

ZENROBOTICS®

Presented by:

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Year 2007

**3 founders: Harri Valpola, Tuomas Lukka
(Aalto University), Jufo Peltomaa (serial
entrepreneur, rapper)**

“Let’s do something cool with robots”

Looking for problems to solve

Consulting projects for energy and mining industry.

2009: Let's sort waste with robots!

Starting with construction & demolition waste

2013: 1st Gen. ZenRobotics Recycler in a C&D waste processing plant near Eindhoven, Netherlands

<https://youtu.be/Z0vwogl1S0I?t=1m30s>

Today

- **2nd Gen. ZenRobotics Recycler (ZRR)**
- **ZRR working in 4 customer sites**
 - **Netherlands, Finland, Switzerland, Japan**
- **3 waste processing plants being constructed for using ZRR**
- **ZenRobotics has ~30 employees and growing**

2nd Generation ZenRobotics Recycler

To give an idea of a C&D waste processing plant

https://youtu.be/X_1sOPqM_VA?t=33s

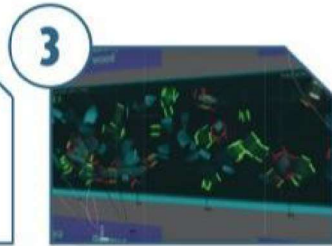
How does it work?



1
ZRR Sensor unit scans the waste stream.



2
ZenRobotics Brain control software analyses data and controls the robots.



3
ZenRobotics Brain identifies materials, objects and gripping points.



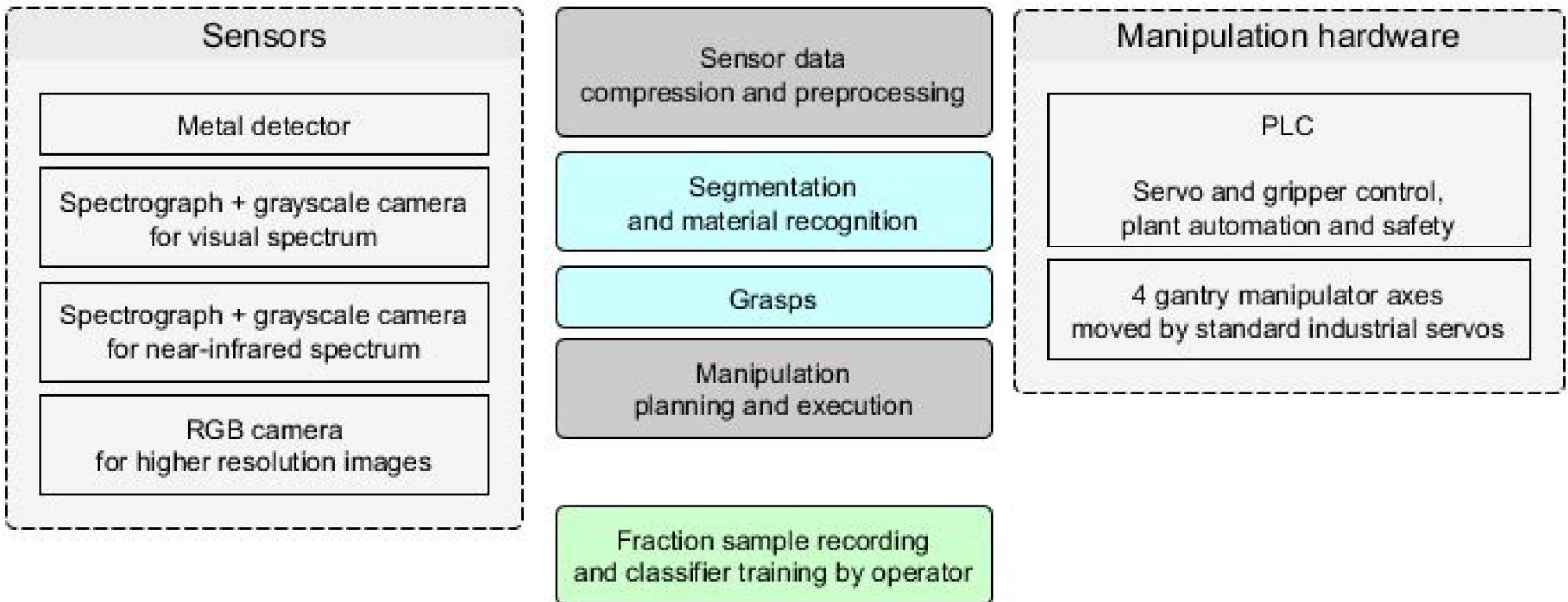
4
ZenRobotics Smart Gripper picks the desired objects.



5
Robots sort multiple fractions in one spot.



Under the hood



ROS in ZenRobotics

- **Introduced in 2013 for prototyping 2nd Gen manipulation**
 - For us ROS replaces
 - Protobuf and TCP sockets for IPC
 - A variety of DIY logging and playback tools
 - Not using for time-critical communications
- **Name-dropping**
 - ROS params, topics, image transport
 - ROS bags and playback
 - Rosbridge_server for connecting with web applications
- **Lets us concentrate on the application, not the infrastructure**

ROS in ZenRobotics

- **Encountered a few bugs, but nothing serious**
- **For Christmas please?**

Research for next generation manipulation and sorting

“Classifying and sorting cluttered piles of unknown objects with robots: a learning approach”

Janne V. Kujala, Tuomas J. Lukka, Harri Holopainen

<https://arxiv.org/abs/1609.01044>



Thank you!

www.zenrobotics.com