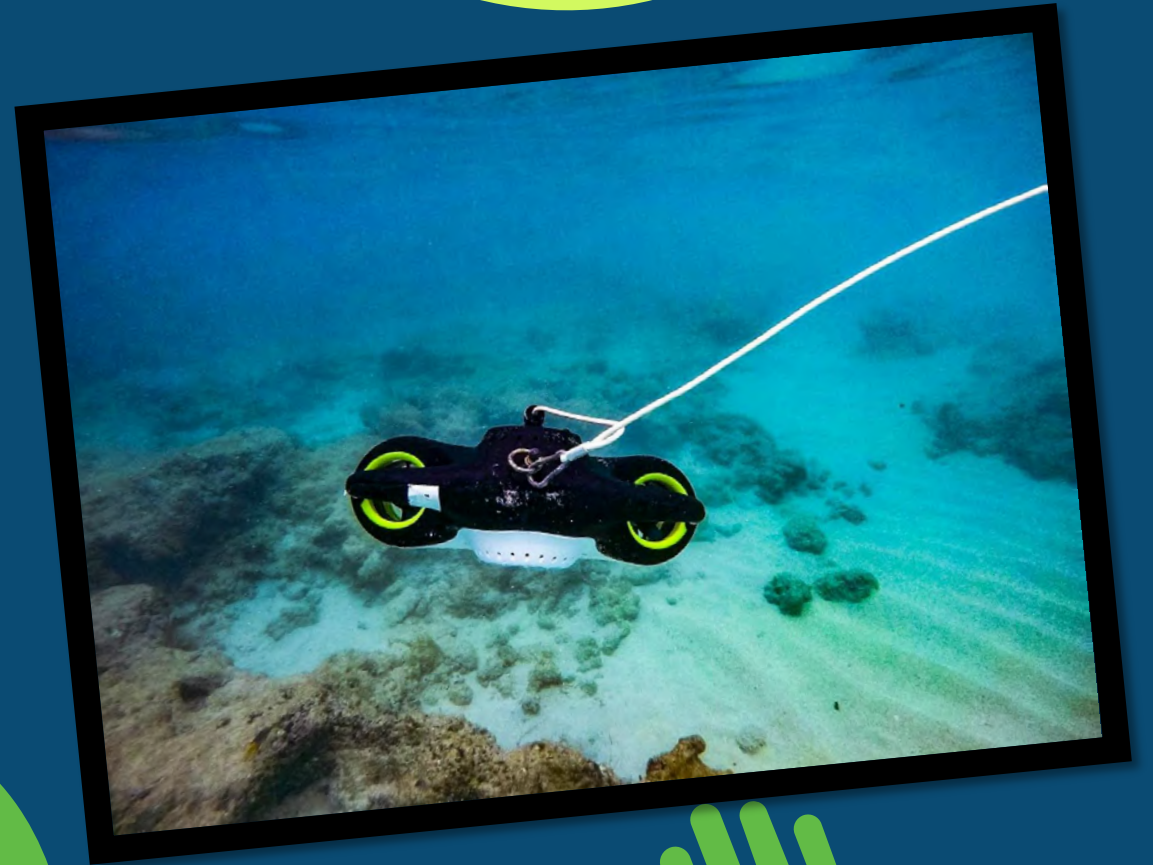




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# Building a sustainable, AI-enabled marine tourism prototype

The UNDP Accelerator Lab for Barbados and the Eastern Caribbean



Co-building the Accelerator Labs as a joint venture with:

Action Partner:



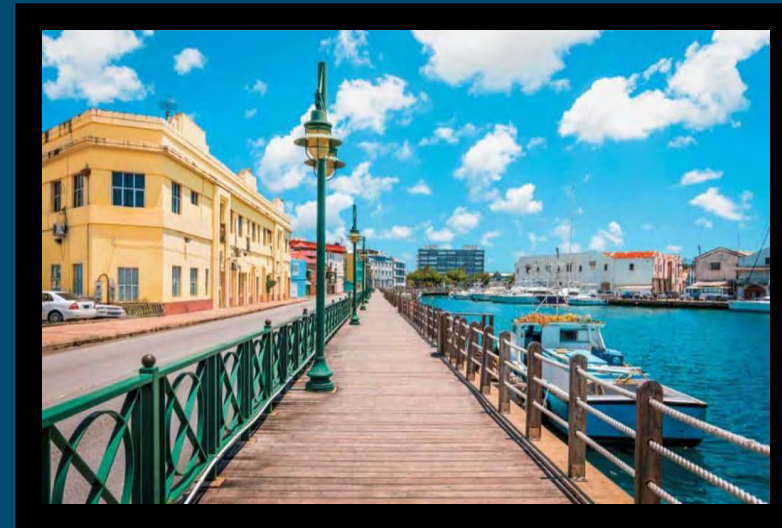
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## A stylized graphic featuring a green hand reaching out from the left, with fingers slightly curled. To the right of the hand is a large, thick green circular shape, resembling a ring or a partial circle, set against a dark blue background.

In 2024, Barbados had 704,340 stay-over visitors, a 10.6% increase compared to previous years  
(Source: Barbados Ministry of Tourism & International Transport)

UNDP Accelerator Labs







# Why Create a Virtual Marine Tourism Product?

1. Expanding Marine Tourism Access
2. Improving Capacity Management
3. Providing Non-Invasive Diving Experiences
4. Blue Economy Diversification
5. Collecting Baseline Marine Data

## Why AI?

1. Efficiency and effectiveness
2. Accuracy increases as the model grows

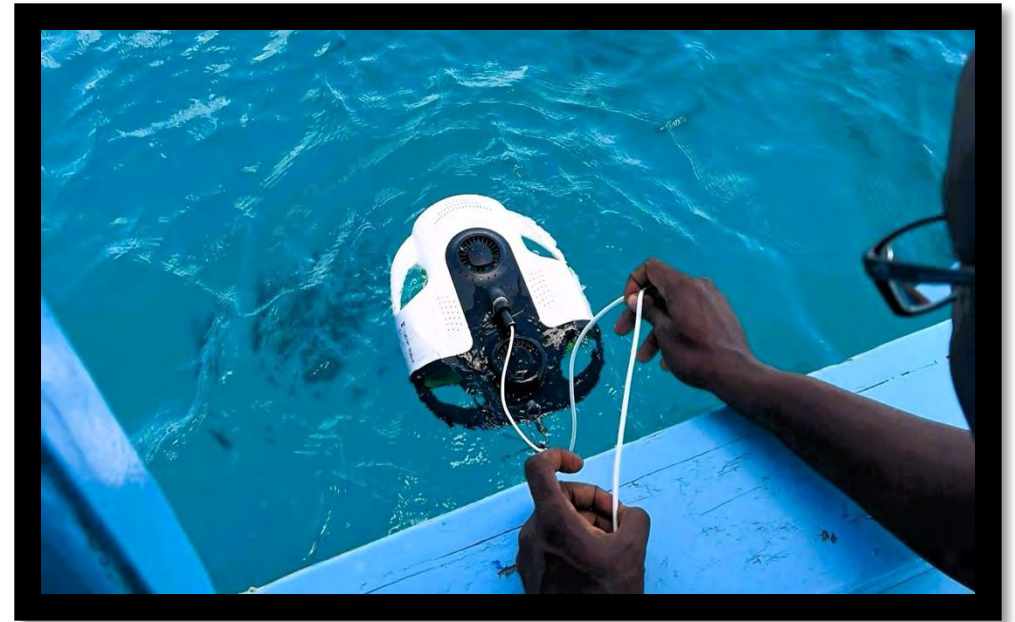


# The Solution

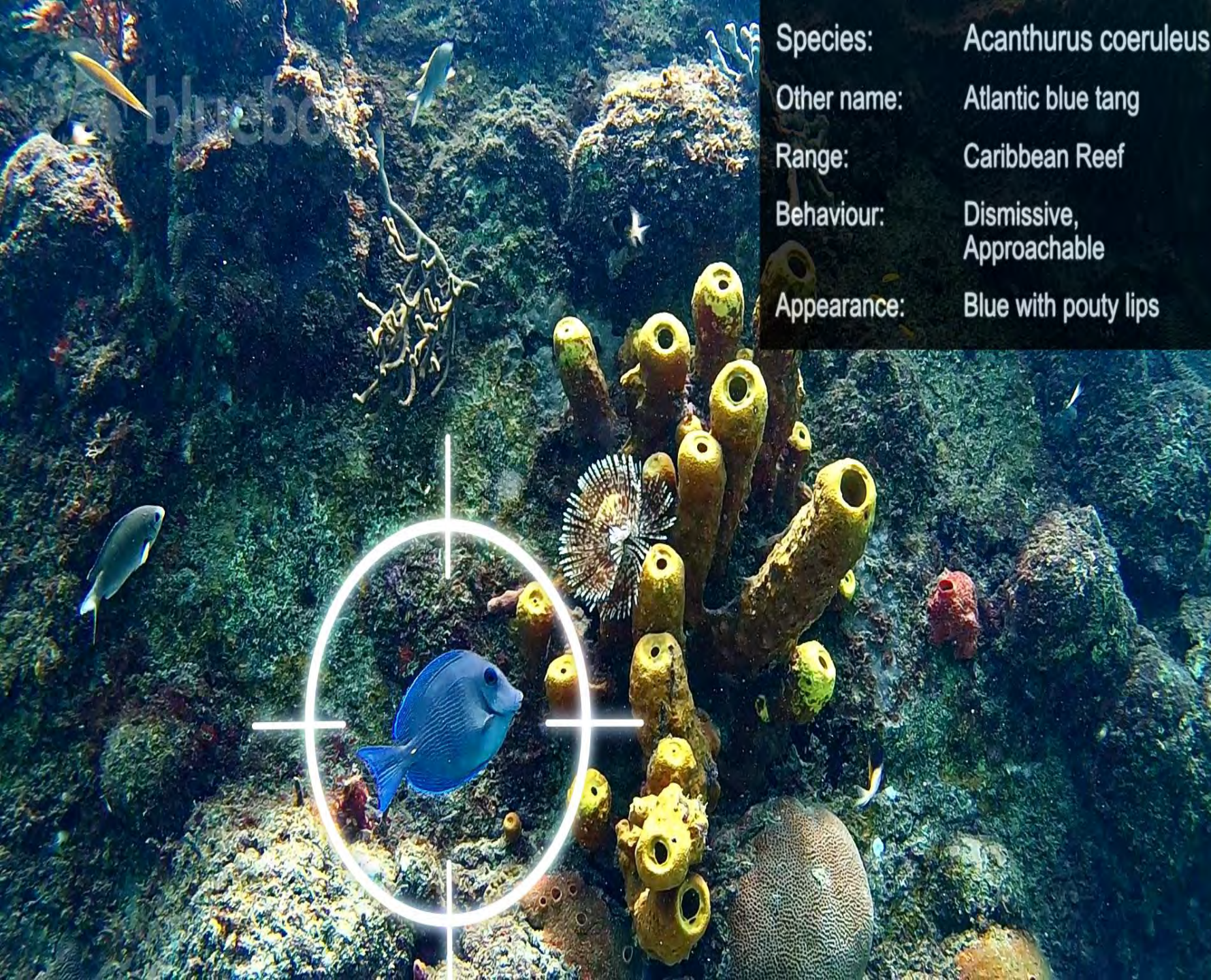
**A sustainable, virtual and accessible marine tourism prototype product**

HOW?

- Leveraging Blue Bot – an underwater robotics system that gathers data on marine species
- In partnership with UNDP, Blue Bot has developed a database of 93 coral reef video samples from the shores of Barbados
- Using AI, coral reef fish species can be categorized and labeled within the 93 videos, resulting in the creation of an educational virtual tourism experience







Species: Acanthurus coeruleus  
Other name: Atlantic blue tang  
Range: Caribbean Reef  
Behaviour: Dismissive, Approachable  
Appearance: Blue with pouty lips

## Technology Used

With support from the Japan SDGs Challenge, tech was applied by:

- Developing a marine training dataset with three (3) fish species labelled using A.I. tools such as Label Studio, Roboflow and YOLO
- Creating a computer vision model for coral reef species identification using the marine training dataset developed
- Forming marine data visualizations based on the computer vision model



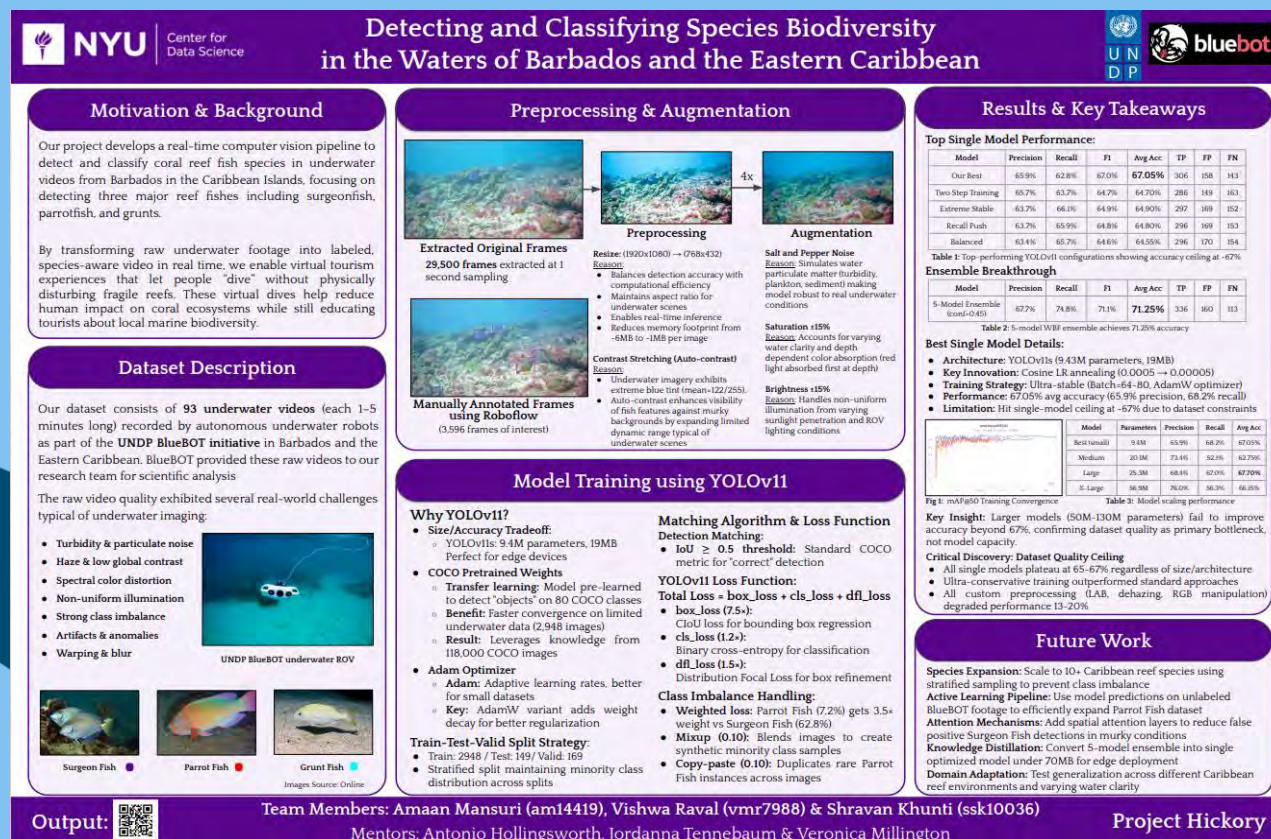


私たちが実現しようとしているのは、



# Results of Prototype Development

In collaboration with UNDP, the NYU Center for Data Science, and Blue Bot Inc. with support from the 2025 Japan SDGs Challenge





# What We Learned: AI-Enabled Marine Tourism Prototype

## Difficulties presented by underwater footage

Low contrast, haze, glare and motion blur make bounding box labelling very challenging.

## Species differentiation

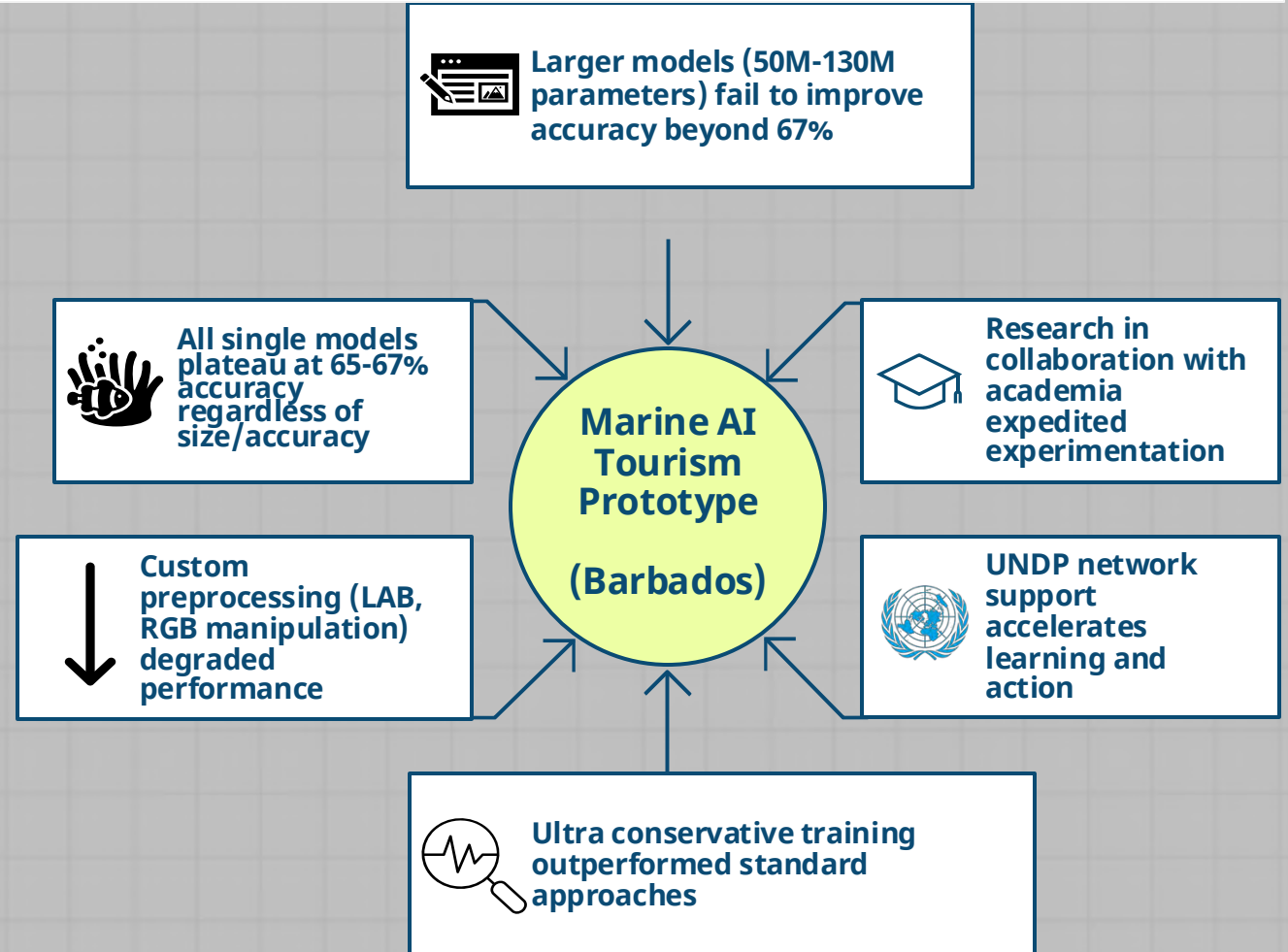
Species differentiation markers (i.e.: colors/patterns) are obscured underwater. As such, how images are preprocessed impacts how the model tells species apart.

## The Power of AI Automation

AI can transform raw underwater videos into structured datasets by automating the identification of fish and species/characteristics (i.e.: Fish vs. No-Fish classifier).

## The Significance of Customization

Generic pretrained models or internet images transfer poorly in underwater settings, therefore custom labelling of Barbados footage was required to obtain meaningful performance (60%+ precision).



## The Bigger Picture



**Due to cost, ability and access, marine tourism and exploration is restricted.**

**By creating a virtual model of coral reef exploration, the underwater world opens to new audiences locally and globally, all while taking human pressure off marine ecosystems.**



# Beyond the Horizon: Opportunities for Scaling

## Species expansion

- Scale to 10+ Caribbean reef species using stratified sampling to prevent class imbalance

## Domain Adaptation

- Test generalization across different Caribbean/non-Caribbean reef environments of varying water clarity

## Commercialization

- Commercial scaling of prototype into tourism business offering
- Enhancement of virtual user experience
- Partnership expansion - i.e.: hotels, tourism boards



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# Thank You! Let's Connect

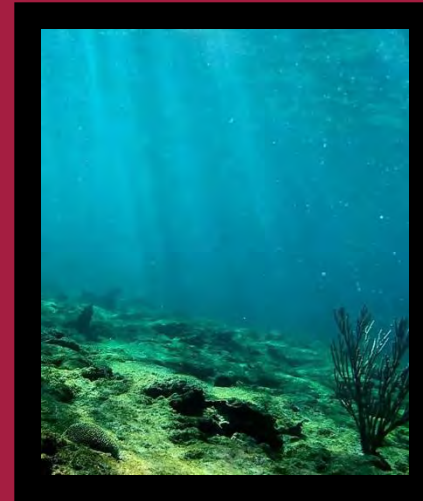
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[www.undp.org/barbados](http://www.undp.org/barbados)

**Blue Bot Inc.:**

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