GAIA CAM

An affordable, low-processing method to detect plastics in rivers

An innovative solution to tackle ocean plastic pollution at its root

*A pioneering project to address a global enviornmental challenge*

Problem

According to the World Economic Forum studies, every year more than 8 million tons of plastic wastes end up in the ocean. Plastics leak toxic chemical components that endanger aquatic life, and even human health.

Most of the plastic waste enters the ocean from rivers. It is estimated that just 10 river systems contribute 90% of ocean plastic. Currently, very few studies have been done on plastic waste in rivers, and there is a huge lack of data to inform and evaluate policies and solutions.

Edge Camera Device overlooking rivers

Machine Learning model counts plastic objects
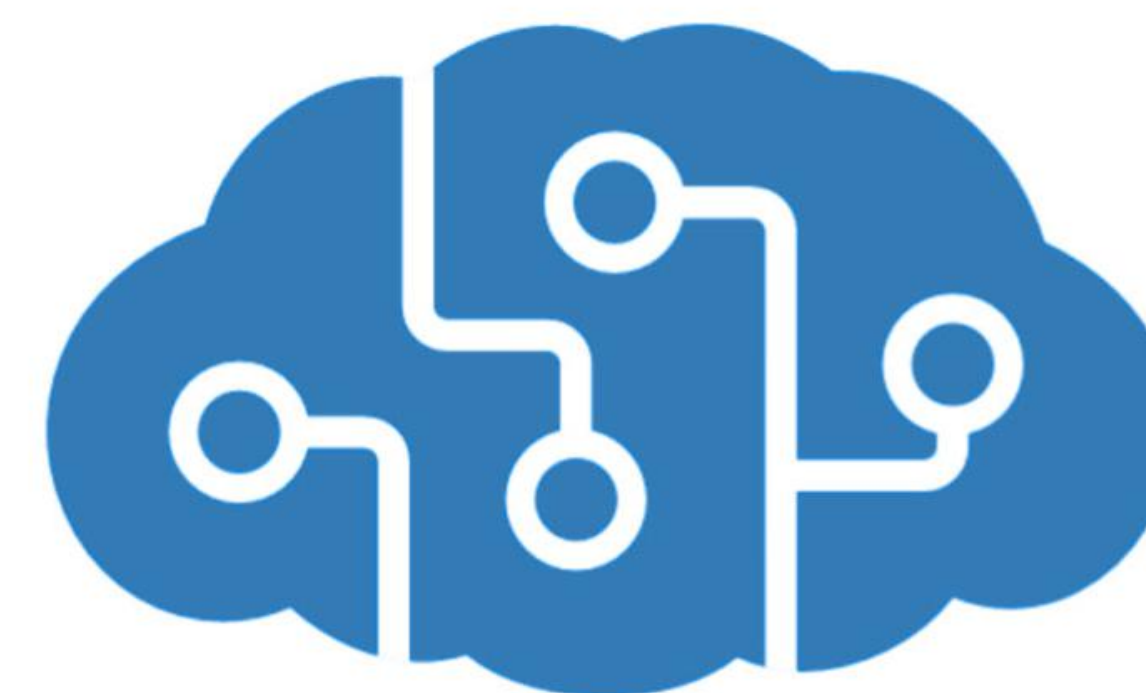
Send **Data** to the cloud continually

Microsoft Azure

Solution

The project is an integrated system of IoT devices that use computer vision devices to collect data on plastic waste in rivers. By deploying multiple devices along rivers, the team expects to build a map of plastic flow along rivers and eventually locate pollution sources based on data analysis.

This project is open source in order to encourage anyone to participate and refine the project. The project provides a tool for environmentalists to locate plastic waste sources, an opportunity for students to practice hardware and machine learning techniques, and a gateway for anyone to make a difference.

Design

Software:
• Hybrid machine learning model using motion detection, object tracking and color detection;
• SQL database using Logic App and Twilio

Hardware:
Raspberry Pi; Camera Module; LTE Module (SIM 7000)

Camera

Video Input

Power Supply

Results

Get GPS Coordinates

LTE

Power Bank

RPI 4 w/ Model

LTE Module SIM 7000

Device — SMS Send Results → twilio

HTTP POST → Azure Logic Apps

Update Database

SQL

Results

Query Information

Request Information

Get Results

User

Device Update Database
User Request Information

GLOBAL INNOVATION EXCHANGE

Microsoft

Cici Dai, MSTI, December 2019
Geoffrey Waterhouse, GIX Dual Degree, July 2020
Peiling Li, MSTI, December 2019
Thomas Wang, GIX Dual Degree, July 2020

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