AMPS

Automatically Maintained Pool System

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Problem

The average American pool owner spends 100 hours each summer in the process of pool maintenance, whether that be removing debris or balancing its chemical properties. While automated solutions to remove debris from residential pools have been produced, there are yet to be cost-effective solutions for pool owners to maintain their pool chemical properties through automation. In addition, lack of proper chemical maintenance can result in health hazards for the user; chemical deficits cause algae to build up while surfeits lead to optical and dermal irritation. Chemical imbalances have environmental impacts as improper pool care results in chemical and water waste.

Solution

Project AMPS (Automatically Maintained Pool System) tackled the issue of pool maintenance through an automated solution of the chemical balancing process. A proof-of-concept prototype was assembled, sensing chemical properties and dispensing an appropriate amount of chemicals to reach a safe equilibrium in pools.

Objectives

AMPS is designed to minimize the amount of time it takes to maintain the water health of swimming pools. This process will also attempt to eliminate the chemical waste due to human error in how pool maintenance is currently done. In addition, it will be easy to install by a professional or a customer because it will retrofit into existing swimming pool systems. Finally, it has external chemical containers to make chemical refilling easily accessible to users, as they will be placed in the pool's control room. By fulfilling these objectives, the product will be able to be implemented into all residential, in-ground pool systems.

Process Diagrams

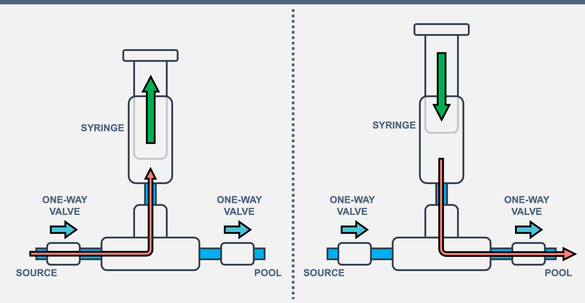

Figure 1: Dispensing process diagram.

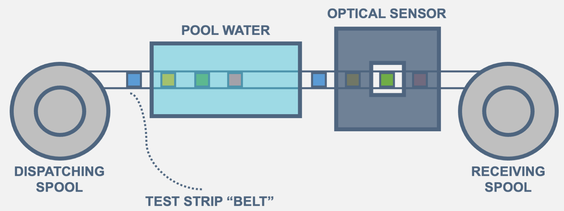

Figure 2: Sensing process diagram.

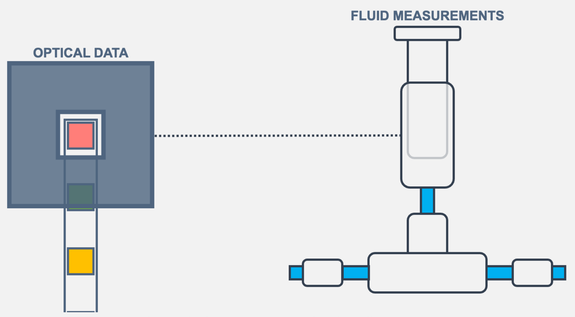

Figure 3: System communication diagram.

The Product

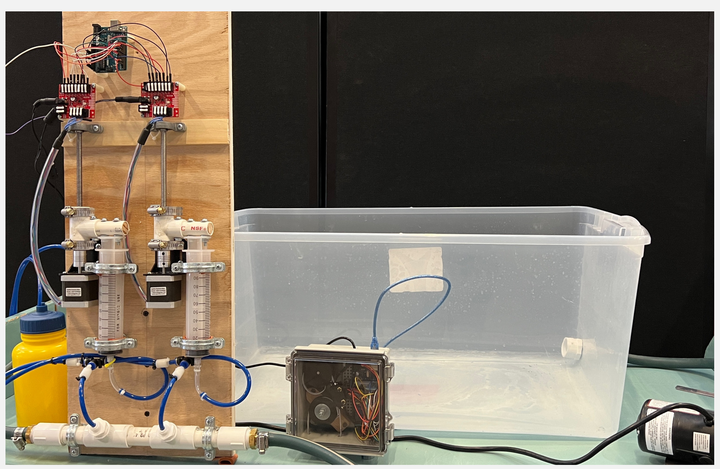

Figure 4: The final build of the dispensing unit (left), the sensor box (center) and display pool (right).

Team Members

Figure 5: Team 16, from right to left: Rohan Mall, Meron Kebede, Josiah Balona, Samuel Ydenberg.

Design Process

The project was inspired by the mechanism of a standard VHS cassette tape: the double reel mechanism was the basis of the design for the sensor system. Pool chemical test strips were to be placed along a "belt" which a color sensor would then sense to determine the chemical pool properties. Combined with a syringe system utilizing one-way valves, Team 16 produced a proof-of-concept of an automated pool maintenance system featuring a test pool setup with working water circulation along with chemical dispensing and sensing systems. These systems were established from a process of continual 3D modeling design, rigorous prototyping and software testing to ensure system would work together. This is AMPS, and with more resources put into further development, getting this proof-of-concept to a fully working product would allow it to be implemented in any pool system.

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