Designing an Autonomous Solar Powered Robot Capable of Filtering out Excess Phosphorus and Nitrogen from Waterways to Naturalize the Process of Eutrophication

Saidi, Abdullah (School: Al-Amal School)
Omer, Mohammed (School: Al-Amal School)

Designing an Autonomous Solar Powered Robot Capable of Filtering out Excess Phosphorus and Nitrogen from Waterways to Naturalize the Process of Eutrophication Mohammed Omer, Abdullah Saidi Al-Amal School, Fridley, Minnesota, USA Purpose: Eutrophication is a detrimental process to our water environments in which the dissolved oxygen of a waterway is used up by algae and bacteria leaving all the other organisms to die. This process is caused by excess nutrients which stimulate excess growth of algae. Procedure: To filter the nutrients, we have created an autonomous boat with pumps which pass the water through nutrient filters. The water filters are controlled by a sensor which detects high nutrient levels and activates the pumps. The boat is powered by solar panels, therefore limiting the need for human interference. For testing, we filled a bathtub with nutrient rich water and placed the boat in the bathtub. The boat filters were left on and phosphate concentration measurements were taken every 5 minutes for an hour. Results: Our boat was able to filter out about 1.2 ppm of Phosphates in the one hour time slot. We also found that the filters last for about 50 minutes each. Conclusion: We conclude that our boat meets the requirements of our engineering goal. We plan on continuing the project by putting it through excessive testing in both controlled and noncontrolled environments. We also plan to add a data logger to the boat to store the sensor data to measure increase or decrease in excess nutrient levels.

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