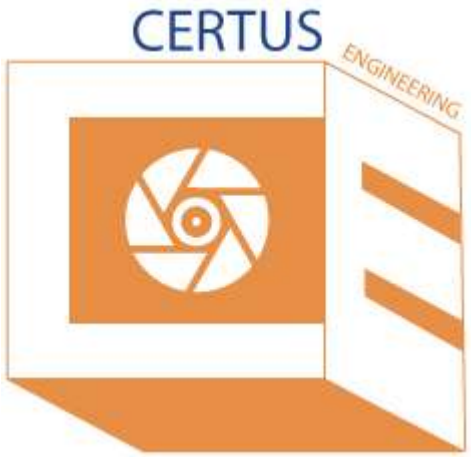
Certus Engineering



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Introduction

Arca is an enclosed system, designed by Certus Engineering, used for personnel verification and attendance tracking for financial or educational institutions. Arca will read a barcode, an identification number, and the RFID value. Depending on the user's specifications, the device can be set to read any of those three features. Our objective in Certus Engineering is to improve accuracy in the authentication process for business enterprises in a cost effective way without compromising on efficiency.

Major system component of Arca are Packaging unit, RFID unit, Scanner unit, OCR unit and Web/SQL unit. Each component is developed following design process described in this document and finally all components are integrated into final product in system design phase.

Schedule

Design process of Arca, mainly follows a waterfall model. Figure 1 shows major deadlines of this project which we were able to meet mostly, however major bugs in software and errors in mechanical design caused overlap between development phases. Our project is currently in system integration phase in which major system components are combined to observe full data path throughout the system.

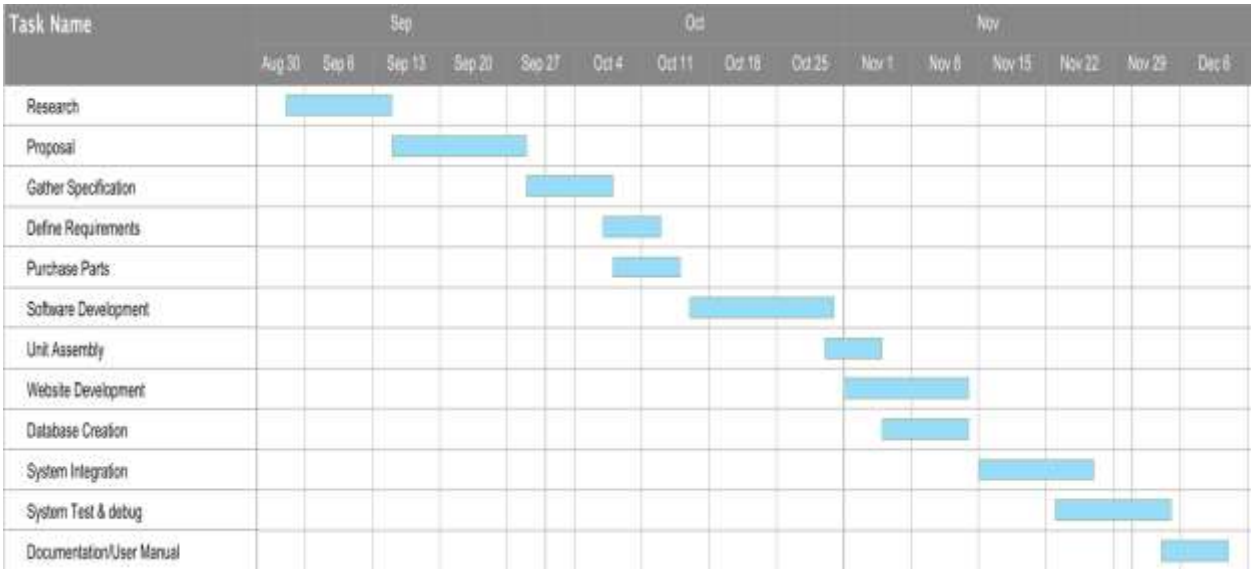

Figure 1: Gantt chart of project deadlines

Test plan for this project includes unit, integration, system and user acceptance tests. Unit and integration tests were performed earlier in the design process and we are planning to perform system and user acceptance tests in December 2015.

Financial Review

Table 1 demonstrates cost of parts and item purchased during development process. At Certus engineering we are focused on quality while keeping the cost down to achieve an affordable price for the final product. Most items are purchased from eBay and Alibaba websites due to their low prices

however this cost estimate does not include cost of human resources used during development.

Table 1: Project's expenditures

Item/Part	Cost (CAD)
Camera x2	6
Arduino Nano x2	6
RFID reader/writer x2	10
3D Printing 4x	200
Cables/Jumpers/USB Hub	5
Others	10
Total Cost	**237**

Progress

1. **Mechanical Design**

   Mechanical design mainly includes design and 3D print of a container that meets size specification while contains RFID and scanner cameras, and provide effective lightening and entry for ID card. We encountered major problems in this phase of our project and were behind our deadline however we dedicated two engineers to fix these issues while other engineers working on website and database design.

2. **Software Development**

   This stage includes developing software components to interact with hardware (RFID chip, microcontroller and scanner) and perform character recognition (OCR) in scanner unit. Using open source computer vision and OCR libraries and intense effort from the team, we were able to meet our deadlines. Most engineers worked more than 40 hours/week and early deadlines were made to ensure project can meet deadlines outlined in this document.

3. **Website/SQL**

   This stage includes developing a PHP website with simple graphic and a SQL database to store and access ID read from RFID and scanner units. We were able to meet our deadline for this stage as well because web development started earlier than our actual deadline. This was possible due to the fact that website doesn't interact with actual hardware. Therefore, test data was used during web development.

Conclusion

This project has five major components: Packaging unit, RFID unit, Scanner unit, OCR unit and Web/SQL unit. Overall project design follows a waterfall model and each component developed based on deadlines outlined in this document. Currently, we have completed 75% of this project including design of all major components and unit/integration testing. We are currently working on final system integration and we expect to have prototype version of Arca ready by December 15th.