Rapid Flood Emergency Response Underwater Vehicle

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The emergence of tropical cyclone flooding has been more frequent and destructive than ever, with an annual death toll reaching more than 10,000. In response to the high casualty rate, coupled with the inefficiency of the current labor-intensive, reach-limited search and rescue (SAR) operation, a more effective solution is therefore needed: an underwater vehicle designed primarily to facilitate underwater SAR operation. This vehicle combines the mechanical features of a Remotely Operated Vehicle (ROV) and an Autonomous Underwater Vehicle (AUV) which has a specially designed detachable tether for two main tasks. Before the SAR team arrives at the flooded area, the vehicle can conduct the underwater SAR for casualties using the wired mode. Once the SAR team arrives, the vehicle's wireless mode can be switched on and follow the diver during the operation. A variety of tools including additional oxygen bottles, inflatable wrist bands, and first aid tools are attached to an interchangeable tool plate for fast-changing purposes. 5 cameras are mounted around the vehicle providing a 360-degree vision and the YOLO real-time object detection system is adopted in order to detect and distinguish humans from non-human objects. In addition, this detection system can track and follow the rescuer for assistance and shorten the time of rescuing. With the obtainment of real-time underwater images, recognized object data, and the interchangeable tool plate, our vehicle can rapidly respond to SAR operations. It is hoped that our vehicle can assist the rescuers and speed up the SAR process during a flood.

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