The Development of a Low-Cost Open-Source Underwater Remotely Operated Vehicle for Coral Mapping

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Oceans cover more than seventy percent of all the Earth's surface. Inside them, one of the organisms that have one of the greatest social-economic importance and that we have the least data about are the corals. The purpose of this project was to manufacture an underwater remotely operated vehicle (ROV) capable of capturing photos and sensor data referring to these marine populations while reducing its final cost. Fused deposit material (FDM) 3D printing and laser cutting were combined with low-cost readily available materials such as polyvinyl chloride (PVC) in order to create a cheap platform that was able to operate underwater. Arduino nano boards were used in conjunction with printed circuit boards (PCB) in order to develop a custom control system. A wired communication system based on the RS485 protocol was also used to transmit data between the platform and the controller. After underwater operation for periods longer than four hours, the vehicle demonstrated no signs of water infiltration and was able to move in all of the proposed directions. The communication system and the custom-made controller board and circuitry showed no noticeable delay and were able to withstand all the testing procedures. The project demonstrated that it is possible to build a low-cost underwater ROV based on affordable materials that can operate and collect data on an underwater environment. Further testing will be able to prove its efficiency for coral mapping in a real-world scenario.

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