JESUS ROCHA GUERRERO

INTERNET OF THINGS

ABOUT ME

▸ BS Computer Engineering & MS Computer Science

▸ Fullstack Javascript Engineer

▸ Open Source advocate and contributor

▸ Passion for building real-world solutions

▸ Instructor at Academy Art University

▸ Long term goal is to build a hybrid community of interconnected hardware with humans

"THE INTERNET OF THINGS (IOT) REFERS TO UNIQUELY IDENTIFIABLE OBJECTS AND THEIR VIRTUAL REPRESENTATIONS IN AN INTERNET–LIKE STRUCTURE."

Wikipedia

— a world where every device is connected to the internet

BASICS

▸ Sense: data is gathered

▸ Transport: data passes through various networks

▸ Store: data is saved

▸ Analyze: data-driven insights are extracted

▸ Control: actions based on data-driven insights

▸ Share: data is exchanged with other systems or users

DATA TYPES: PHOTOS | VIDEOS | TIMELAPSES

▸ Objectives:

  ▸ Take photos, videos and timelapses

  ▸ Share with any user

DATA TRANSPORT

▸ We'll have three entities

  ▸ Hardware

  ▸ Server - two types

    ▸ HTTP / Sockets

      ▸ Message Proxy

      ▸ Loads Web Client

    ▸ S3 Data Store - for jpg's and mp4

  ▸ Web Client

▸ Web Sockets

  ▸ Bi-directional (full-duplex) communication at tcp layer

DATA TRANSPORT – WEB SOCKETS

▸ Server - socket.io

▸ Clients - socket.io-client

▸ Transport Layer (lower-level compared to HTTP)

▸ Rich documentation and examples at socket.io

▸ Basic Socket Test

  ▸ WebStorm Demo

HARDWARE SETUP

▸ client-hardware.js - main interface with sockets

  ▸ socket.io-client (npm module)

  ▸ camera/index.js - main interface with camera (raspicam)

    ▸ raspicam (npm module)

    ▸ aws/aws-upload.js - interface with AWS S3

      ▸ aws-sdk (npm module)

▸ https://github.com/ComputerEnchiladas/mahrio-chatbot-client/tree/3502bcd75154c4f8b0cbba21731f33919a5c521b

HARDWARE TESTING

```
pi@rpi3-media:~/mahrio-chatbot-client $ node
> var camera = require('./camera/index')( );
undefined
> camera.setMode('photo');
undefined
> camera.start()
calling....
/opt/vc/bin/raspistill --output /home/pi/mahrio-chatbot-client/images/
myImg_2017-01-20T17:02:34.602Z.jpg --height 720 --width 1280 --quality 100
undefined


pi@rpi3-media:~/mahrio-chatbot-client $ ls images/
myImg_2017-01-20T07:25:49.381Z.jpg   myImg_2017-01-20T08:20:19.597Z.jpg
myImg_2017-01-20T07:26:02.752Z.jpg   myImg_2017-01-20T15:19:17.122Z.jpg
myImg_2017-01-20T07:26:24.614Z.jpg   myImg_2017-01-20T16:08:41.508Z.jpg
myImg_2017-01-20T07:35:45.851Z.jpg   myImg_2017-01-20T16:44:05.430Z.jpg
myImg_2017-01-20T08:16:23.177Z.jpg   myImg_2017-01-20T17:02:34.602Z.jpg
myImg_2017-01-20T08:16:50.960Z.jpg   test.jpg
```

HARDWARE TESTING
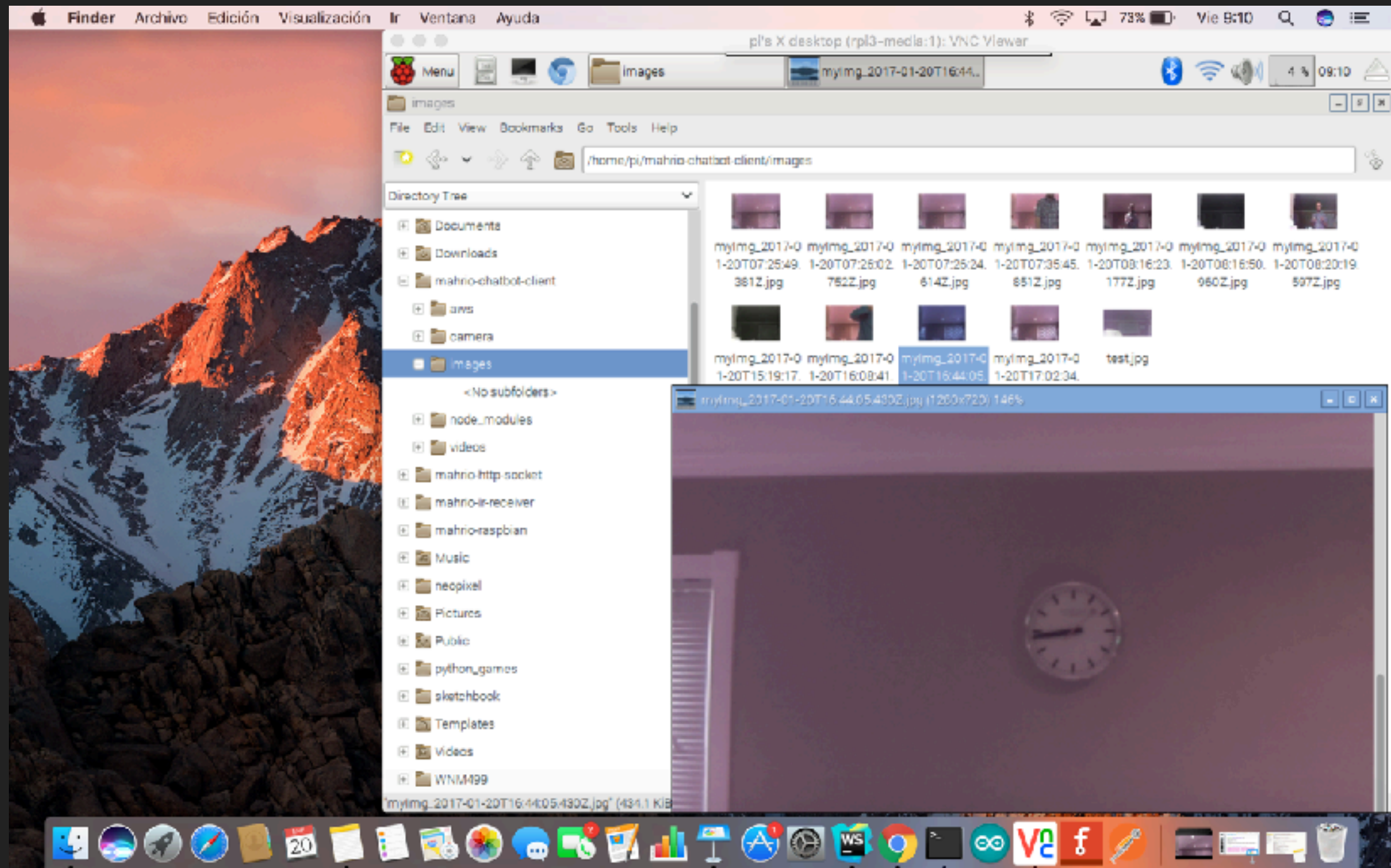
SERVER ROLES

▸ HTTP Server

  ▸ Loads Web App over HTTP

▸ Socket Server

  ▸ Message Forwarding

▸ AWS S3

▸ Heroku - heroku.com

▸ https://github.com/ComputerEnchiladas/mahrio-chatbot-client/blob/master/server.js

WEB APP

▸ Simple Technology

   ▸ HTML - Structure

   ▸ CSS - Aesthetics

   ▸ JavaScript - Programming

▸ Use Cases

   ▸ Know Status (is available and what mode) of Camera

   ▸ Switch camera mode

   ▸ Take Action - Hit Shutter

   ▸ View Image or Video

LIVE DEMO

▸ Start Server

▸ Start Hardware-Client

▸ Go to url to serve web view

▸ [optional] switch to desired mode

▸ Take Action

▸ View jpg or video

▸ Repeat back to switch desired more or take action

▸ Share url with any user

MATERIALS & COSTS

▸ ~$45 - Raspberry Pi 3 with 2.5amp power cable

▸ ~$30 - Camera Module

▸ $7/mo - Heroku (free for testing/development)

▸ AWS S3 - pennies to dollars per month, based on usage

PROVISIONING RASPBERRY PI

▸ Raspbian

▸ Git

▸ Node / NPM

▸ VNCServer

▸ Wifi/Ethernet for SSH / VNC - Use mac or pc

BEST PRACTICES – MESSAGING

▸ Server

    ▸ Socket listeners should differentiate by namespace the type of connected client's message and direction

        ▸ 'client:set:mode' -> 'hardware:set:mode'*

        ▸ 'client:take:action' -> 'hardware:take:action'

        ▸ 'client:get:status' -> 'hardware:get:status'

        ▸ 'hardware:camera:status' -> 'client:camera:status'

        ▸ 'hardware:camera:done' -> 'client:camera:done'

* Missed this - will refactor

STANDALONE TESTING

▸ Chrome Browser

   ▸ Developer Tools

▸ Raspberry Pi

   ▸ Node REPL / WebStorm Debugger

   ▸ SSH / VNCViewer

▸ Server

   ▸ WebStorm Debugger

   ▸ Local Network
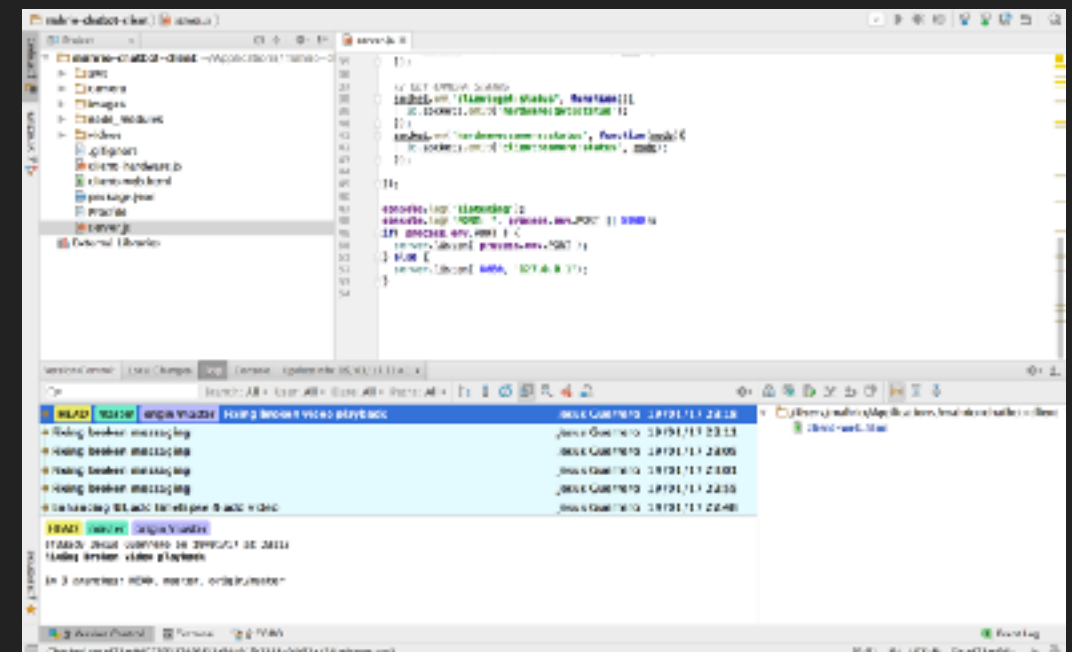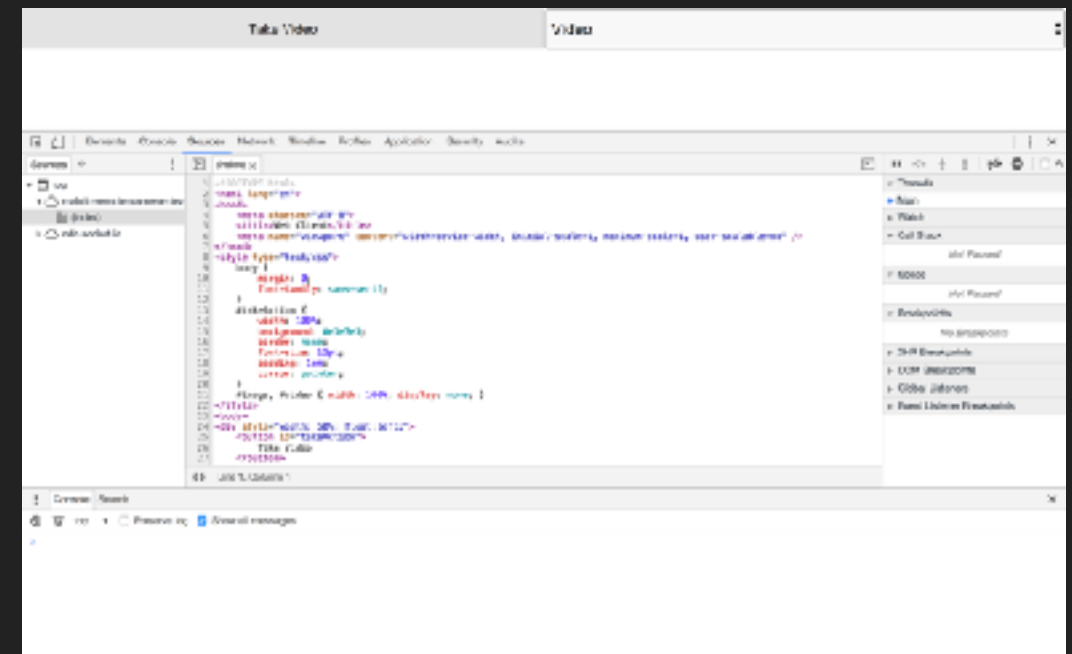
FUTURE OUTLOOK

▸ Real-time video (live streaming)

▸ Authentication & Role-Based Access

▸ Hybrid-Mobile App - Ionic 1/2

   ▸ Cordova

   ▸ Native Look and Feel

▸ Chatbot - interconnect users with hardware

THANK YOU

▸ Comments?

▸ Questions?

▸ Reach me at

  ▸ jesus.rochaguerrero@capitalone.com