Abstract

Launched as a development of the rudimentary SeaPerch 1, the MIT-developed SeaPerch 2 utilizes an onboard microcontroller and various sensor modules, allowing high school students to design and experiment with underwater ROVs. However, SeaPerch has one major limitation: it utilizes a tether to send and receive information. Our work mitigates the need for a tether through a light-based communication system. This system was developed at MIT's Seagrant lab and utilizes cheap and off-the-shelf components to keep our system accessible for high schools. After choosing an adequate LED and sensor module, a modular waterproof enclosure was developed to house these components. Initially, numerous light sensor types, such as photoresistors, phototransistors, and photodiodes, were tested along with various LED types for maximum range and accuracy. A base seaperch 2 frame was then designed and built from the ground up to accommodate our waterproof sensor modules, followed by experimental code for both light following and data transmission. While the long-range viability of this system remains untested, short-range tests have yielded positive results that surpass the ability of standard radio transmission. Using a Morse-code-based system, we were able to send commands wirelessly from the walls of our test tank to SeaPerch 2. Additionally, using a quad-sensor array, a feedback loop-based light following code was successfully executed. However, work still needs to be done to improve the range and power of our system as well as its viability in more unpredictable environments such as the ocean.