Contribution ID: **159** Type: **Oral Presentation**

Evaluating Object Detection Neural Networks for Landmine Detection: Training and Performance Analysis with Synthetic and Real-World Data

Wednesday 11 February 2026 14:45 (15 minutes)

Reliable UXO detection remains one of the most persistent sensing challenges due to the diversity of threats and the variability of real-world environments. This study explores the use of synthetic data to train object detection models for landmine detection. The YOLOV8n model trained on n=1000 real images achieved a mAP@50 of 0.983, a precision of 0.966 and a recall of 0.961. The best synthetic model, starting from YOLOv8n, used n=10,000 images with a 90:10 UE:CPL split, yielding a mAP@50 score of 0.936, a precision of 0.912, and a recall of 0.880. These findings indicate that comparable model performance can be achieved with entirely synthetic data, with a greatly reduced lead time due to automated data generation and bounding box labelling. Varying setup conditions for CPL models also found that matching the pixel size in training images to that of the final data yielded the most robust models. These experiments further demonstrated that earlier CPL research, showing that patch-level realism alone was sufficient in low-noise environments, remains valid even when extended to more cluttered and stochastic background conditions.

Authors: Mr YORK, Jude (University of Bristol); Mr PEREIRA, Seb (University of Bristol)

Co-authors: Dr KIND, Charles (University of Bristol); Dr MEGSON-SMITH, David (University of Bristol); Prof. SCOTT, Tom (University of Bristol)

Presenter: Mr PEREIRA, Seb (University of Bristol)

Session Classification: Session 3