Baker/Koob Endowments
Academic Affairs

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Baker/Koob Final Report Template

Final reports will be published on the Cal Poly Digital Commons website(http://digitalcommons.calpoly.edu).

Title of Project: Air Wear—Portable Oxygen Aid Device

Project Completion Date: June 03, 2022

Student Names and Majors: Deepthi Ravuru (Electrical Engineering), Ani Svadjian (General Engineering), Ada Tadeo (Biomedical Engineering)

Faculty Advisor and Department: Jim Widmann, Engineering Interdisciplinary Senior Design

Cooperating Industry, Agency, Non-Profit, or University Organization(s): N/A

Executive Summary:
Since the outbreak of COVID-19 pandemic, hospitals have experienced an overwhelming increase in patients needing respiratory assistance. Our client identified the need for a sustainable, affordable, and portable outpatient device that will provide supplemental oxygen and assisted breathing to speed up the patient recovery process. Our team accomplished to design a device that contains a more sustainable oxygen supply method, has a longer functional duration, is safer and ergonomic, as well as compact.

Major Accomplishments:
Replaced the oxygen tank from the previous senior project group's protoytpe with a more sustainable and safer solution. Reverse engineered an existing oxygen concentrator available on the market to design a sustainable solution to producing oxygen without using an oxygen tank. Integrated components of that oxygen concentrator with the previous senior project's oxygen aid device prototype. Transferred the hardware from breadboard to PCB board and perf boards, so it's more reliable, safer, and discrete.

Expenditure of Funds:
The Baker Koob fund was used to purchase backpack materials for wearing our device, the hardware for our design, and a backup on-the-market oxygen concentrator that we reverse engineered. The following table shows the purchases made in detail:

Purchased Items	Cost/Unit	QTY	Total
Amazon Backpack	$21.44	1	$21.44
DigiKey Air Flow Sensor	$175.13	1	$175.13
Grainger O2 Analyzer	$281.52	1	$281.52
Amazon Mesh	$13.21	1	$13.21
totalElement Magnets	$15.99	1	$15.99
ORSupply Test Lung	$47.34	1	$47.34
Pololu Step Down Voltage Regulato	$26.76	2	$53.52
IC Station Humidifier	$8.73	2	$17.46
DigiKey Electronics		1	$65.42
AdaFruit Power Sensor	$12.82	2	$25.64
Mouser Electronics 12bit ADC	$10.06	1	$10.06
DigiKey Back Up Parts	$33.43	1	$33.43
Varon 5LPM Oxygen Concentrator	$549.00	1	$549.00
Total			$1,309.16

Impact on Student Learning: Personal reflection by student(s) detailing how the project impacted their learning and career aspirations.

Deepthi Ravuru: This project was a great learning experience because I learned how to reverse engineer a device and use the knowledge I learned to come up with our own design. As an EE major, I also learned how to use a raspberry pi, which controls our whole device. Moreover, I learned a lot about team work and communication since all of the team members are from different majors. Since the device was very firmware and hardware heavy, I got to step up to help my teammates understand how the code and circuitry worked.

Ani Svadjian: This project was a very insightful look at how the engineering design process works in professional circles. I strengthened a lot of professional practices that will serve my career no mater what I pursue: skills like integrating everyone's inputs, managing complex schedules, and communicating with a variety of audiences on a complicated topic. I also gained a lot of insight into what different types of engineers do; as a general engineering major, my curriculum was, as a professor of mine likes to say, "an inch deep and a mile wide," so it was awesome to learn what my teammates and other people we collaborated with focused on and continue to pursue. I also learned how to integrate physical circuits with microcontrollers and their specific pin-outs, which I had very little experience with before.

Ada Tadeo: This interdisciplinary project truly challenged me to work outside my comfort zone with people from different engineering backgrounds. The project scope itself was also outside of my area of expertise. As a biomedical engineering student I

have more knowledge on the human physiology, biomaterials, biomechanics, and medical device design. Since this project was heavily electrical and computers science based design, I learned a lot about building a circuit on a raspberry pi and coding the software to run this device.