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SAAPBR: Semi-Automated Algae Photo Bioreactor

The purpose of this project was to create a working, semi automated algae photobioreactor. This bioreactor would require little to no maintenance, and would produce algal bi-products, such as biomass and oil. The bioreactor would only require the user to refill water and save a small amount of algae to keep the process going.

The machine functions in a step by step process. The first step is growth, where algae can grow in the sunlight and have a healthy intake of CO₂, while always being agitated by a constant source of bubbles from below. The next step is the Transfer process. After the algae has grown over a certain period of time, a motor will activate and pull the top of the device down. This will cause algae to pour out into the containment chamber, where users will be able to save some of the algae for growing later batches. The algae will then slowly flow through a drip line into the final step, extraction. Many larger algal oil companies extract algae by constantly pumping micro CO₂ bubbles into the tank, along with an electromagnetic pulse, which causes the bubbles to burst and breaks the algal cells, releasing the oil content made in the growth process. This oil can then be harvested and refined to be used in modern cars and machines. A nebulizer is used to give specific doses of liquid medicine to humans via transfer to vapors, which are then inhaled by the patient. If algae was to be put in a nebulizer, surrounded by an electromagnetic field, the algae would be turned into a vapor and less stable than its liquid state, making it easier to extract the oil from the cell.