

Workshop on TinyML for Sustainable Development

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<https://indico.ictp.it/event/10499/>



SDG#2



Plant diseases

Food security is endangered by the spread of plant diseases that reduce productivity. The early detection of plant diseases can help raise awareness and incentivise farmers to seek professional help and mitigate the potential damage.

In this project, you can build a TinyML model to identify plant diseases based on images of leaves and provide technological support for small farmers in isolated areas.

Datasets

1. <https://www.kaggle.com/datasets/nirmalsankalana/crop-pest-and-disease-detection>
2. <https://www.kaggle.com/datasets/rashikrahmanpritom/plant-disease-recognition-dataset>
3. <https://www.kaggle.com/datasets/hsmcaju/d-kap>
4. <https://www.kaggle.com/datasets/sadmansakibmahi/plant-disease-expert>
5. <https://www.kaggle.com/datasets/nirmalsankalana/plant-diseases-training-dataset>

References

1. [Coffee disease classification at the edge using deep learning](#)



Mosquito breeding grounds

Mosquito-borne diseases affect hundreds of millions of people worldwide every year, leading to many deaths and diseases. In urban environments, most of the mosquito breeding grounds (MBG) are due to human intervention: pots, tires, barrels, bottles and any puddle of stagnant water.

In this project, you can build a TinyML-powered system to spot and tag MBG locations using computer vision tools on drone aerial images. This information is useful when coordinating the health services response.

Datasets

1. <https://www.kaggle.com/datasets/pradeepisawasan/aedes-mosquitos/data>
2. https://map.openaerialmap.org/#/33.48976135253906,-13.050716828775348,13/user/5f1fe6f357ddda00054a0647?_k=7zoqnd
3. <https://universe.roboflow.com/research-j46h3/mosquitoes-bhavs>
4. <https://ieee-dataport.org/open-access/stagnant-water>

References

1. [Implementation of a deep learning model for automated classification of Aedes aegypti \(Linnaeus\) and Aedes albopictus \(Skuse\) in real time](#)
2. [The application of drones for mosquito larval habitat identification in rural environments: a practical approach for malaria control?](#)
3. [Automatic detection of Aedes aegypti breeding grounds based on deep networks with spatio-temporal consistency](#)
4. [Autonomous Detection of Mosquito-Breeding Habitats Using an Unmanned Aerial Vehicle](#)



Mosquito detection by sound

The direct monitoring of mosquito populations in field settings is a crucial input for shaping appropriate and timely control measures for mosquito-borne diseases.

The proposed project is low-power, low-cost and can run without human intervention in resource-constrained areas.

Datasets

1. <https://zenodo.org/records/4904800>
2. <https://elifesciences.org/articles/27854>

References

1. [A low-cost TinyML model for Mosquito Detection in Resource-Constrained Environments](#)
2. [Classifying mosquito wingbeat sound using TinyML](#)



Traffic jams

In major urban areas, traffic jams have a negative impact on the access to the workplace and cause loss of job opportunities. Mental health is also affected by the long hours spent daily in traffic during commute. The ubiquity of traffic cameras at highways and intersections present an interesting data source that enables several monitoring activities.

In this project, you can build a TinyML model to detect and quantify traffic jams to help drivers avoid hotspots and reduce their time in transit.

Datasets

1. <https://www.kaggle.com/datasets/aryashah2k/highway-traffic-videos-dataset>
2. <https://www.kaggle.com/datasets/hasibullahaman/objectdetectiondatasetcar>
3. <https://www.kaggle.com/datasets/imtkaggleteam/city-intersection-computer-vision>

References

1. [Adaptive Traffic Control With TinyML](#)
2. [A TinyML Soft-Sensor Approach for Low-Cost Detection and Monitoring of Vehicular Emissions](#)



Acoustic rain gauges

Landslide and flooding events are a frequent source of property and human loss in Latin American cities. The damage is usually greater in poorer neighbourhoods, with slanted hills and insufficient flood management systems. Access to early warning systems can help save lives and trigger a pre-emptive evacuation from endangered areas.

In this project, you can build a low-cost acoustic rain gauge to collect and process rain volume time series data that can be used to inform an early warning system.

Datasets

1. <https://aurora.portal.csem.ch/index.html>

References

1. [An Innovative Acoustic Rain Gauge Based on Convolutional Neural Networks](#)
2. [Rainfall monitoring using acoustic sensors](#)