

# RoboCRM

*Advanced Robotics to capture Critical Raw Materials in WEEE recycling for a Circular Economy*

## Read About: RoboCRM

- **With an ever-increasing population and limited resources, we need to cease discarding our products and materials when they reach End-of-Life (EOL) and instead close the loop by re-using them as raw materials.**
- **Batteries are one of the richest sources of CRMs for WEEE recycling plants. However, more and more appliances nowadays already contain some form of integrated battery or power pack which the user cannot easily remove or replace.**
- **RoboCRM uses technologies like computer vision and machine learning in conjunction with pattern recognition and artificial intelligence to identify and sort batteries and electronics containing batteries from the main WEEE stream.**

## Background

The Electrical and Electronic Equipment (EEE) recycling industry is currently facing a number of challenges, foremost among these being to close the loop on the circular economy in EEE recycling and re-use. At present, many of the resources, metals and materials present in these appliances when they become WEEE/e-waste at their End-of-Life (EOL) are economy model.

CRMs are those raw materials which the European economy deems to be economically and strategically important for its continued success and development, but their supply has an associated high-risk due to location, scarcity, or other geo-political factors. Such CRMs are crucial to the Irish and European economy and manufacturing sectors.

The system being developed is a combination of existing technology that the partners have experience with. Housing some of the most advanced research facilities in Ireland, the project partners utilized their extensive knowledge in

The RoboCRM Innovation Demonstration Project has been delivered in collaboration by:



areas such as Artificial Intelligence (AI) and Machine Learning (ML) for battery and object recognition. Combining these experiences, the project partners have developed the system to help close this loop on the circular economy in WEEE & battery recycling in Ireland.

## Circular Demo Pilot

The main objective of this project is to construct, test and train an inline machine to identify, sort and remove WEEE containing batteries (the RoboCRM system). The proposed system is based on a proven design and concept, using advanced computer vision detection techniques in conjunction with AI systems and deep learning models in order to realise a novel application to the WEEE processing environment.



The project is being led and overseen by FPD Recycling. Robotics Drive Systems (RDS) and University of Limerick (UL) are project partners, working together and responsible for acquiring/procuring the equipment and software tools necessary to then construct/build/implement the proposed system. Closing the circular economy loop on material/resource recovery during the WEEE recycling process has enormous benefits as it reduces the amount of

waste being sent to land-fills and helps conserve natural resources such as the virgin CRMs, metals and minerals recovered from WEEE and batteries.

## Impact

The recycling of WEEE is a major global environmental issue that needs addressing. Using systems like RoboCRM, a highly-skilled workforce will be required to operate machines and systems, pioneer advances and spearhead the move towards a circular economy in the industry. This sustainable, fit-for-the-future workforce and business model will ensure long-term viability for local economies. It is estimated that the completed system, when commercialised, can lead to significant numbers of jobs being created at the regional level in Ireland. Direct environmental impact reduction - estimated waste reduction and related annual Greenhouse Gas Emission reduction as a result of this demo project.

## Key Lessons Learnt

This system will make recycling more efficient and profitable, therefore helping to expand collection rates for WEEE, leading to reduced dumping of WEEE and the resultant environmental impacts (e.g. pollution). The project is closely aligned with Circular Economy Strategies and Ireland's National Strategic Outcomes (NSOs) as expressed in Project 2040. By recycling more batteries and powered WEEE, the project will enable greater re-use of CRMs and materials from WEEE and the adoption of a Circular Procurement process. The problematic nature of collecting batteries for Recyclers present a fire hazard to recycling facilities and this

process will minimise this through early identification and segregation.