

Integration of Image Processing with Underwater Rover to Monitor Coral Growth

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This research outlines the integration of image processing with an Aquabot, underwater rover to monitor the growth of corals. The designed system is composed of an underwater vehicle, a floating station for communication, and a coral monitoring unit. This monitoring unit is capable of classifying the coral type and also to identify available diseases on the coral. Communication occurs through a combination of wired and cloud methods. The coral disease detection unit was evaluated based on a data set of 121 images containing 489 instances of coral disease and the coral varieties detection model was evaluated based on a dataset of 124 images containing 492 instances of coral varieties. These images were taken from coral reefs and coral nurseries around Sri Lanka. In both cases the models identified the diseases and varieties correctly with overall confidence levels of 33.1% and 59.6% respectively. The two models achieved box precision of 0.346 and 0.679, the box recalls of 0.331 and 0.558, the mean average precision (mAP50) of 0.295 and 0.596 and the mean average precision at IoU thresholds of 0.5 to 0.95 (mAP50-95) of 0.188 and 0.425 respectively. The results of the evaluations show that both models are effective for their respective tasks. This study introduces a combination of AquaBot and an image processing system, which is capable of real time monitoring and identification of corals and their diseases.

Keywords: *underwater rover, coral growth monitoring, image processing, coral diseases detection, coral varieties detection*