



# Detection of Algae in Fish Tanks Using Optical Absorption

Group 1

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## Summary

With many people owning fish tanks nowadays the issue of trying to keep the water in them clear becomes an important issue. Water in fish tanks can become murky due to algae blooming in the fish tanks. Algae blooms can be caused by a multitude of things most of which have to do with the amount of nutrients in the water. These nutrients come in the form of photosynthesis, nitrites, and nitrates. Photosynthesis, nitrites, and nitrates can find their way into the fish tanks ecosystem from overfeeding the aquatic life in the tank, and they can also come from the aquatic life themselves, from having an over abundant amount of food the fish will produce more waste than if they had the appropriate amount of food. Algae blooms can also be caused by keeping the fish tank too close to external light sources light windows. And an algae bloom can also be an indicator that the lights on the fish tank need changing. This is because some types of algae like lower light than others. Our Device seeks to assist fish tank owners in knowing what is going on in their fish tank by telling them the amount of algae in their fish tank.

The fish tank assistant that we are creating will utilize the optical properties of Beer's Law to help fish tank owners know how much algae is in their fish tanks. The fish tank owners can then use this information that they get from our fish tank assistant to better determine, or make an educated decision on their own, if they need to change their feeding habits for their aquatic pets to live healthier lives. Or if they need to move the location of their fish tank to a darker area, or if they need to change the lights for their fish tanks. The fish tank assistant is also helpful for a fish tank owner to know when they need to clean their tank based on the concentration of algae in the tank. This document will illustrate how our team plans to do this. First discussing all the features of our product, then going through research that was done to look at similar products and then all that will be necessary for us to achieve our goal. Then going over some of our constraints and standards that pertain to the design of our Beer's law using fish tank assistant. Then finally the prototyping, constructing, and testing our device.

## **Device Description**

Fish Tank Assistant, it is an algae detection system designed for first time fish tank owners as well as those who struggle with keeping old tanks clean. Algae blooms are very harmful and can easily be found in warm nutrient rich environments. The system will detect algae using an optical system paired with a thermal camera and notify the owner that the tank needs to be cleaned.

A microcontroller will be used to power, read, and display the outputs of sensors through system integration. All components will be fastened to the housing via custom 3D printed casings and configured around a siphon that will continuously pull the water from the tank into the testing area. The user interface will consist of a physical display on the housing along with wireless internet connection.