# AI-based channel infused coral identification and tracking algorithm for autonomous underwater vehicles

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**Autonomous underwater vehicles (AUVs) equipped with *in-situ* artificial intelligence (AI)-enabled image processing capability could help understand the influence of climate change on reef ecology, and evolve well-informed policy decisions for sustaining coral reefs. The recent focus is on developing technologies to collect images of coral reefs autonomously over larger areas using AUVs with AI-aided image processing capabilities. This article presents the development of a computer vision and deep-learning-based coral identification and tracking algorithm trained on six distinct families of coral images acquired from the Andaman Islands using a remotely operated vehicle PROVe500 developed by the National Institute of Ocean Technology, Chennai. The YOLOv8-trained coral detection and classification model, along with the ByteTrack, have been used to identify and track the corals with mean average precision and recall rates of 97.4% and 96.8% respectively. The developed AI algorithm gives confidence in deploying AUVs to identify and track corals of interest or anomalies in real-time over a large spatial domain.**

**Keywords:** Artificial intelligence, autonomous underwater vehicle, coral, detection, tracking.

Considering its strategic importance and conservation needs, coral reefs form an important agenda in Agenda 2030 of the United Nations General Assembly (SDG14) and other international and regional agreements[2]. The Global Coral Reef Monitoring Network (GCRMN)[3], an operational network of the International Coral Reef Initiative (ICRI)[4], aims to provide the best available scientific information on the status and trends of coral reef ecosystems for their conservation and management.

The proposed key contributions of this study are as follows:

(1) Integration of efficient new age algorithms like YOLOv8 and ByteTrack to underwater vehicles for monitoring and tracking corals.
(2) Development of a user-friendly interface to facilitate effective observation of corals.
(3) The trained model has been developed using real-time data in oceanic conditions, which would be effective in monitoring and tracking corals precisely.
(4) For automatic monitoring of corals, which allows for continuous tracking of the given coral.