



Robotic Waste Sorter for Industrial Environments

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ABSTRACT

Urban waste management is a most challenging issue for modern societies. Reducing pollution and saving environmental resources provides significant opportunities for local, national and international economic growth. The present work aims at developing and integrating an autonomous robotic system for categorizing and separating recyclable materials. The development of an automated procedure for recyclable waste separation will significantly contribute in increasing the (currently low) recycling rates in Greece, for the benefit the local societies and the economic enhancement of recycling activities across the country.

The “ANASA” Robotic Waste Separator (RWS) has significant advantages over the existing ordinary recycling systems which are summarized in the following list:

- high reliability in object recognition (material detection),
- short separation cycle (high speed),
- significantly low installation volume,
- low cost and ease of application to both old and new recycling industries.

The combination of the above features makes RWS a vital and directly applicable tool for the Greek industrial recycling units.

The development of the Robotic Waste Separator assumes the identification of objects moving on a conveyor belt and the categorization of their material-type that is currently accomplished using deep learning methods. The pick and place of the recycle materials is accomplished with the use of vacuum grasping. The latter is facilitated by a custom-made suction cup placed at the end effector of the robot, which enables waste sealing and transfer to the appropriate classification bin.

The RWS will be deployed in two different urban waste management industrial units, namely in DEDISA (processing recyclable wastes) and in ESDAK (processing composite wastes), where the system's reliability and validity will experimentally be tested in real industrial environments. The long-term operation of the entire system in hard industrial conditions will guide the focused adjustment of the RWS parameters to achieve optimal performance and excellent waste separation results.

