \$49.95 (1)
- Audio amplifier (<https://www.sparkfun.com/products/11044>) \$7.95 (1)
- Speakers (<https://www.sparkfun.com/products/9151>) \$1.95 (3)
- Remote Control (<https://www.sparkfun.com/products/11759>) \$4.95 (1)
- IR Receiver (<https://www.sparkfun.com/products/8554>) \$9.95 (1)
- Graphic Equalizer IC (<https://www.sparkfun.com/products/10468>) \$4.95 (1)
- LCD 16x2 (<https://www.sparkfun.com/products/9052>) \$14.95 (2)
- 25-pack RGB LEDs (<https://www.sparkfun.com/products/9853>) \$19.95 (1)

**Total: \$133.45**

# Task Breakdown

- Interfacing the MP3 Trigger to the MSP430
- Interfacing the EQ IC and LCDs to the MSP430  
(<http://tronixstuff.com/2013/01/31/tutorial-arduino-and-the-msgeq7-spectrum-analyzer/>)
- Interfacing the IR receiver to the MSP430
- Interfacing the RGB LEDs to the MSP430 (or to the EQ IC)
- Interfacing the speakers and audio amplifier to the MP3 Trigger
- Bring it all together for prototype and final testing

# Issues



- Too complex? Not really. Some component interfaces will be prerequisites for other parts of the project, but most items can be figured out independently of each other. Between the five of us, I'm pretty sure we can help anybody with issues on their individual assignments.
- Cost? Shawn already has over half the components available, and is willing to purchase the rest with the caveat that he can keep it when finished.
- May need more than one MSP-430 if there are insufficient IO. This means one will have to send info to another, etc., adding another layer of complexity.

# MSP430 Features used

- Digital IO
  - 1 input from IR receiver
  - Up to 18 trigger lines out to control MP3 trigger board (if not using UART feature)
  - 2 outputs to EQ filter for reset and strobe
  - 7 outputs to LCD
  - Remaining GPIO used to drive output to RGB LEDs
- USCI
  - UART communication with MP3 trigger board for command and control (alternative to trigger lines)
  - UART debug output through USB port on LaunchPad
- ADC
  - 1 input from EQ filter
- External interrupt
  - Driven from IR receiver input
- Timer
  - Used for measurement of received IR signal pulse durations

# High level system block diagram

