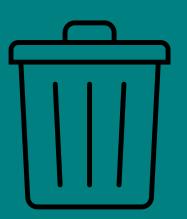
BEng (Honours) Software & Electronic Engineering



SmartCycle

By Ciara Crowe



This was the output score from edge impulse. It

Compost being accurately identified at 89.5% and

COMPOST

0.0%

89.5%

0.82

RECYCLING

0.0%

0%

75%

0.69

received an overall F1 score of 72.4%, with

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Atlantic Technological University

Introduction:

SmartCycle is a smart waste management system which uses computer vision to detect waste objects. It sorts them into two classes, Recycling or Compost. Using servo motors, the bin is opened based on what class is detected. To ensure my bin is user friendly, I have added an infrared sensor which lets the user know if the bin is full. While the addition of my DHT11 temperature and humidity sensor ensure that optimal composting conditions are taking place. All data is containerised via Docker, saved in my TinyDB database and displayed in a web page. This presents the real time data on the waste collected and the compost readings.

Hardware:

- Raspberry Pi Microcontroller
- DHT11 Temperature and humidity sensor for composting.
- Infrared Senor Checks if bin is full.

Software:

- Edge Impulse Generates my machine learning model.
- Python Controls servo motors, sensor and processes data.
- TinyDB NoSQL database which stores data in JSON.
- HTML and CSS: Structuring and designing the webpage.

Diagram:



Edge

downloads

data on the Pi.



data.



Infrared Sensor checks if bin is full.

DHT11

sensor

checks

temperature

and humidity

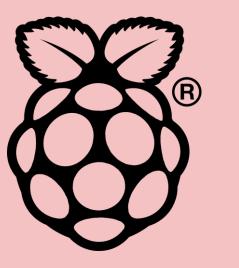
for compost.

Raspberry Pi

captures live

camera

feed.



Python Language

Processes Edge impulse

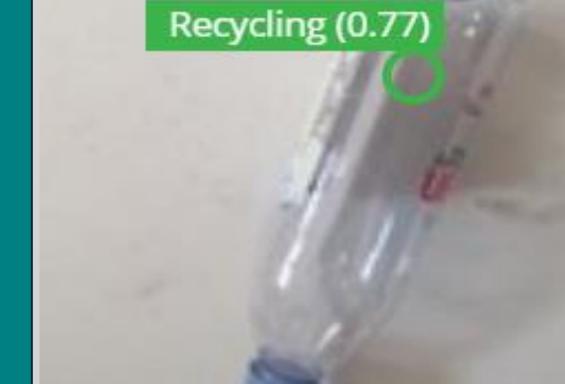


in webpage for using using HTML and page.

Servo Motors for opening and closing bins based on output.







Results:

Recycling at 75%.

F1 SCORE ②

Confusion matrix (validation set)

72.4%

BACKGROUND

COMPOST

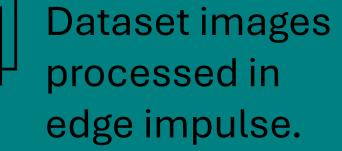
RECYCLING

F1 SCORE

Compost (0.95)

Recycling = 0.77

Compost = 0.95



database

Inputted data from edge and

sensor is sent to database, using Flask to

Data is displayed user to see. I am CSS to style the

the DHT11

handle the

These are the live images which show the accuracy classification labels.

BACKGROUND

100.0%

10.5%

25%

1.00