SONOS
INTERCOM SYSTEM

Initial Design Review

What are we going to do?

Product Description

Build a <u>compact</u> device which allows a person to <u>broadcast their voice to a specific room's</u> SONOS devices and <u>control their music</u>.

Required Functionality

Communication

Real time voice broadcasting.

Allows user to select which "room" to talk to.

"room" = a group of SONOS devices.

Music Control

Play/Pause

Next

Previous

Volume

Design Constraints

Experience

Minimize audio latency.

Responsive controls.

Simplicity

Durability

Product should withstand home environment (drop/water proof).

Affordability
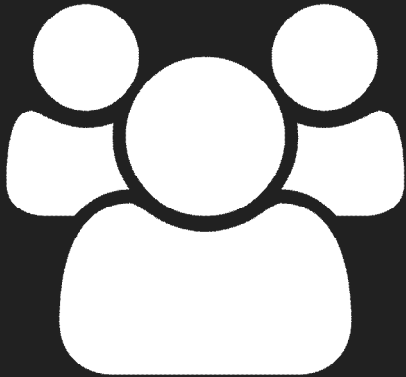
$49.99-$99.99 is acceptable for such a simple device.

Target Market

Middle to Upper class people who own SONOS devices.

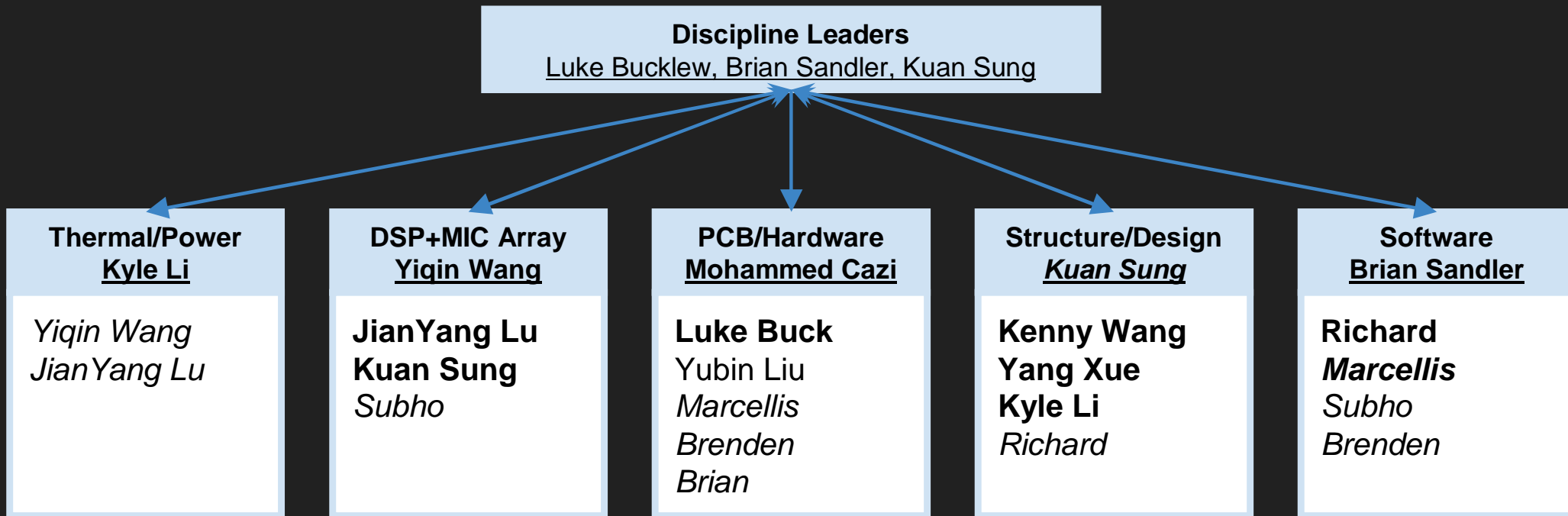Young families.

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Research and Development

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Who's on the team?

Our Team

Discipline Leaders
Luke Bucklew, Brian Sandler, Kuan Sung

Thermal/Power Kyle Li	DSP+MIC Array Yiqin Wang	PCB/Hardware Mohammed Cazi	Structure/Design *Kuan Sung*	Software Brian Sandler
Yiqin Wang *JianYang Lu*	**JianYang Lu** **Kuan Sung** *Subho*	**Luke Buck** Yubin Liu *Marcellis* *Brenden* *Brian*	**Kenny Wang** **Yang Xue** **Kyle Li** *Richard*	**Richard** ***Marcellis*** *Subho* *Brenden*

Legend

Underline = Leader
Bold = Primary Group Member (1 per person)
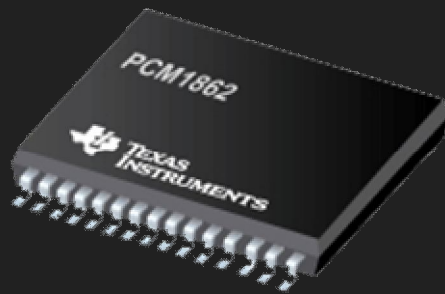*Italics* = Secondary Group Member / Communications

How will it be done?

Components
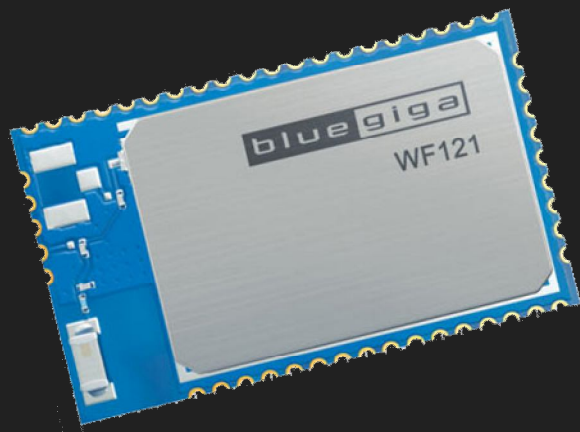
WF121 WiFi Module

PCM1862 ADC

1.44" ST7735R

Components

Final Version

Capacitive Touch Controllers

AT42-QT1010(x2) Digital Output SOT23 or PCF8883(x2) (NXP)

Capacitive Surface

Prototype Version

Push Buttons 519PB-ND(x5)
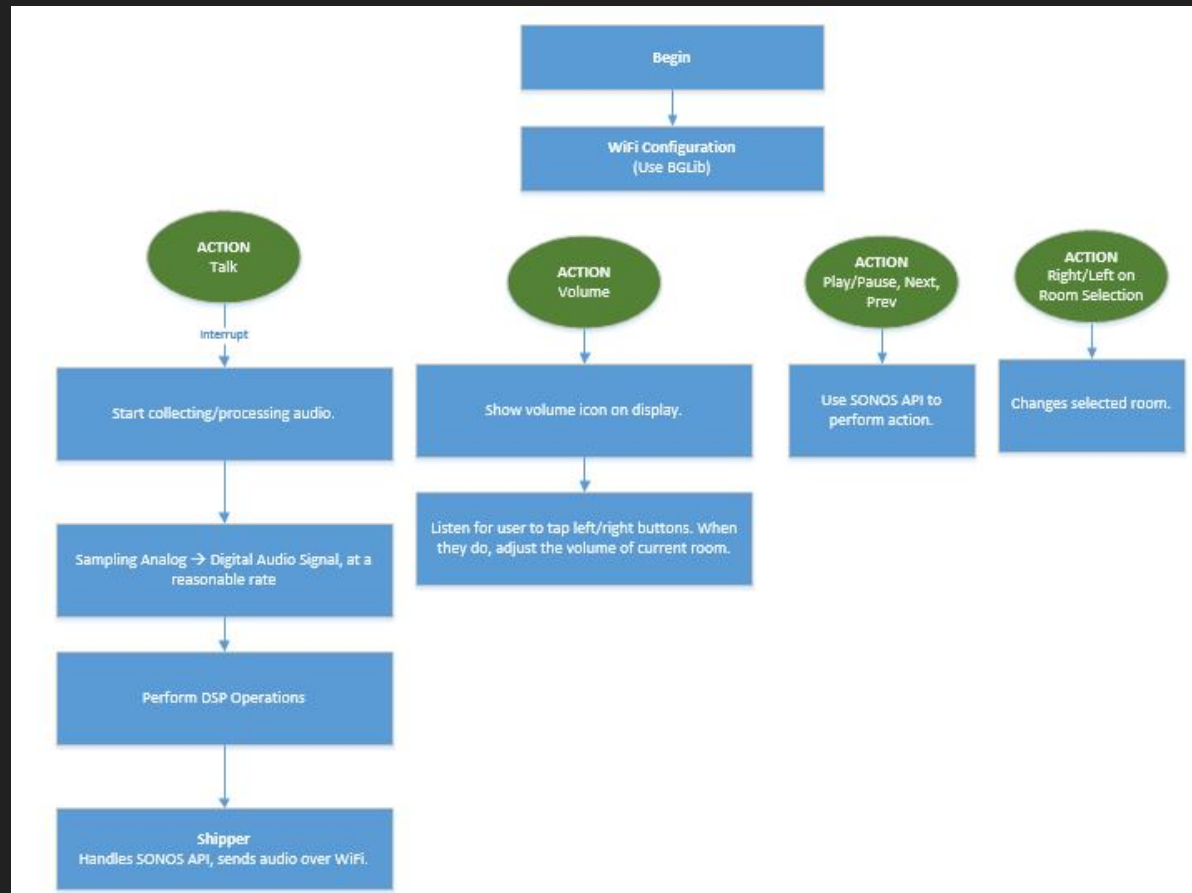
Interfaces

Symbol	Choice	Description	Purpose
P0[0:31]			
P0[0]			
P0[1]			
P0[2]	U0_TXD	UART 0 TX	ISP
P0[3]	U0_RXD	UART 0 RX	ISP
P0[4]			
P0[5]			
P0[6]	SSP1-SSEL	SPI 1 CHIP SELECT	PCM1862 PIN 25
P0[7]	SSP1_SCL	SPI 1 SERIAL CLK	PCM1862 PIN 24
P0[8]	SSP1_MISO	SPI 1 MASTER IN/ SLAVE OUT	PCM1862 PIN 22
P0[9]	SSP1_MOSI	SPI 1 MASTER OUT/ SLAVE IN	PCM1862 PIN 23
P0[14]			
P0[15]	U1_TXD	UART 1 TX	WF121 WIFI MODULE
P0[16]	U1_RXD	UART 1 RX	WF121 WIFI MODULE
P0[17]	U1_CTS	UART 1 CTS	WF121 WIFI MODULE
P0[22]	U1_RTS	UART 1 RTS	WF121 WIFI MODULE
P1[0]	SSP2_SCK	SPI 2 Serial Clock	COLOR TFT CLK
P1[1]	SSP2_MOSI	SPI 2 MASTER OUT/ SLAVE IN	COLOR TFT MOSI
P1[2]			
P1[3]	PWM0[2]	PWM INPUT	COLOR TFT LITE
P1[4]	SSP2_MISO	SPI 2 MASTER IN/ SLAVE OUT	COLOR TFT MISO
P1[5]			
P1[6]			
P1[7]			
P1[8]	SSP2 _ SSEL	SPI 2 CHIP SELECT	COLOR TFT TFT_CS

Hardware Block Diagram
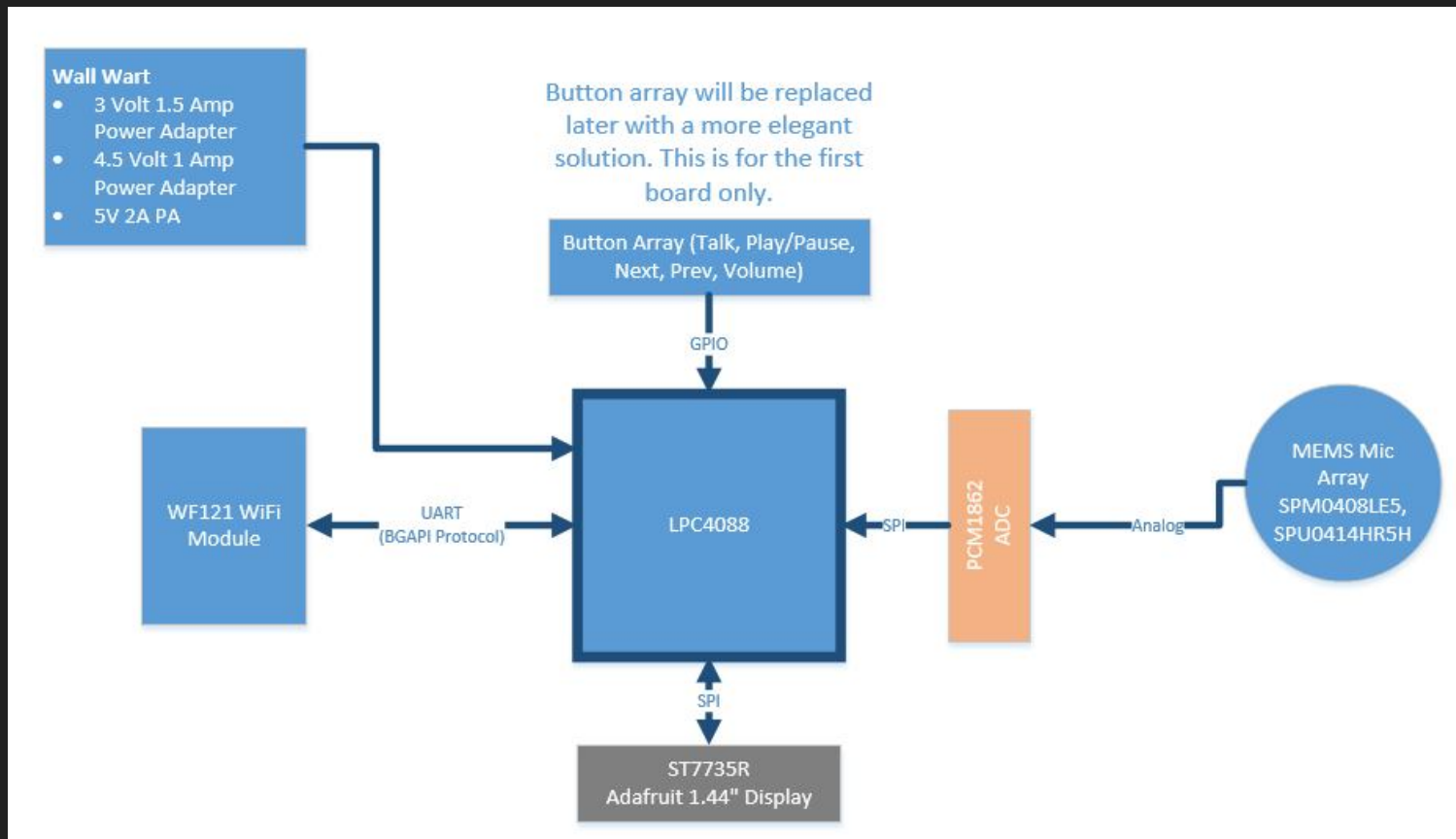
Software Block Diagram

The Microcontroller

Processor: NXP LPC4088
Manufacturer: NXP Semiconductors
Part Number: LPC4088FBD208

Used to connect and control all peripherals through the SPI/UART interfaces on the ARM Cortex-M4 processor.

Cost:$11.30

The WiFi Module

WF121 WiFi Module:

Will be used to join a network that has other Sonos products

2.4 GHz 802.11 b/g/n

BlueGiga's Wi-Fi Software

Cost: $28.71

The ADC

PCM1872DBTR from Texas Instruments.

24 bit resolution ADC converter.

2 channels

Allows the microcontroller to process the inputs from the mic array.

Cost: $3.79

The Screen

Adafruit 1.44" Diagonal Color TFT LCD Display

128 x 128 resolution, 18 bit color

SPI Digital Interface

Built in MicroSD slot

3.3V or 5V compatibility

~25mA max current draw for LCD and Backlight

10g weight

33 mm x 45mm x 7mm total size

Cost: $14.95
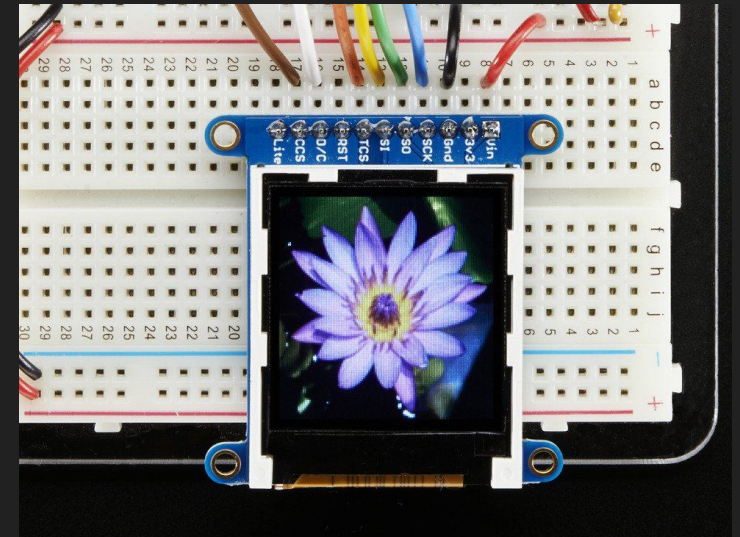
Critical Elements

Minimize latency when broadcasting real time audio using the SONOS API.

Same MCU will be performing DSP as well as interacting with the API on the network.

Schedule

For this project the ECE 189A Gantt Chart was followed: