

Individual Reflection Report

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Team D

Global Software Product Development

June 2, 2022

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1 Introduction

As climate change and sustainability have never had as much importance as now, it was naturally that the idea of this project came. Tri-rac is a prototype project mimicking factories that take care of waste sorting adapted to a more individual use. It consists of a conveyor where trash items are put. They are then identified using a phone camera and placed in the correct bins depending on their type. The prototype consists of a small conveyor and another pick up car, and items are classified by colors. As it is a system that already exists, we figured it would be a good way for us to learn while having access to many resources. These were the main motives behind this project.

2 Contribution

I was part of team D and contributed mainly as a communication support at the beginning by setting up meetings and making sure tasks were given equally. After the robots were built on both sides and we managed to have programs running, I focused on more specific tasks. I mainly implemented the app which is used as a remote control for the robot. For that, I used React Native and Flask. As one of my teammate was establishing a server/client connection between the robot and our computer, I was building the different components of the app. We combined everything together in order to send commands to the robot remotely in a repeated way.

We also wrote scripts in order to combine the different programs we had and launch everything smoothly. I equally built a connection to the phone camera, with the help of a teammate who encoded the color recognition, so we could scan the different items and classify them. I also took videos for the demonstration and participated to all the supervisor meetings and milestone presentations. I set up the structure of the final report and wrote the abstract and the background part.

3 Collaboration

At the beginning, all the communication tools and meetings were set easily and went smoothly. As we progressed in time, me and my teammate from Uppsala University realized we were envisioning different systems than our teammates at Hanoi University. We had a longer meeting to discuss exactly what we wanted our prototype to be and how to build it. I was meeting with my Uppsala University teammate on campus regularly to work on the robots directly and to build the app.

Several times, it felt that as we were working on different components, the team wouldn't be able to assemble everything together. A few people were staying silent and not really contributing during meetings or when tasks were given. Overall, there was mainly four members working on the project. We were also communicating regularly via Discord to update each other with pictures, videos or resources. We used GitHub for our code base and Google Drive to exchange any other documents.

4 Product

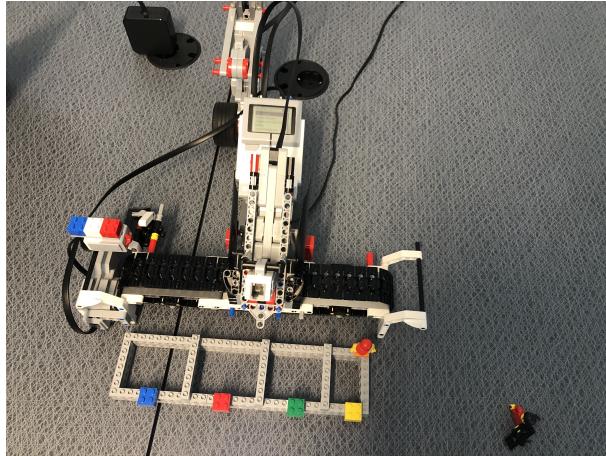


Figure 1: Picture of the final product

The final product is a prototype for a conveyor that sorts the trash and can be controlled remotely. It is composed of:

- a conveyor,
- a color sensor,
- an app using a phone camera,
- a small car that can pick up trash.

To use, the user selects a mode (autonomous or manual) and can see the conveyor classifying the trash given to it using the pick up car or classify them himself by using the remote. In comparison to the first proposal that was made, a few items were added such as the app and the small car. Therefore, the prototype not only fulfills its primary functions, we also implemented other elements to the final material.

As the app was added when we were done with our initial prototype, I believe it was challenging but also satisfying to have a stable and functioning system at the end. It also felt more complete and made sense with the other components we already had. As for the report, it is a good description of what the product was aiming for, how it was built and what were the ideas and difficulties faced behind it. We tried to make it as complete as possible by including illustrations and diagrams and it could be given to someone external of the course but in the field of Computer Science.

5 Possible changes

Amongst the different changes that could have been made, the prototype should have been defined more clearly between all the group members. In that case, the addition of the app would have been decided from the beginning giving us more time to polish it and add additional features. As for now, the phone camera only recognizes red, green

and blue. The recognition of yellow could have been added with more time.

Overall, the system could be more fluid and more intuitive for the user with more experience with React Native. It was also stated during the first presentations that Machine Learning could have been added to recognize objects as well as colors. We managed to find datasets as well as explanations surrounding similar projects which could help us implement this part. An algorithm was written but we didn't make it our priority as we wanted to focus on having a stable app and clearly defined functions instead.

6 Lessons learned

This project has allowed me to develop multiple skills as a programmer. I now have experience with React Native by building both the front end and the back end with Flask of a simple app. I notably understood how routing works and how to make navigation smooth for a user. I equally was able to get a better understanding of sockets with Python as I only had a prior experience using C. Overall, I learnt how to install different frameworks on my computer and try to make them work together. I also became more creative in the various existing ways to implement features. For example, the addition of threads at the end in order to launch the server and client at the same time using an ssh connection.

In addition to those technical skills, I also got more familiar with Discord and Google Drive to work on group projects. I believe the use of these tools will be helpful for future projects as well. I learnt how to convey an idea to people who may not have English as a first or second language. The different presentations and reports allowed me to be more confident in my speaking and writing skills as well as forging them for the future. Finally, I learnt that communication has to be set up correctly from an early stage in order for a project to progress smoothly. The time to correctly explain and listen to each of the member has to be taken at each stage of the realization in order to all move in the same direction and build a good collaboration.

7 Unplanned events

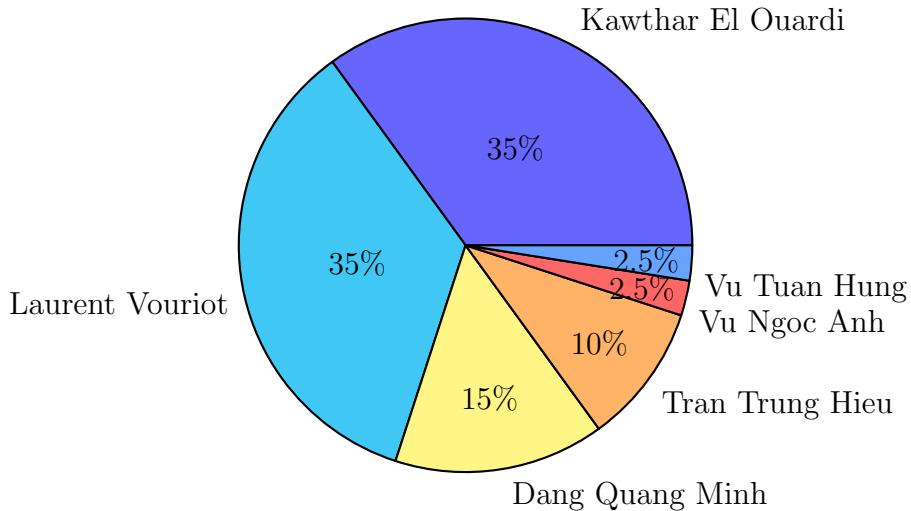
At the beginning of the project, we were planning on only having an autonomous control with image recognition. As we were moving forward with meetings, we were told that the addition of an app would be welcomed. After reflecting together, we decided to go on with that idea. This slowed us down as we had to learn a new technology in order to build a simple interface. I also had to learn how to link this with the robot and think of a way an app would take the project to a better state. We ended up changing our plans and only included color recognition with the phone. That ended up making sense with our model as we had already planned to include a phone camera early on in the process.

We also realized that the team members from the two universities were building different components which were getting complicated to connect. Both the Hanoi and Uppsala students built a socket connection using various ways and it was complicated

to include every member's work in the project without being redundant. After some discussions, we decided on which part we were going to keep and which were not necessary. In the end, everyone's participation was acknowledged in some way and we could learn from the distinctive ways features were implemented.

8 Conclusion

Below is a pie chart showing how much each team member contributed to the project by dividing 1000 euros between all members.



To conclude, I believe this project has enabled me to grow on a professional level in terms of technical but also communication skills. I could be part of the process of creating a product from discussing an idea with teammates to writing a report and presenting the work that has been done. It also showed me that a lot of systems could be easily implemented with creativity and the will to learn new things. All in all, I can now teach myself something instead of giving up because I don't possess a certain skill. I think the final product reflects the work that has been put into this project. It isn't exactly what was described at the beginning, some parts were added and others removed, but it conveys the main idea that was behind it: having an easy, intuitive and accessible system to sort waste.