CNT Capstone Project

**Security Camera**

**With Motion Detection**

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As a requirement of CMPE2960, CNT Capstone, we are submitting this project proposal for consideration. After discussions with out capstone mentor, Mr. Marc Anderson, we have decided to design and build a security camera with motion detection.

After performing preliminary research, we have decided to use the Raspberry Pi’s GPiO pins to drive a servo motor using the RPi.GPiO library for Python. This method is the fastest and easiest to implement as the library is natively supported by the Raspberry Pi, and root access is not needed to access the GPiO, thus eliminating issues with Linux permissions and security risks caused by root access.

The Raspberry Pi will capture and stream video using the Raspberry Pi NoIR camera and the motion software package. It will also listen for commands sent from a webserver to rotate the servos allowing the user to rotate the camera. A webpage hosted on this webserver will receive and display the stream from the Raspberry Pi and allow the user to rotate the camera from its controls.

When motion is detected, the Twilio APi is used by the webserver to send an SMS notification to the user.

Elements of the project that will require research include:

* Learning how to use PHP to respond to HTTP requests from the Raspberry Pi.
* Creating a user login page with credentials stored in a database.
* Learning how to receive video streaming or photo frames sent from Raspberry Pi and display videos on our webpage.
* Learning how to use Twilio APi to send notification to users.

Elements of the project that are currently available:

* Raspberry Pi, power supply, servo motors, motion sensor.
* Python libraries for handling HTTP requests on the Raspberry Pi.
* Support libraries written in Python for SMTP communications.

Elements that need to be acquired in order to complete the project:

* Raspberry Pi NoIR camera.

We would like to propose the following timeline to ensure the completion of this project in a timely manner. Please note that some dates for planned activities are fixed based on the course syllabus.

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| Week | Activity |
| 1 – Sep 3, 2018 | Project selection and research, discussion with capstone course coordinator. |
| 2 – Sep 11,2018 | Creation of this proposal. |
| 3 – Sep 18, 2018 | Place order(s) for all necessary missing elements for the project. Research the Python language and required libraries. |
| 4 – Sep 25, 2018 | Develop testing PHP page to receive HTTP request from the Raspberry Pi. |
| 5 – Oct 2, 2018 | Develop Python receiver script for Raspberry Pi. |
| 6 – Oct 10, 2018 | Status report #1 - progress to date.  Develop testing webpage to receive Picture sent by Raspberry Pi NoIR Camera. |
| 7 – Oct 17, 2018 | Integrate Twilio API to PHP webpage. Used for phone notifications. |
| 8 – Oct 24, 2018 | Status Report #2 – progress to date. |
| 9 – Oct 31, 2018 | Develop user authentication page. |
| 10 –Nov 6, 2018 | Test web interface with authentication enabled. |
| 11 – Nov 14, 2018 | Develop database to store Pictures and/or motion detection timestamps. |
| 12 – Nov 21, 2018 | Test website with database. |
| 13 – Nov 28, 2018 | Develop front end CSS webpage for professional presentation. |
| 14 – Dec 5, 2018 | Optimize webpage and Python receivers for Raspberry Pis. |
| 15 –Dec 12, 2014 | Final testing of the security camera. |

During the creation of this project we hope to learn more about using the Raspberry Pi and Python for controlling remote hardware, two way communication via the internet, and the implementation of third party commercial APis. These topics are not covered in the CNT program and will demonstrate that we are ready to extend our knowledge beyond that provided by the CNT program.