
Summary

Starting from the first industrial revolution, the ever-increasing population of the world has been borrowing immensely from the environment in order to sustain the daily needs of billions of people. The mortgage of this debt is a very limited resource: the flora and the fauna of our Globe. Because the majority of the world's population lives in big cities (half of the population of the Globe) one of the most harmful anthropogenic factor that we face is the accumulating heaps of garbage in cities and greenbelts. The pollution caused by garbage is a major problem that affects both directly and indirectly not only our own lives but also the existence of other living organisms/creatures.

If we'd hold up a mirror to our modern civilization, we should see that we are the ones responsible for the pollution and destruction of our environment. We should also recognize that our efforts to find solutions have failed so far. This is why it is paramount to develop new technologies and find new solutions for this mounting crisis. In my work, I've tried to develop a new approach to reduce environmental pollution. I named this approach: Social Mirror Technology.

With my first prototype, Rusty (small sized robots optimized to recognize and process images) I am working on the detection and surveillance of garbage on a given website. Furthermore, these robots also draw the attention of those passing by to the disposed trash, this way they function as a moral mirror to society.

The system that would provide a more sustainable waste management consists of three main parts: a small robot, Rusty, a central server, and a website. Rusty is a small robot that can detect various objects (trash) in its environment using machine learning.

The Android application processes the images made by the camera using machine learning in parallel with the navigation and that is how Rusty searches for trash. The central server is a web server written in the Node.js framework and is designed to serve requests from the website and the Android application, furthermore, communicate with the PostgreSQL database. The website includes a map, which shows the locations of the trash with different position markers and also includes a problem report section where trashed places can be filled in that are waiting for volunteer teams to clean up. Those who follow Rusty's instructions, can communicate with it through a website and earn digital points, called Trashcoins, for their community work.

After the garbage detection, Rusty gets in touch with people around him through different communication solutions, more specifically using sound and light signals, which are intended to draw attention to the garbage to be cleaned up. When Rusty detects a trash stop next to it and starts glowing red and making different sounds until someone picks it up or until it does not pass a specified time interval. With my development, I wish to reach those social groups who want to take small steps towards a more livable environment.

In the future, I would like to utilize this project in such a way that Rusty would not only be at the disposal of municipalities, but also at the disposal of institutions, businesses, schools as a demonstration tool, a model that can be purchased or further developed, creating a green Rusty community.