

## **Economics:**

Our project budget consists of \$3000 for both semesters and the \$250 budget from UC. The total budget we have is \$3250 to spend on our project. On top of the financial budget, we are highly encouraged to try and stay underneath this budget as this project will be used by people in developing countries so keeping the materials affordable is a high priority. The \$3000 comes from the nonprofit that we are working with. We will have to pay for our expenses first and then be reimbursed at the end of each semester. We will have to research different components of our project and make sure we are getting the most benefit out of what we are purchasing. We will have to purchase a microcontroller, sensors, components for wireless communication and anything else that we might need to provide power to our system and as well as app development. Hopefully, when our project is completed, it can be used in different parts of the world and can be mass produced to be used at other vineyards. Ideally, this will help farmers of a vineyard monitor their crops and help them save money by informing them of when hazardous conditions are occurring in real time. The end goal of our project is to further contribute to economic development and increase the total yield of a harvest, allowing for greater food production.

## **Security:**

Within the vineyard, the information that will be retrieved from the sensors and analyzed in the application needs to be private to the owner and whoever they delegate access to. When we develop the application, we need to implement logins and verifications.

We also need to ensure that all data provided to the application is authenticated. We should prevent bad actors from hooking up new sensors and providing bogus data. In order to achieve this, we should develop a process for securely connecting new sensors.

## **Environmental:**

The concerns for environmental limitations to our project include the power requirements of the microcontroller, sensors, and system, physical limitations on where we can place certain equipment in the vineyard, how the weather impacts the system, and how the system affects the vineyard plants. These environmental limitations can be broken down into two categories: How the environment affects our microclimate monitoring system, and how our microclimate monitoring system affects the environment.

Discussing the first category of how the environment affects our system, it is important to look at the power requirements for the system components, the outdoor ratings for each system component, and the overall structure of how our system functions inside a vineyard. In our system, the panels and by extension microcontrollers and sensors will all be fed by power from a barn. Originally, it was designed to be fed by solar panels. While we have more freedom in choosing equipment, we also must keep in mind the eventual goal of the project is to return to solar power. While designing with these limitations in mind we must select sensors and microcontrollers with low power requirements that can be sustained on battery even when there may not be constant power from the solar panels. In addition, the sensors should be in DC power instead of AC. While keeping the power constraints in mind, we also

similarly use the same thinking for the other environmental limitations, to create a system that operates within the limitations.