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AUTOMATION OF WASTE SORTING IN DEVELOPING NATION USING COMPUTER VISION AND ROBOTICS

I.W.B. Wickramage*, G.G.S.V. Kalhara, H.G.E.M.R.S.J. Ekanayake, G.A. Canistus
Department of Engineering Technology, University of Jaffna, Sri Lanka.
**Correspondence E-mail: iranweranga96@gmail.com, TP: +94778589939*

Abstract: Efficient waste sorting poses significant challenges, particularly in developing nations like Sri Lanka, where manual separation demands substantial labour. This research introduces an innovative solution to revolutionize waste sorting by integrating computer vision (CV) and robotic technologies. The proposed system features a mechanical core comprising a conveyor belt for controlled waste movement and an advanced object placing mechanism for accurate sorting. An extensive image database facilitates the identification and categorization of waste objects, overcoming the limitations of traditional sensor-based approaches. A multi-jointed robotic arm with a sophisticated gripper automates manual tasks, enhancing efficiency and reducing dependency on human labour. The system's advantages are multifaceted, encompassing reduced operational costs, maximized resource recovery through effective recycling, and minimized environmental impact. Moreover, by promoting a safer working environment for waste pickers and aligning with principles of environmental justice, the system contributes to improved public health outcomes. The research presents a scalable and adaptable solution for waste management in developing nations, promising cleaner environments, healthier communities, and a more sustainable future. Its implications extend globally, offering a model for addressing waste management challenges across diverse contexts. In conclusion, this innovative approach signifies a significant step forward in waste sorting, promising lasting positive impacts on waste management practices and environmental sustainability.

Keywords: Sorting; Sustainability; Recycling; Innovation