Secure Photograph Capture System

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The Project

“A system that snaps a picture and stores the picture in memory securely. A good system will enable a security protocol, hopefully with military-grade encryption, so that any system cannot possibly be compromised by a user or thief. The picture should also be able to be recalled at a later time.”

http://www.aviorlando.com/wp-content/uploads/2012/08/Security-Camera.jpg

The Team

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- Kevin Seitz

Hardware Specifications

- Take and upload a picture every minute
- Take picture of at least 640x480 px
- Tamper protection - if stolen, the system will not retain any sensitive data
- Store a year's worth of pictures on the server
- Store the picture securely and offboard (on the remote server)

Software Specifications

- A method for the user to retrieve the pictures remotely
- Use AES-128 or AES-256 as the standard for encryption
- Index all image with a time and date stamp
- Store images named with time and date stamp
- Images accessible from any standard Windows computer
- Secure storage of the AES key on the off-site server

Block Diagram

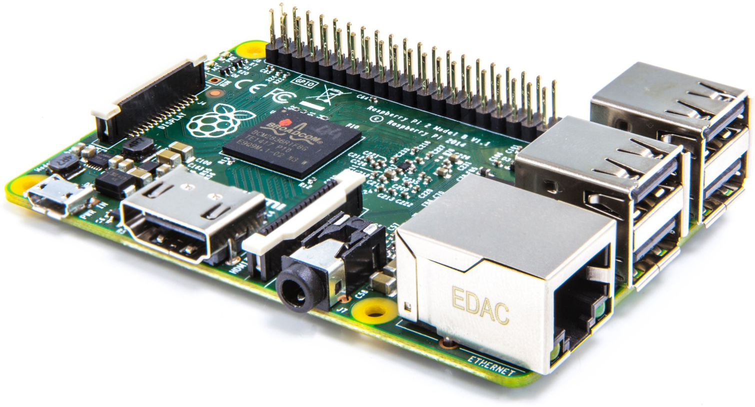
Development Plan

Three phases

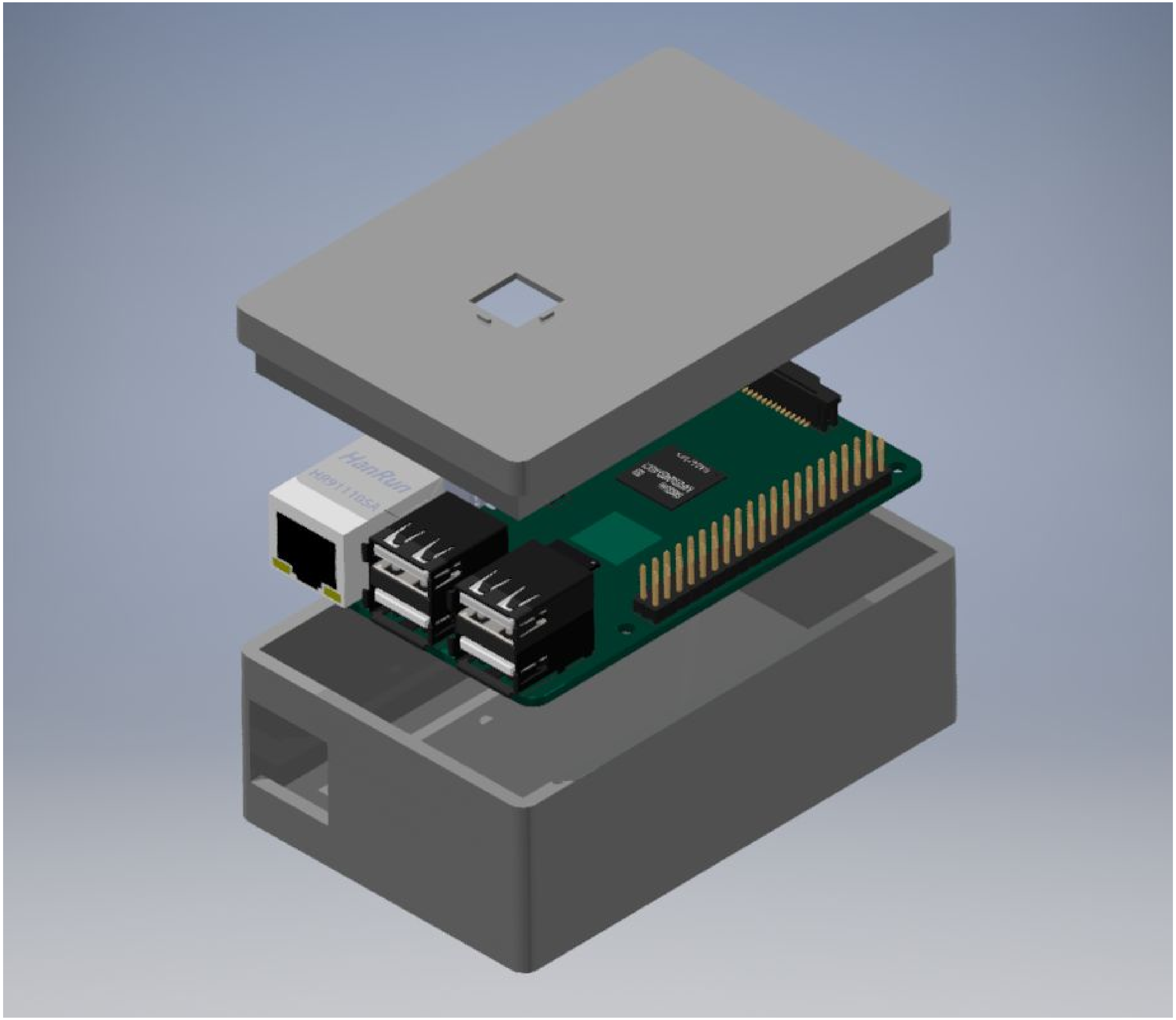
- Photography/Encryption
- Off-Site Storage
- Retrieval/Decryption

Phase I: Photography/Encryption

- Raspberry Pi 2 captures a photo using a Pi Camera
- Images encrypted while sending over ethernet
  - AES-256
- No on-board images, server storage only
- Images stored only in RAM and lost as soon as power is cut



https://www.raspberrypi.org/wp-content/uploads/2015/01/Pi2ModB1GB_-comp.jpeg

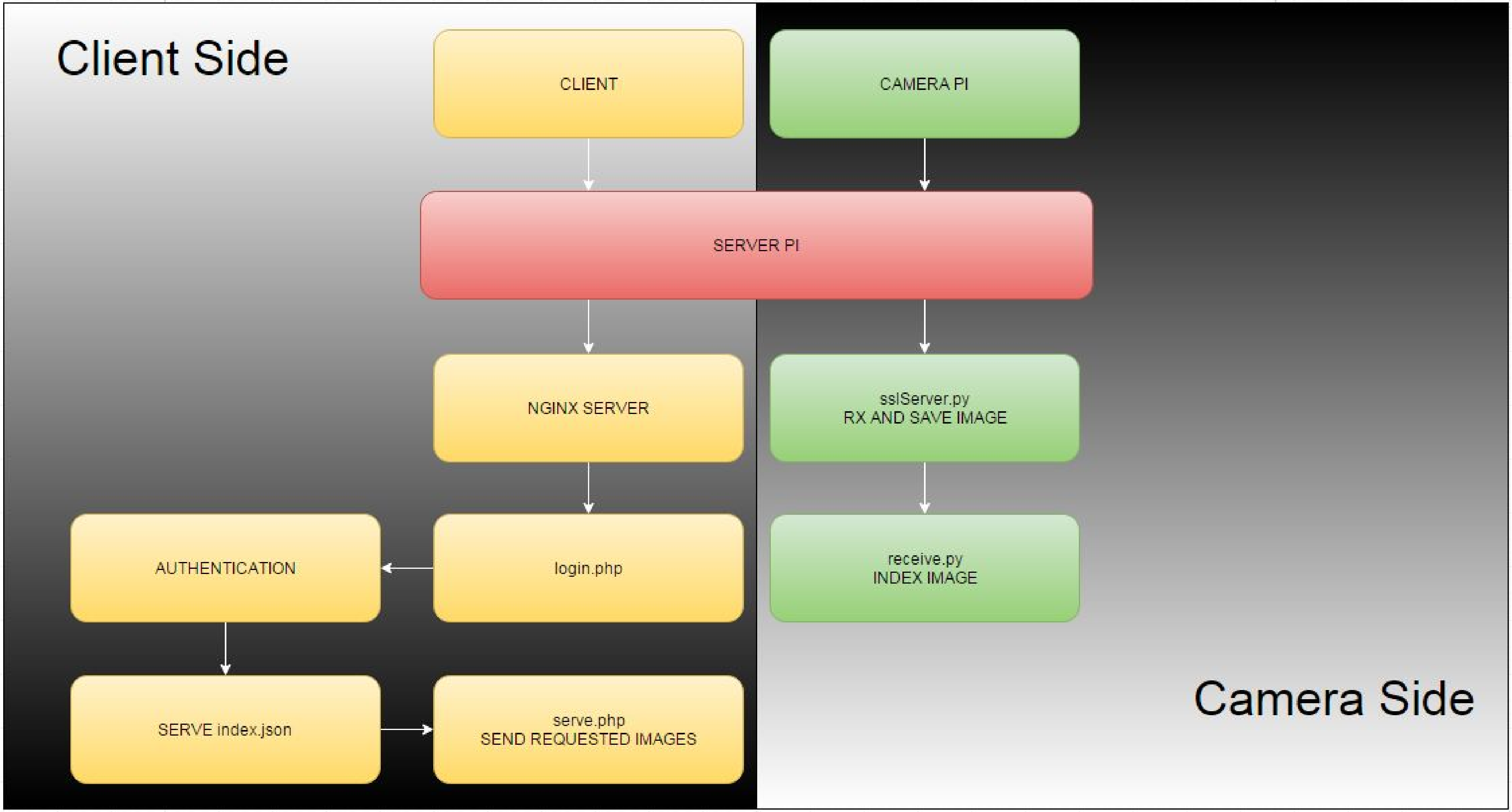

HanRun
HR911105A

Phase II: Off-Site Storage

- Raspberry Pi 2 server safely stores, indexes, and serves encrypted images
- Technologies used
    - NGINX, PHP, Python, SHA-256
- Security in Place
    - Login/Register/Create Account system
    - NGINX settings
    - Encrypted Camera Pi Interaction
- Security to Add
    - Session Key system for Client
    - AES-256 Encrypt Pictures
    - Fail2Ban
    - Stronger Firewall

http://www.oldcarpet.com/images/secure_shopping_1_250.jpg

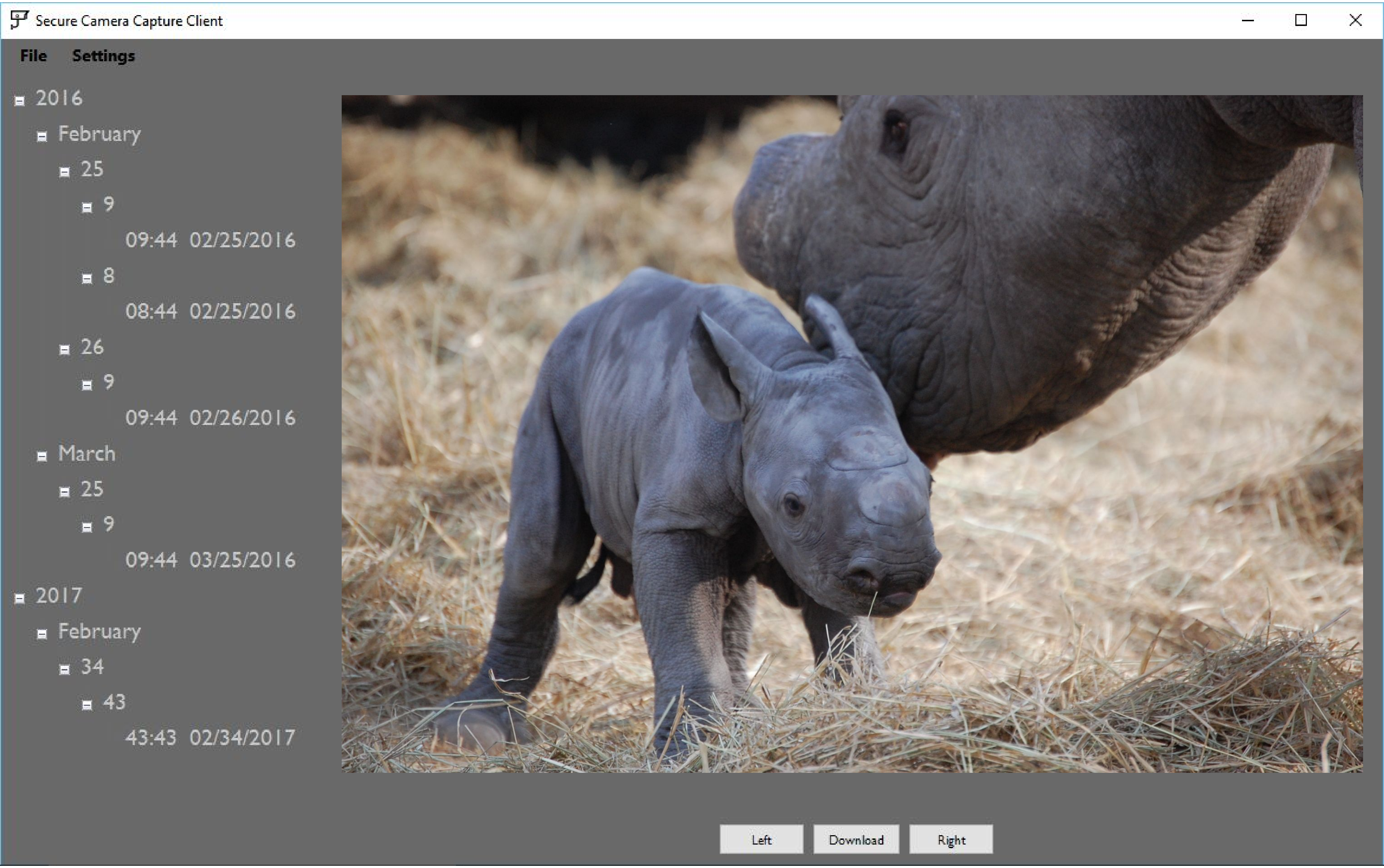
Server Block Diagram



Phase III: Retrieval/Encryption

- Software client running on any windows system to retrieve and decrypt images from the server
- Clean, user-friendly GUI
- Uses JSON to put images into an organized tree based on timestamp
- Written in C# for a visually appealing design

http://www.javaguru.co/2015/01/how-to-compare-two-string-in-java.html



```
2016
  February
    25
      9
        09:44 02/25/2016
      8
        08:44 02/25/2016
    26
      9
        09:44 02/26/2016
  March
    25
      9
        09:44 03/25/2016
2017
  February
    34
      43
        43:43 02/34/2017
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http://imirevolunteers.org/wordpress/wp-content/uploads/2013/09/Tatenda-born.jpg

Website

- Contains all documentation for the project
  - Directions to rebuild it

- Tracks team progress throughout development

[See it here!]

Future Plans

- Wi-fi connectivity (if possible)
- Mobile applications (Android, iOS)
- Motion Detection
    - Mobile phone/e-mail alerts

In closing...

- Currently functional prototype
- AES encryption
- Live demonstration!

Live Demonstration!

SC3.exe

Questions?