Sensor Based Sorting lab (GeMMe Uliege)
Topic : Master thesis proposal
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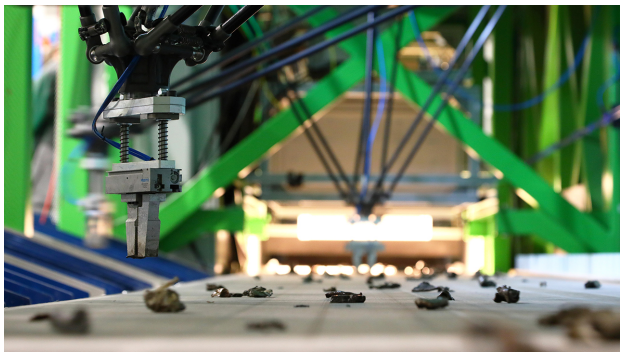
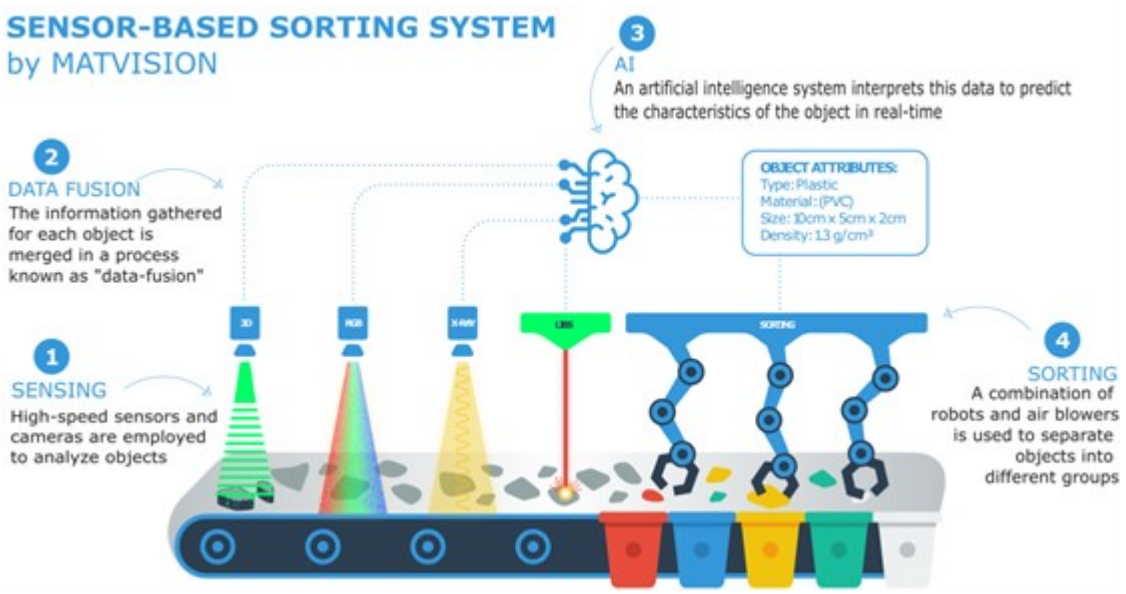
What is the Sensor Based Sorting (SBS) laboratory at GeMMe ? It is specialized in developing cutting-edge solutions for matter characterization and scrap sorting. The lab's primary tool is the PICKIT machine, which was developped by the team as a Prototype for industrial applications. Today, a variant of this system is used in production and can sort up to 20 000 tons of waste annually. While the achieved performance is already competitive in the field, we are continually striving to reach better performance and tackle new challenges from the recycling industry. Your assistance could be essential in achieving this goal and making a direct impact on European recyclability.

What is PICKIT ? It is a sorting machine that can be split into various components :

- **A conveyor belt** transporting waste objects under the sensor modules and the robot pickers.
- **Sensor modules** collecting relevant data on the waste.
- **Robots** that pick the scraps from the conveyor up and place them into designated bins.
- **A computer-program** orchestrating the whole process from retrieving data from the different sensors, processesing the data, predicting the type of each object, and sending sorting instructions to the robots.



On which task will you work ? The task will consist in using reinforcement learning to throw the metal scraps directly into the bins instead of dropping the scraps above the identified bin. The goal is to reduce the sorting time of the line by learning this ability **directly** with the robot instead of relying on a robotic simulator. Indeed, recent advances in robotic reinforcement have shown the ability to learn in a sample efficient way enabling one to learn in minutes. Your job will be to leverage the sensor's feedback to learn how to throw the scraps in the bins. This work offers the opportunity to explore new reinforcement learning exploration techniques and contribute to the state-of-the-art in the robotic reinforcement learning field. Depending on the student's motivation, there is an opportunity to publish an article based on this master's thesis.

Are you interested ? Feel free to reach out to us for further information regarding the tasks, the data, and other related details.

References :

PICKIT : mieux trier pour mieux recycler.

Laura Smith, Ilya Kostrikov, Sergey Levine, A Walk in the Park: Learning to Walk in 20 Minutes With Model-Free Reinforcement Learning, 2022.

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