Warren J. Baker Endowment

for Excellence in Project-Based Learning

Robert D. Koob Endowment *for Student Success*

FINAL REPORT

Final reports will be published on the Cal Poly Digital Commons website

(http://digitalcommons.calpoly.edu).

I.   Project Title

Dreamer Technologies' Home Automation System

II.   Project Completion Date

August 31, 2018

III.   Student(s), Department(s), and Major(s)

(1) David Lennon, Engineering, Computer Engineering

(2) Chandler Warne, Engineering, Computer Science

(3) Jordan Shaw, Business, Accounting

IV.   Faculty Advisor and Department

John Townsend, Business – Entrepreneurship

V. Cooperating Industry, Agency, Non-Profit, or University Organization(s)

Cal Poly Hatchery

VI. Executive Summary

Our initial idea was to create a complete smart home system that can easily connect to all smart home devices and be easily controlled by the user. The system would run and controlled from a smart hub that we would create. After we developed the hub we planned to form a business around the product and sell our whole home smart home system.

Our first step was to do market research to make sure anyone would even want to by our product. What we found was not too encouraging. We found that most people weren't interested in outfitting their home with a whole system. Most customers were only interested in a few smart home products, such as lights and locks, and had no need of a smart hub that centralized the smart home devices into one user-friendly interface. So we decided to pivot.

Instead of creating a smart hub that no one would be interested in buying, we decided to focus on a single smart home product that the market has a need for. We started by seeing what types of smart home products were available and what products weren't fulfilling the needs of customers. We used social media sites like Facebook and Reddit to survey people in our target market to see what types of products they are interested in buying. We saw what our target market wanted from home automation and researched the products already available. We decided to pivot from the whole home system to smart window coverings.

The current market for smart window covering is lacking. The only options are very expensive or completely Do-It-Yourself (DIY). Our goal is to make a simple, economical window covering that is able to be controlled easily and effectively from your

smartphone. The system would be easy for someone to set up in their home, and contain all the parts needed for window control.

Our market research that we conducted from Facebook, Reddit, and Home Depot helped us determine what design features we should include and how to price the product.

We found that price is important for automatic blinds. Many of the smart home users talked about the expensive nature of automating blinds. Even DIY kits they have bought run $400-$500 per window. Cost-effective smart shades don't seem to exist. People would like to pay less for the simple function automatic blinds offer. The market does not reflect this. The only complete sets are available from large online retailers that do not specialize in automatic shades. Another important aspect is availability. At the present moment, smart home users cannot buy blinds easily from the established channels. There are no smartphone compatible sets on sale on Amazon. The major websites focus solely on regular, non-automated blinds and are very hard to order from.

Installation and Integration are very important to our key market segment. Consumers want a shade that works with standard industry equipment. Samsung Smart-Things, Wink, direct Wi-Fi connection are all good. The more seamless integration the better. Customers also want the blinds to integrate easily with existing smart home systems, and setup needs to be simple. Users are forced to buy a DIY kit to upgrade their existing blinds. Even with the expensive kit, the user must break open the blinds and install the motor and control systems themselves. Installing and setting up the blinds must be very simple. Ideally users just hang the blinds with the provided mounting brackets and connect to the blinds using their smartphone/device.

One of the features we found that was important to our customers is being cordless. In our market research at Home Depot we found out that Home Depot is making the transition to only sell cordless blinds. This is mostly due to safety concerns with small children or pets. Some articles we found online seemed to agree that cordless blinds can be dangerous for small children and pets. However, our customers still want to be able to control the blinds manually. If a phone or remote control is

nowhere to be found, users need to be able to push a button on the blinds to tell them to close. It is a point of frustration to require the use of an external remote to close blinds.

With all of the data we collected we determined price, safety, energy saving, and integration were the four most important features for our target market. The simple roller shade design allows for easy motor integration and control. This should allow us to come in significantly under the $300 average for new smart home blind sets. Our cordless design and operation eliminates all traditional blind hazards. A small pull string at the top of the shade will allow our shades to be controlled manually. Shades can already greatly reduce energy bills by keeping home interiors cool, however our shades will maximize these savings with a feature that closes your blinds for you when you leave your house. An additional solar panel module can also be purchased and attached to the window at the top of the frame. This panel will detect the presence of the sun and will charge the the blind's batteries. Our blinds will also be very user friendly in the setup and installation. The blinds can be controlled via direct WiFi or through any supported smart home hub. Programming of the shades will be simple, and can be set to your schedule, or the blinds will operate automatically in power saving or safety mode.

VII.　Major Accomplishments

(1) Market Research

We completed extensive market research on our smart window covering. We surveyed people that subscribed to home automation subreddits on Reddit and the Cal Poly Parents page on Facebook. We also went to Home Depot and talked to customers directly who were there to purchase window blinds. The data we collected lead us to a pivot from the whole home smart hub system and interface to smart window coverings, a product much more suited to succeed in the current market.

(2) Product Design

With the help of our market research and survey data, we listened to what the customer wants and expects from smart blinds and designed a product that will meet those needs.

(3) Kickstarter Campaign

We will start the Kickstarter Campaign at the end of January 2018 which will run for 2 months. If we meet our goal we will manufacture the smart window coverings during the months of June, July, and August 2018 shipping our products by August 31, 2018.

VIII. Expenditure of Funds

The funds were used to purchase prototyping equipment and parts for the smart blind that are currently in development. We made sure to use cost effective ways to spend the grant money, for example, instead of buying a complete laser cutter and CNC machine, we decided to build the equipment ourselves with help from previous Do-It-Yourselfers on the internet.

Parts not purchased for the prototyping equipment were purchased for the prototype itself. We went through multiple iteration of the product fine-tuning each one to create the product we have now.

We also spent $50 on two $25 Amazon gift cards that we gave away in a random drawing of our survey participants. The chance to win an Amazon gift card incentivized our survey and brought in many more responses than we expected.

IX. Impact on Student Learning

This has been a very good experience that has opened our eyes as to what it really takes to bring a product to market. Our initial idea is vastly different than what it ended up being. Our market research told us that the home automation market doesn't want or need the interface/system we initially thought of. We believe that one day our homes will have so many "smart" devices that a system that we imagined will be needed but the market is still a few years away. After our customer segment failed to validate our initial idea, we decided to see what

need there was and if we could create a product that met that need. This was a major pivot, that allowed us to focus on one aspect of the smart home, window coverings. We still have market research to perform. The Kickstarter will be a crucial step for validating our product. If we reach our goal of selling 200 units in our Kickstarter campaign then we will move forward in development and launch of our automatic blinds.

In addition to the market research, we have put our engineering educations to use in the creation of the prototype for this product. The CNC purchased with grant money was used as a circuit board prototyping machine. Microcontrollers were picked for the prototype based on the knowledge gained from an upper division electrical engineering class, and the website created to test the smart blinds was a direct result of many computer science classes' worth of programming. Overall, our engineering educations have improved as a result of this project, however, we also learned a lot more on the business and customer development side. The knowledge we gained about business development is something we don't expect to gain from our engineering classes. We are a group of engineers who didn't know much about the marketing side of creating a business, but we were afforded an opportunity to to learn as a result of this grant.