



## Abschlussvortrag Masterarbeit Avani Jhanwar

### „TRASHY - A General-Purpose Household Trash Sorting Appliance“

The sorting of waste in the correct form is an essential part of waste management and recycling measures. A person in Germany who produces 632 kg of waste per year can help reduce landfill waste and facilitates a better recycling process contributing to a sustainable future by pre-sorting the trash into different dustbins provided by the municipality or local disposal company for recyclables, biodegradable, non-recyclable, hazardous, and glass waste. The problem lies in identifying the right bin color for the specific trash that leads to waste misorting in private households. We propose a general-purpose waste sorting appliance named "TRASHY" for private houses to detect all types of trash except biodegradable food waste and display the waste category and the respective bin color on a 7" Raspberry Pi screen. We have built the prototype TRASHY on a Raspberry Pi 4 model B that captures images from a Raspberry camera and classifies objects using an image-classification pre-trained VGG-19 deep learning model. TRASHY can sort the 25 pre-defined waste categories, namely glass, paper cups, metal containers, newspaper, plastic cups, medical, e-waste, plastic bottles, and more, into five colored bins such as blue for paper or cardboard, red for e-waste, white for residual waste, yellow for recyclable plastic or metal products, and green for glass bottles waste. The dataset has 20146 images, and the VGG-19 model achieves an accuracy of 93% for waste classification. Yellow bin in houses is for packaging waste made of plastic and metal, and our model achieved the highest accuracy of 95% for the yellow bin, thus having promising results for improving recycling. The research focused on studying the strengths and weaknesses of current waste-sorting approaches and developing an enhanced waste-sorting classifier. The future vision is to expand the dataset by analyzing the patterns of trash collected during daytime or evening in a particular season like winter, summer, or spring to improve TRASHY's sorting capabilities. Also, evaluating the performance of other pre-trained CNN models, including more household waste categories, and incorporating digitalization in TRASHY are a few tasks for future work.

Betreuer der Arbeit: Prof. Dr. Benjamin Leiding, PD Dr. Robert Basmadjian (Institut für Informatik)

Datum: Freitag, 04. August 2023, 13:30 Uhr

Ort: Online-Meeting über BBB

Link <https://webconf.tu-clausthal.de/b/ava-xyu-peb-vao> Code: 824399