

# Doorbell Camera

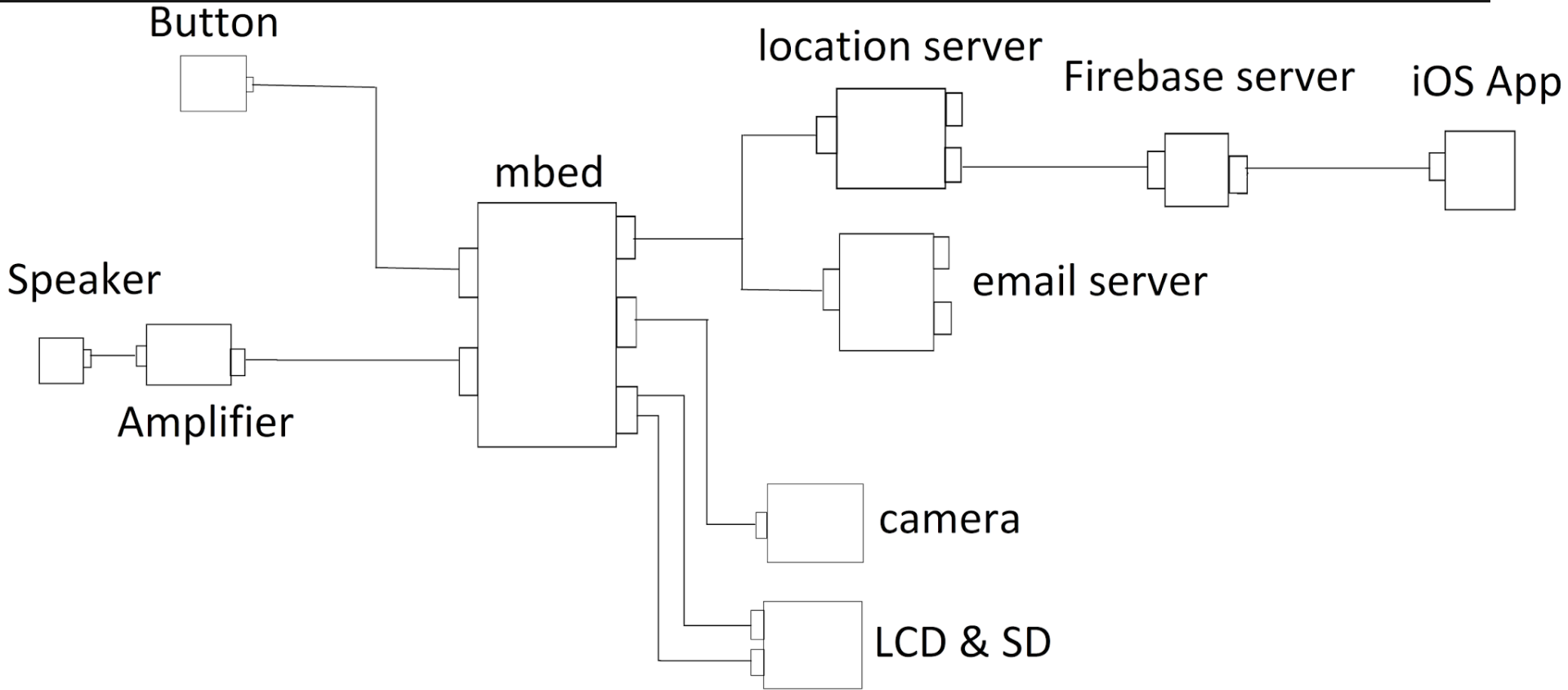
Daniel Rolandi, Alex Mead, Kelly Peng

Demo Links:

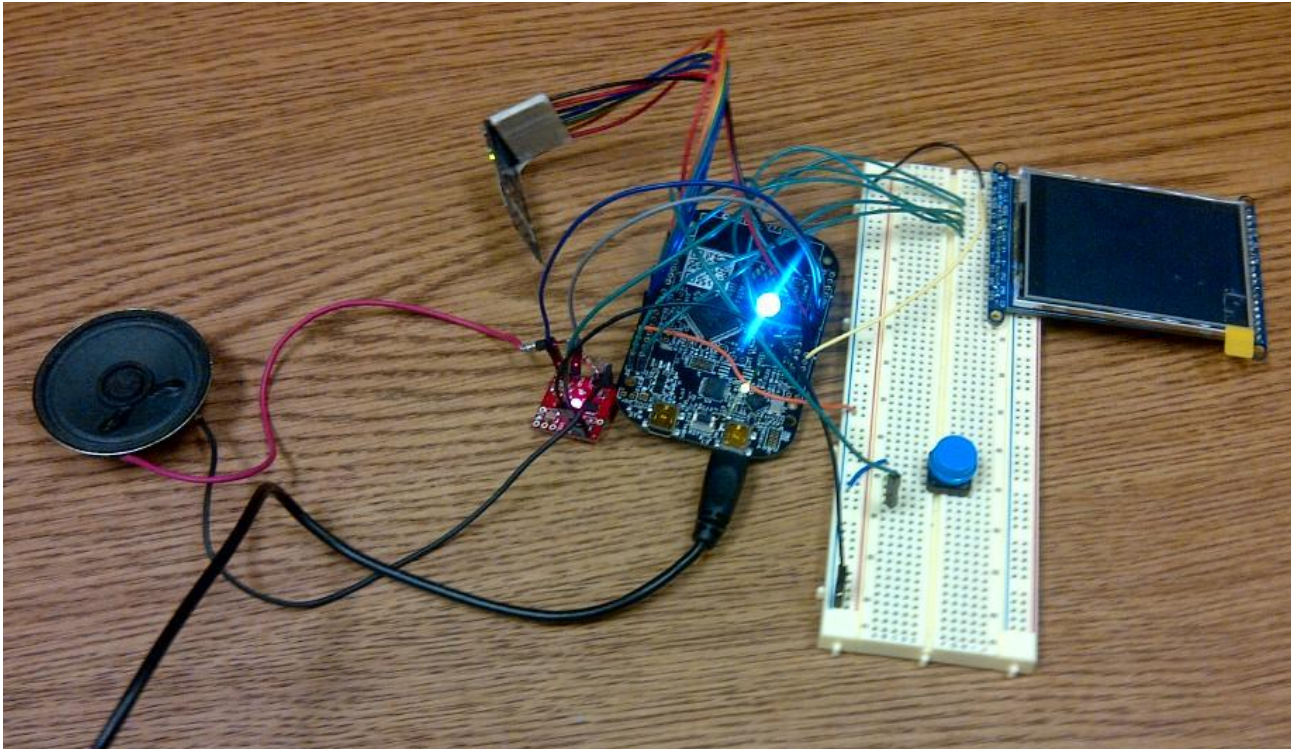
[Video Part 1](#)

[Video Part 2](#)

# Overall System Map



# Overall System Hardware



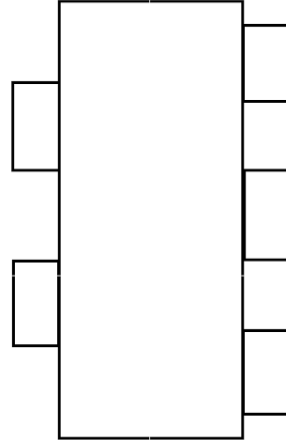
# Mbed Board Subsystem

**Interface:** Button

**Protocol:** GPIO pin Interrupt ( interrupt)

**Interface:** Speaker/Amplifier

**Protocol:** GPIO pin Interrupt (interrupt)



**Interface:** CC3000

**Protocol:** CC3000\_hostdriver\_mbedsocket Library ( SPI )

**Interface:** JPEG RS-232 Camera 2M

**Protocol:** Serial library, customized code (TTL Serial)

**Interface:** 2.8" TFT LCD Screen with microSD socket

**Protocol:** SPI\_TFT\_ILI9341 Library ( SPI ) - LCD screen  
SDFFileSystem Library ( SPI ) - microSD socket

# Apache Detector Server

**Interface:** mbed

**Procotol:** HTTP Get Request



**Interface:** Personal computer terminal

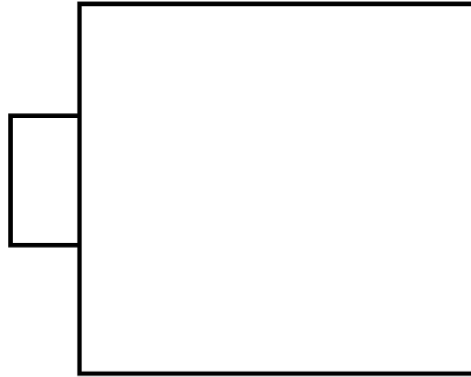
**Protocol:** SSH

**Interface:** Firebase server

**Protocol:** Firebase Python API

# Tornado Email Server

**Interface:** mbed  
**Protocol:** WebSocket



**Interface:** Personal Computer Terminal  
**Protocol:** SSH

**Interface:** Email  
**Protocol:** SMTP

# Firestore Database

**Interface:** Apache Detector Server  
**Protocol:** Firestore Python API

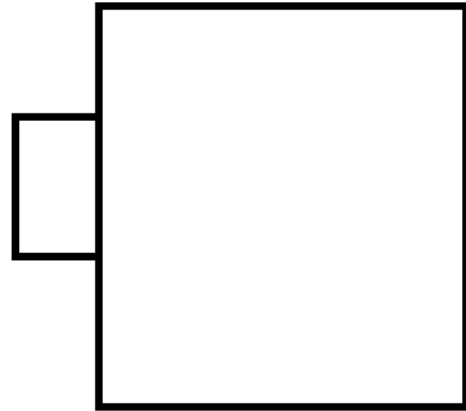


**Interface:** iOS Application  
**Protocol:** Firestore iOS API

# Location Tracking iOS App

**Interface:** Firebase Server

**Protocol:** Firebase iOS API





# Successes

- Getting the Wifi module CC3000 working with MBed.
- Get Websocket working with Mbed to send/receive messages to Server on Digital Ocean cloud.
- Able to take a photo using Camera Module with MBed.
- Get push button and speaker and amplifier working with MBed.
- The Apache server scripts is able to query Firebase DB and calculate if person is at home.
- Get Websocket and a user interface works using Tornado server on Digital Ocean.
- iOS App (Swift) is able to track user location from simulator.
- iOS App is able to keep updating Firebase DB variable once it changes.

# Issues

- microSD card file system failure - can't save files
  - Multiple Libraries: SDFFileSystem and SDHCFileSystem with multiple microSD cards
  - Others also had these errors using KL25Z board, yet no solutions found
- Email photo not possible
  - HTTP Clients don't support Post Requests with desired content type
  - Five clients tried: HTTPClient (x3), NetServices, NetServicesSource
- Serial Connections with Interrupts example doesn't work on KL25Z (camera)
  - Rewrote our own serial interrupt with buffer almost from scratch
- Camera output .jpg, screen input .bmp, but can't convert files
  - Found an example, but it doesn't compile and can't figure out why
  - Implementing algorithm ruled out

# Sources and Inspirations

mbed Official Library

Project Demo; by Antonio Iannopollo

CC3000 (wifi) by Martin Kojtal

HTTPClient; original by Donatien Garnier, latest fork by David Smart

Firebase (iOS-side) by Firebase.com

SPI\_TFT\_ILI9341; by Peter Drescher

Tornado (Python-side) by tornadoweb.org

Websocket (Python-side); by python.org

WebSocket; by Samuel Mokrani

Camera: Link Sprite (Arduino)

Serial Interrupt Cookbook mbed

\*Big Thank you to Antonio Iannopollo for advice and lots of patience