SIDS Night Eye Guardian

MAY14-29

Nicole Bruck	bruckna@iastate.edu
Jeremy Dubansky	dubansky@iastate.edu
Daisy Isibor	isibord@iastate.edu
Eric Woestman	woestman@iastate.edu

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Project Info

- Client : Adan Cervantes

- Advisor : Dr. Diane Rover

Problem Statement

Researchers who are analyzing Sudden Infant Death Syndrome (SIDS) need better tools for collecting and analyzing data from infant sleep studies.

Parents do not want intrusive tools in their child's sleep area and they want their child to be safe.

Researchers are looking for a way to gather the sleep data of infants without inconveniencing the parents or child.

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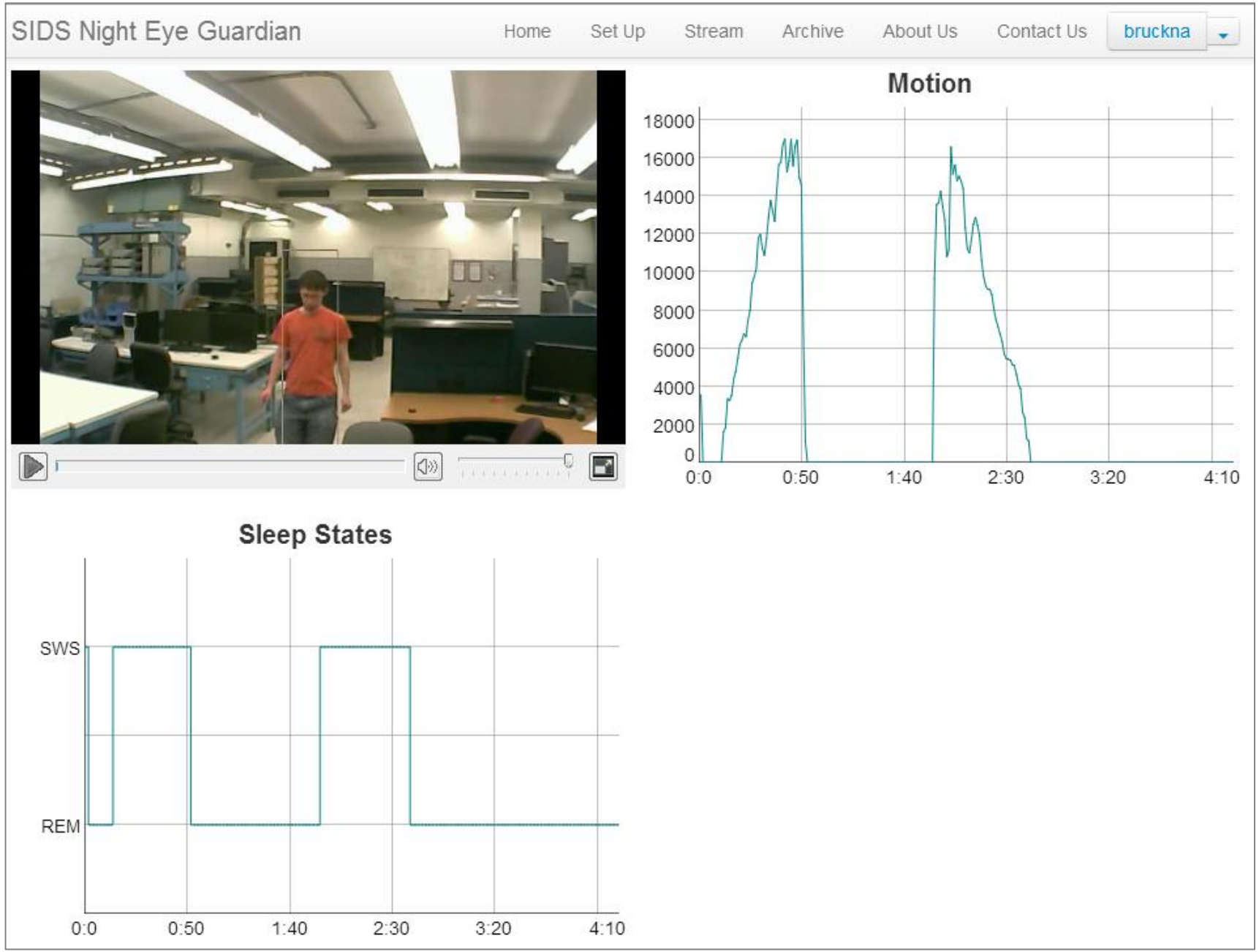
Description

- Building on Previous Senior Design Project
- Simple, Easy-to-Use Website
- Sleep State Detection Algorithm
  - Motion Detection
- Graphing
  - Motion
  - Sleep States


SIDS Night Eye Guardian
Home
Set Up
Stream
Archive
About Us
Contact Us
bruckna
Motion
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
0:0
0:50
1:40
2:30
3:20
4:10
Sleep States
SWS
REM
0:0
0:50
1:40
2:30
3:20
4:10

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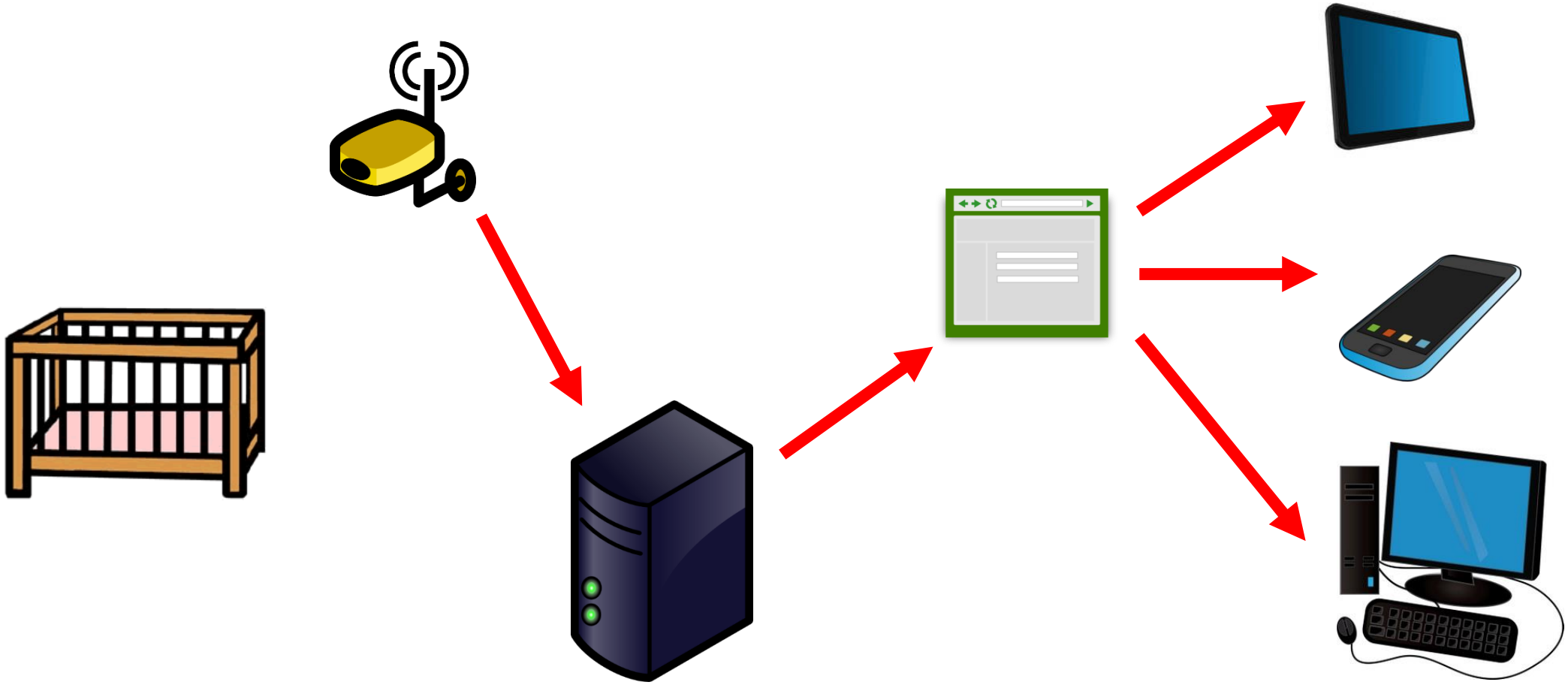
Objectives

- Stream video to the server over a network
- Transform video into a clearer image
- Provide a clean user interface
- Detect and display a graph of the motion
- Determine and display a graph of mapped sleep states

System Overview



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Users

- Admin
  - Used to control most of the website and other user accounts
  - Webmaster and software developers
- Researcher
  - Able to view all video and data necessary
  - Does not change other user accounts
- Parent
  - Only their own infant’s video and data
  - Simplistic view to see what data is being made available

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Technical Requirements

- FOSCAM IR IP camera provided by client
- MIT EVM Software to enhance color and motion
- Video data archived for retrieval
- REM/SWS sleep state detection
  - Motion detection
- Graphs of motion and sleep states versus time

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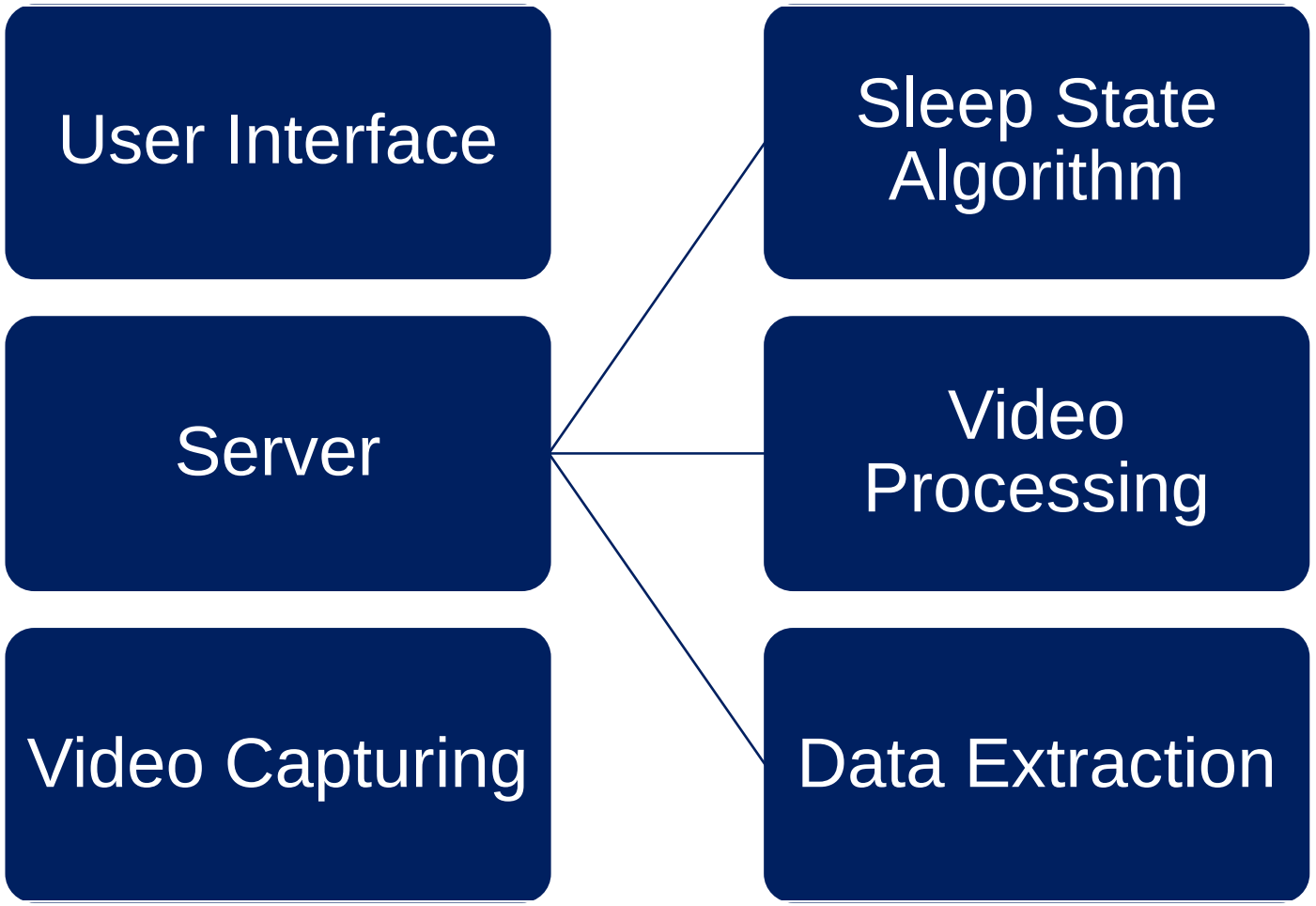
Module Diagram



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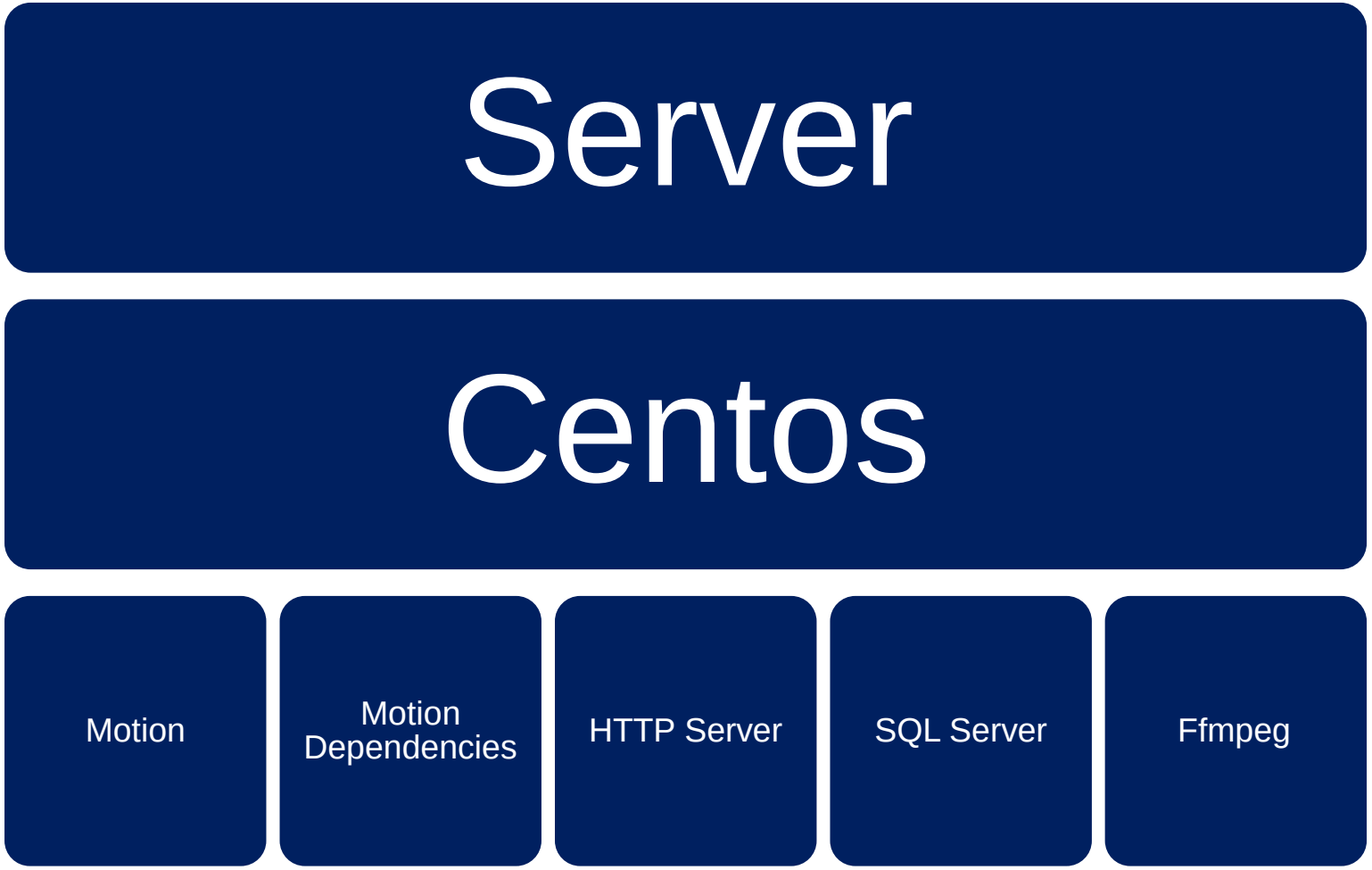
Architectural View



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Languages and Frameworks

- Bootstrap Web framework
- JQuery
- UserPie
- PHP

MIT Eulerian Video Magnification

Legacy Software : ZoneMinder

- No instructions from previous project
- ISU network needed registration

- Unable to easily configure cameras
- Motion-triggered not detection
- Poor quality and low-resolution video

New Software : Motion

- Streaming Capabilities
  - Connects to a wide range of IP cameras
  - Captures events from a video stream
- Video Storage
  - Manages video directories
  - Playbacks multiple video formats
- Motion
  - Provides JPEGs for frame-by-frame comparison
  - Outputs data stream for motion activity

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Technical Challenges

- ZoneMinder was not a good fit
- Motion only detects areas of movement
  - Needed to translate into a quantity to graph
- Communication with previous group
  - Only once in person, didn’t respond to emails
- Over Spring Break, campus network was reset
  - Cameras reset when disconnected

Design Timeline

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Testing : Motion

- Created a full test suite
  - Completely automated
  - Memory leaks and invalid configurations
- Results reported to Motion
  - Bug database is open to the public (open-source)

Testing/Maintenance Recommendations

- Authentication
- Sleep-State Detection
- Multiple Cameras
- Heartbleed

Responsibilities

- Nicole Bruck
  - Team Lead : Overall website design and page navigation
- Jeremy Dubansky
  - Server, Motion and Graphing
- Daisy Isibor
  - Networking, Database and Motion
- Eric Woestman
  - Authentication, MIT EVM Software and Motion

Milestones

Fall 2013

- Project Planning
- Design Document and Validation
- Gain Access to Server
- Install Necessary Software
- Research Open Source Software
  - Similar Systems
  - Motion Detection

Spring 2014

- January 27
  - Client Demo : Website Skeleton
- February 24
  - Video Streaming and Motion
- March 31
  - Motion Detection and Graphing
- April 15
  - Client Demo : Motion Detection
- April 28
  - Finalizing Testing

Demo