Final Project Proposal

Year: 2019 **Semester:** Spring 2019 **Team:** 2 **Project:** Guard DAWG Systems
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Team Members (#1 is Team Leader):

Member 1:	Evan Miller	**Email:**	mill1576@purdue.edu
Member 2:	Yash Nain	**Email:**	ynain@purdue.edu
Member 3:	Ian Sibley	**Email:**	isibley@purdue.edu
Member 4:	Viktoryia Zhuleva	**Email:**	vzhuleva@purdue.edu

1.0 Project Description:

This project implements a smart-lock system, which provides the user with three ways to gain access to the door. Firstly, there will be a camera which, when activated, will capture the face of the user. The information is processed on a Raspberry Pi, and if the number of images matched reach a certain threshold, the Pi sends an ACK/NAK signal to the microcontroller, which will activate the motor to unlock the door. In the event an unauthorized user wants to gain access to the lock, there is a number pad that can give access to the user. If other two methods are unsuccessful, we have decided to implement a mechanical override using a physical key. The reason we decided to implement this is that we needed a way to gain access regardless of the state of the electronics.

2.0 Roles and Responsibilities:

Team Leader:

Evan Miller has had the opportunity to work with various engineering teams through internships and understands how critical communication is to a successful project. As the team leader he can help make sure that the team is organized and delivering on time. Additionally his experience with embedded hardware and software engineering gained through coursework will allow him to help other members of the team tackle challenging problems along the way.

Systems Engineer:

Viktoryia Zhuleva had had significant practical experience in working with embedded systems and I/O system interfacing in her Embedded Systems and Microcontroller System Design courses. Her background makes her well-qualified for the systems engineer position for the team, working on tasks such as microcontroller I/O integration, interfacing and hardware communication.

Hardware Engineer:

Yash Nain has experience with designing and implementing embedded hardware. He is able to use several PCB CAD softwares, is familiar with several families of microcontroller, and is able to design simple power electronics. In addition, he has gained the requisite software experience required for this project through ECE 570, as well as other classes, projects, and internships.

Software Engineer:

Ian Sibley has had previous experience both with project development in a software context for multiple years through Purdue IEEE ROV, and has previously taken the ECE 570 course and submitted a project in AI, and specifically related to facial recognition and processing. In addition to being familiar with tools relevant to AI, he's had experience working with a Raspberry Pi over networks through ROV, and through ECE has exposure to communication protocols to and coding of the microcontroller itself.

2.1 Homework Assignment Responsibilities

Design Component Homework		***Professional Component Homework***	
3-Software Overview	Ian	9-Legal Analysis	Evan
5-Electrical Overview	Evan	10-Reliability and Safety Analysis	Ian
7-Mechanical Overview	Viktoryia	11-Ethical/Environmental Analysis	Yash
8-Software Formalization	Yash	12-User Manual	Viktoryia

Figure 1. Assignment Responsibilities

3.0 Estimated Budget

Item	**Estimated Price**
Mechanical	
Lock and Key	$15.00
Electrical	
PCB Fabrication	$50.00
PCB Components	$30.00
Raspberry Pi 3 Model B+	$40.00
Servo Motor	$50.00
LEDs	$15.00
Other	
Door	$100.00
Shipping	$50.00
Total	$350.00

Figure 2. Estimated Budget

The only mechanical items needed are the lock and key which will be a fail safe in the event that our system loses power. The lock should be relatively inexpensive but we will only need one for the duration of the project.

The estimates for the other components are on the high end with the inclusion of an actual door should we choose a more polished demo. With the total cost coming in $100.00 short of the amount allotted for each project, we will have room left over should we have any significant changes to our project or in the event one or more of our items breaks.

4.0 Project Specific Success Criteria

The following are the proposed for the Guard DAWGS project specific success criteria

1. An ability to read video frames from an embedded camera at 4 frames per second
2. An ability to receive a password from a numeric keypad
3. An ability to communicate through UART to receive user verification
4. An ability to interface with a motor driver IC
5. An ability to process image data to recognize a registered face

5.0 Sources Cited:

Lock and Key Cost Estimate:
https://express.google.com/u/0/product/5275992547100053097_3143937820502292416_7820913?utm_source=google_shopping&utm_medium=tu_prop&utm_campaign=7472660&utm_content=eid-lsjeuxoeqt

Raspberry Pi 3 Model B Cost Estimate
https://www.amazon.com/s/ref=nb_sb_noss_2?url=search-alias%3Dmobile&field-keywords=raspberry+pi+3+B

LED Cost Estimate:
https://www.amazon.com/dp/B073QMYKDM/ref=sxts_kp_bs_tr_1?pf_rd_p=8778bc68-27e7-403f-8460-de48b6e788fb&pd_rd_wg=wZnWe&pf_rd_r=NT2A92MN5PQT4TPCS5C0&pd_rd_i=B073QMYKDM&pd_rd_w=voKSc&pd_rd_r=7ffd59b2-69c2-46bd-b772-891cb5698464&ie=UTF8&qid=1547058983&sr=1

Door Estimate:
https://www.homedepot.com/p/JELD-WEN-24-in-x-80-in-Coventry-Primed-Right-Hand-Smooth-Molded-Composite-MDF-Single-Prehung-Interior-Door-THDJW136300034/203857096?cm_mmc=Shopping%7CG%7CVF%7CD30%7C30-25_INTERIOR_DOORS%7CJeld-Wen%7CPLA%7CJELD-WENInteriorDoors%7c71700000040212516%7c58700004316212239%7c92700036061522837&gclid=Cj0KCQiA1NbhBRCBARIsAKOTmUvrhgcMUl_ZzwFuQt1SQv1N-OGaOeKHaP1fh-4N2jjHfV5BXDEXPrcaAjCFEALw_wcB&gclsrc=aw.ds

Appendix 1: Concept Sketch