SpyBot

Juuso Mattila, Tommi Pekkala, Joni Väisänen TVT15SPL
School of Engineering, Information Technology, Equipment and Product Design

Introduction.

This project was a 6-week school project. The main idea was to make a robot that could move from one place to another on its own and have a certain real task.

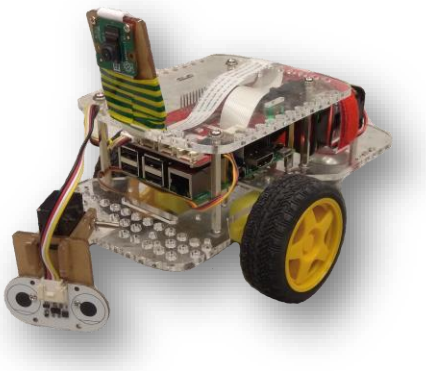


FIGURE 1. GoPiGo3 Robot

Objectives.

Our goal was to create an obstacle avoiding, color- searching, and following robot.

Another thing was, we wanted to have some sort of an online API based front -end to showcase the robot's movements in a fun and learning way. Twitter API was a good choice.

We had a mission. We wanted to create a robot that monitors and moves around a specified area. The robots missions were to search for fire extinguishers in the area and inform via twitter. This was a new type of a monitoring exercise using AI and computer vision.

Embedded Systems Project

ECTS credits: 15

Date of publication: 2017, December

Instructors: Eero Nousiainen, Pekka Alaluukas

Methods.

Raspberry Pi 3 and GoPiGo3 board were used as the base hardware.

Color and picture detection software were written in Python and with OpenCV library. First the robot drives towards a color. After that, it checks the picture inside the colored rectangle. This was done with the Raspberry Pi camera V2.

The robots main operations can be overridden with a Windows-based remote control software. Remote control program is made with QT and it is written in C++

Movement commands within the C++ and Python interface stack are sent via WebSockets.

The robot can and will avoid any obstacles that are on its way. The obstacle avoidance overrides the color search. This was done with the Dexter Distance sensor.

Web server and MySQL database were installed on a local PC. The web-page was used to show motor data and have vision through the camera. The robot sends motor data to our database and then a PHP script shows that data on the web-page as a table and a graph. The robot takes pictures with a short delay and saves and overwrites that picture to a folder where the web-server can fetch that photo and show it on the web-page. That photo is then refreshed constantly to have a vision of the robot.

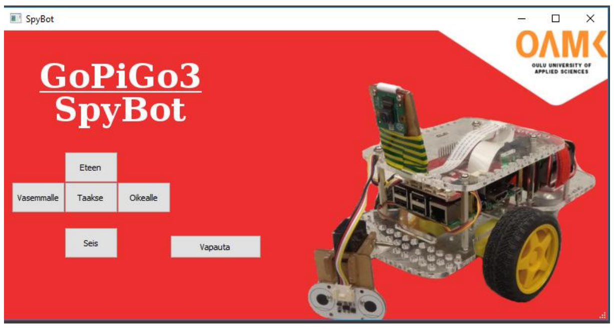
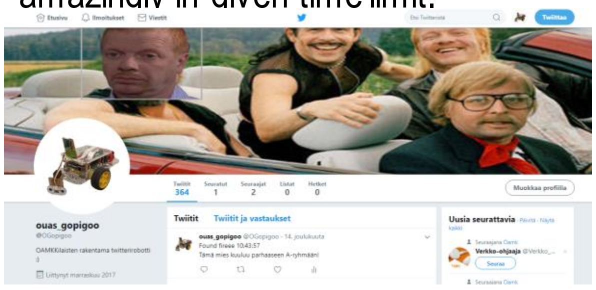


Figure 2. Remote control

Results.

We accomplished our qualities and Software requirements specifications which we set at the start of the project. Our robot can move independently, move with Windows-based remote control and last but not least, send information to Twitter and to our website. Overall we are very happy with our work. We made the robot and website work amazingly in given time limit.



ouas_gopigoo
@OGopigoo
OAMKKilaisten rakentama twitterirobotti
Liittynyt marraskuu 2017

ouas_gopigoo @OGopigoo · 14. joulukuuta
Found fireee 10.43.57
Tämä mies kuuluu parhaaseen A-ryhmään!

Verkko-ohjaaja @Verkko_...

Figure 3. Twitter account

Conclusions

This project was a success!

References

https://opencv.org/ [OpenCV library]

http://gopigo3.readthedocs.io/en/master/ [GoPiGo3 Documentation]

https://www.dexterindustries.com/shop/distance-sensor/ [Dexter Distance Sensor]

https://www.raspberrypi.org/products/camera-module-v2/ [Raspberry Pi Camera V2]