International

Field Robot Event

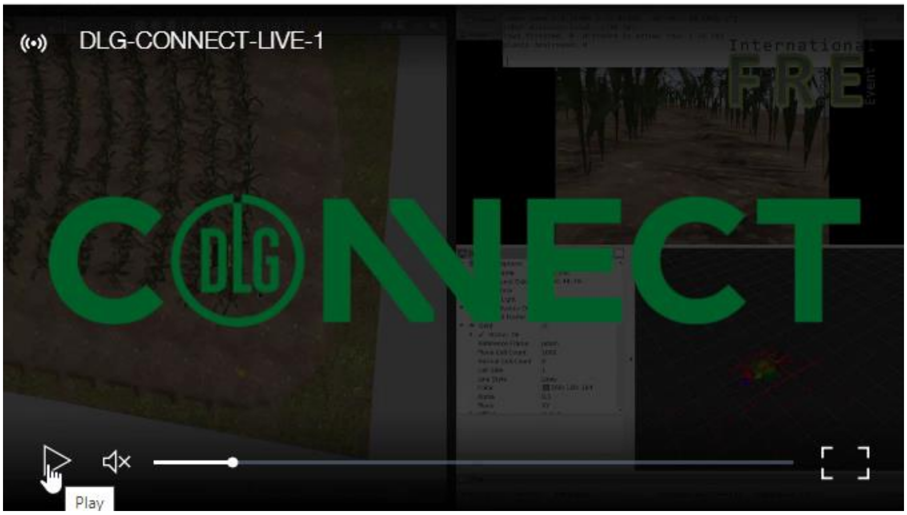
FRE

2022

virtual part of the event

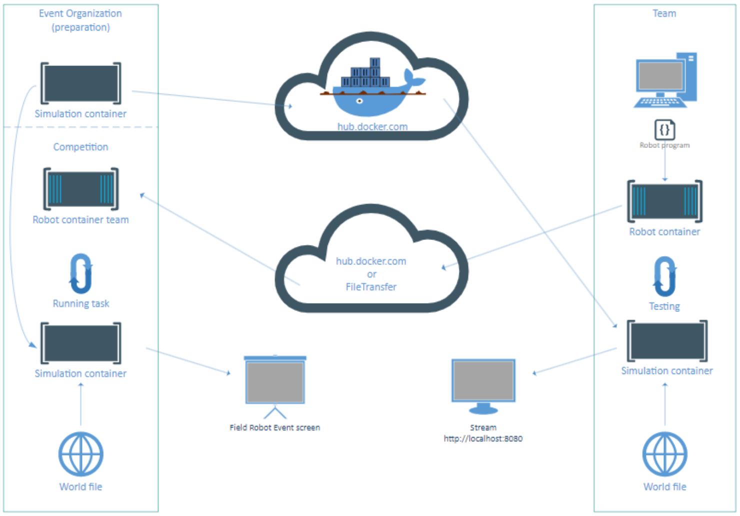
All information in this presentation is also available on the field robot site and the Github. At the end of the presentation, I will give you the links to these places. You can find this presentation also on the field robot site.

How does it look like on the event?



I think its good to see how it will look like on the event. This is a video of last years virtual event. On the left, you see the simulation with a robot driving though the maize field. On the right, you see a visualisation of the robots sensory input. At the end of the field, the robot has to turn and continue to drive in the next row. Its not visible on the video, but if the robot hits a maize plant, the plant will fell down.

How does this work?


Event Organization (preparation)

Simulation container

Competition

Robot container team

Running task

Simulation container

World file

hub.docker.com

hub.docker.com or FileTransfer

Field Robot Event screen

Stream http://localhost:8080

Team

Robot program

Robot container

Testing

Simulation container

World file

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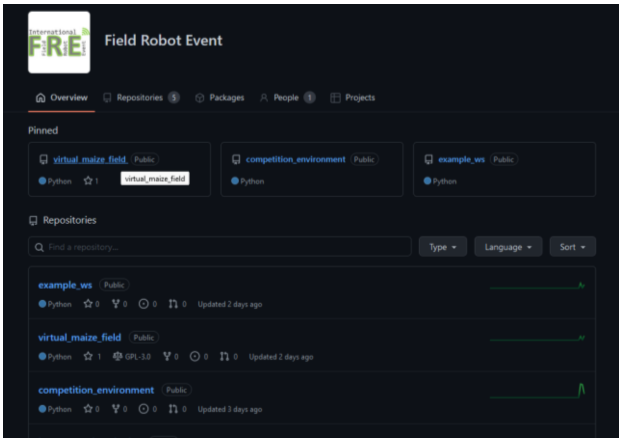
So, how does this simulation work? To let the simulation work on the even for multiple robots, we use Docker. In Docker, you have the concept of containers, which you can see as a virtual computer in which software is installed. We use two containers, the simulation container and the robot container. The combination of the two containers will result in a working robot. The organisation provides the simulation container, in which all the software is for simulating the world. Each team has to make a robot container, in which all your robot software is installed. During the development of the robot, you can test your robot on your own computer using the simulation container we provide on dockerhub. I will give you a demo of this in a few minutes. On the event, you have to sent your robot container to us, and we will run your robot container on the computer of the organization on an ‘unknown’ world.

Where do we share code?

- https://github.com/FieldRobotEvent



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Pinned

virtual_maize_field Public
Python 1 virtual_maize_field

competition_environment Public
Python

example_ws Public
Python

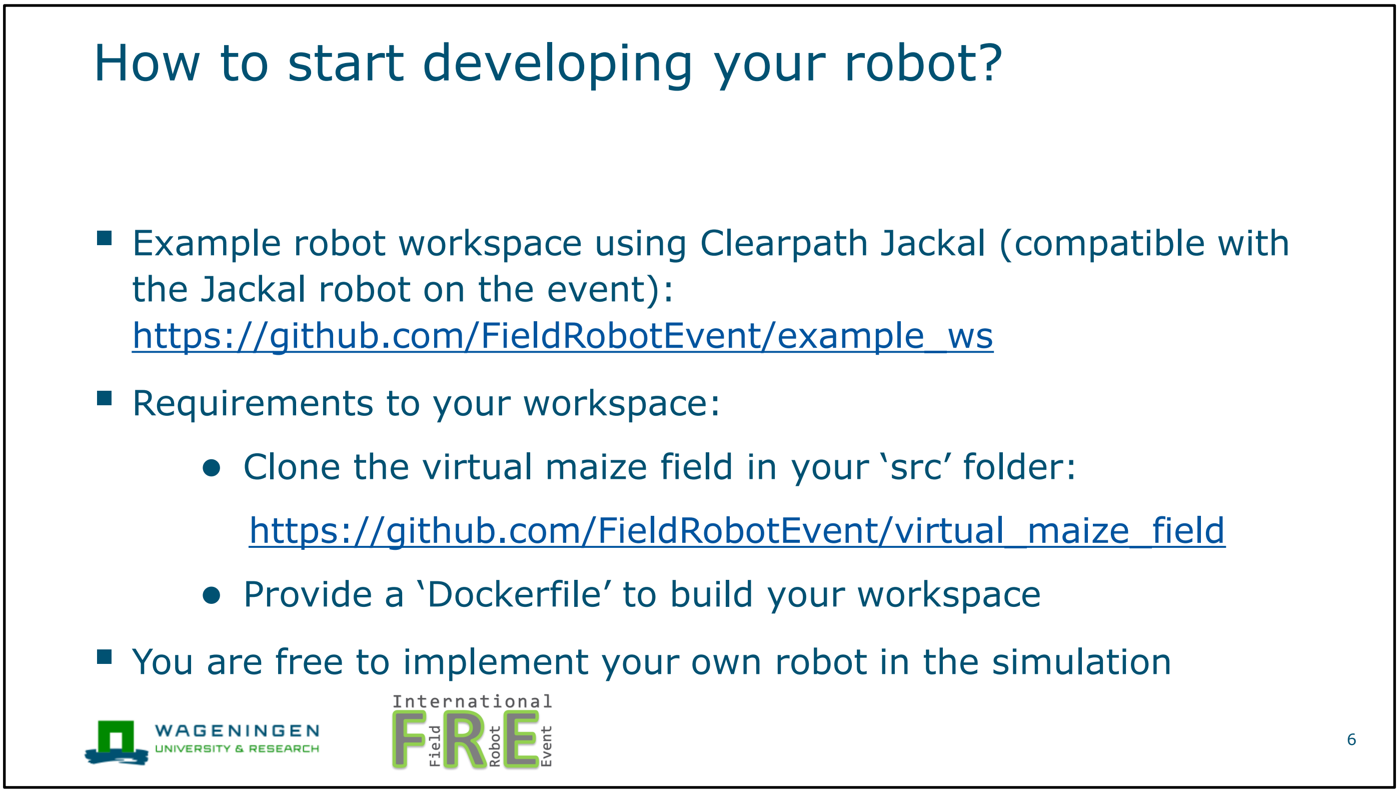
Repositories

example_ws Public
Python 0 0 0 0 Updated 2 days ago

virtual_maize_field Public
Python 1 GPL-3.0 0 0 0 Updated 2 days ago

competition_environment Public
Python 0 0 0 0 Updated 3 days ago

We provide the code for this on Github. This consist of three repositories: the virtual maize field, competition environment and example workspace repository. The virtual maize field repository is a package that can be used to generate maize fields randomly. We will update this package to provide fields according to the tasks of this year. The competition environment repository consist of all the files needed to run the beforementioned docker environment. Lastly, the example workspace repository provides an example workspace that works with the competition environment and contains the Jackal robot. You can use this as starting point to develop your own robot.

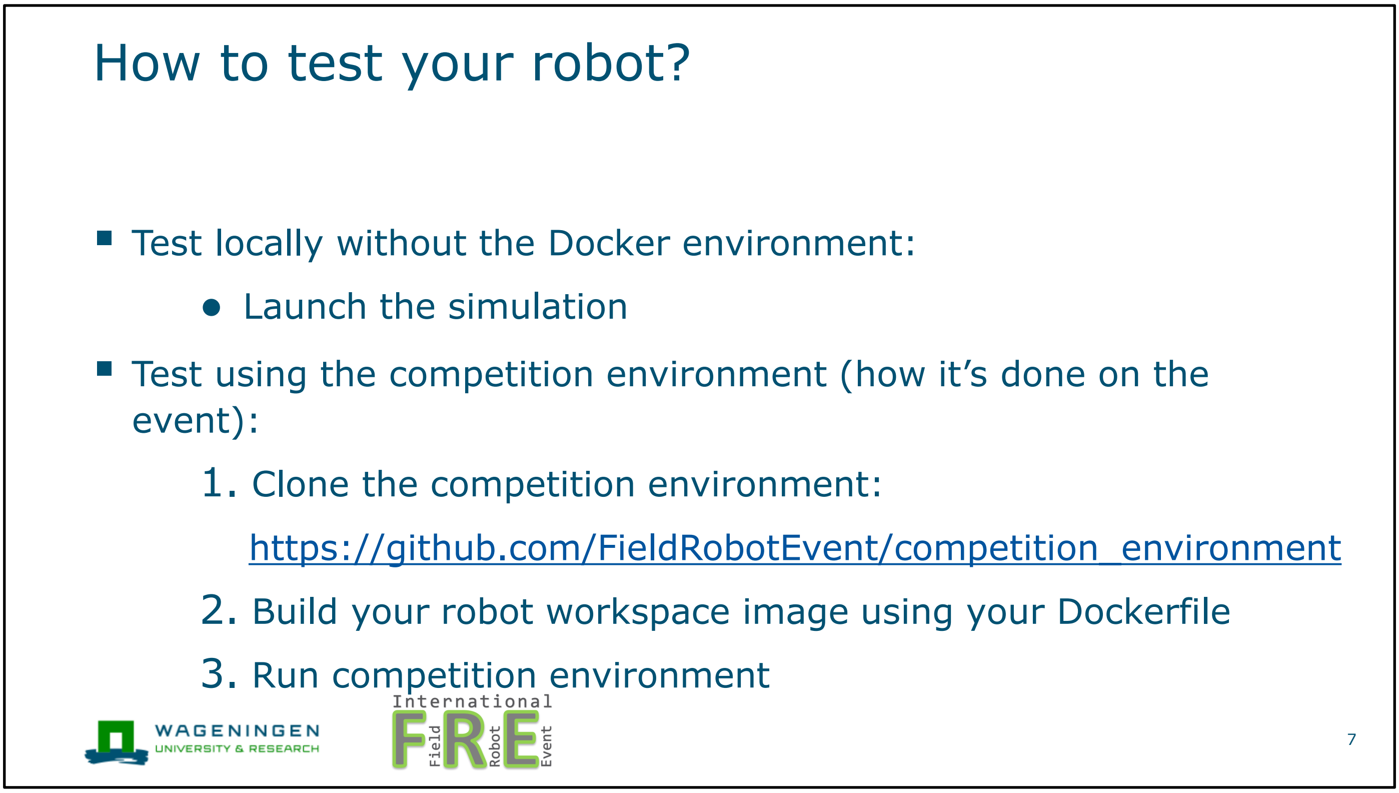


How to start developing your robot?

- Example robot workspace using Clearpath Jackal (compatible with the Jackal robot on the event): https://github.com/FieldRobotEvent/example_ws
- Requirements to your workspace:
  - Clone the virtual maize field in your 'src' folder:

    https://github.com/FieldRobotEvent/virtual_maize_field
  - Provide a 'Dockerfile' to build your workspace
- You are free to implement your own robot in the simulation

To start developing your robot, have a look at the example workspace. There are two requirements on the workspace: it should have a copy of the virtual maize field package in the src folder and it should have a dockerfile. The docker file is a file that is used to build your robot container. If we go to the example workspace, you can see that we provide the virtual maize field package in the src folder and we have a dockerfile. If we open the dockerfile, in the first part, we install all software needed to run our robot, in the second part, we copy the robots code and the last part starts the robot. We provide the jackal robot that can be used on the physic event, but you are free to implement your own robot in the simulation.

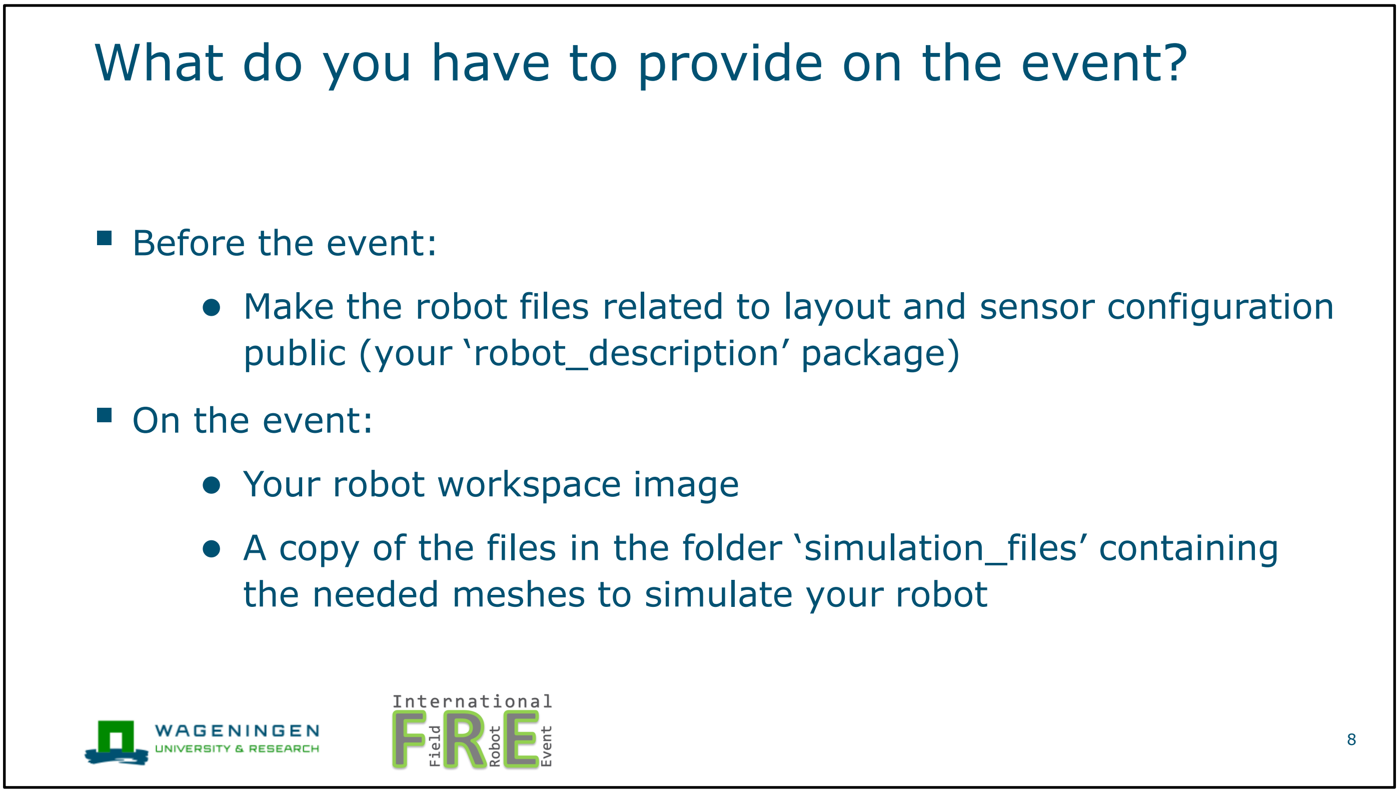


How to test your robot?

- Test locally without the Docker environment:
  - Launch the simulation
- Test using the competition environment (how it’s done on the event):
  1. Clone the competition environment:

     https://github.com/FieldRobotEvent/competition_environment
  2. Build your robot workspace image using your Dockerfile
  3. Run competition environment

Testing your robot can be done in two ways, locally and using the competition environment. Locally, you can just launch the simulation <demo>. For testing in the competition environment, you have to clone the competition environment, build your robot container and run the competition environment. <demo>



What do you have to provide on the event?

- Before the event:
  - Make the robot files related to layout and sensor configuration public (your 'robot_description' package)
- On the event:
  - Your robot workspace image
  - A copy of the files in the folder 'simulation_files' containing the needed meshes to simulate your robot

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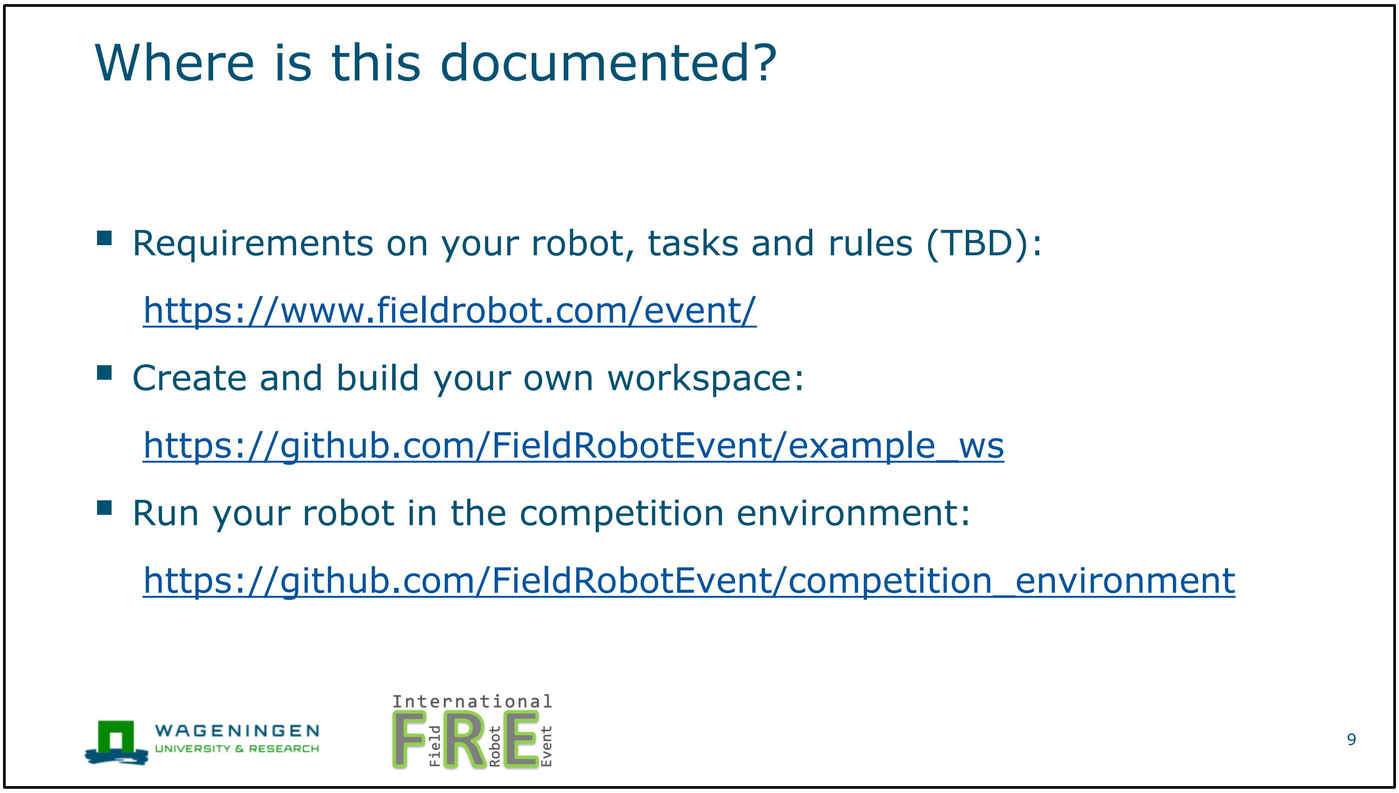
Before the event, you have to make the robot files related to the layout and sensor configuration public. This is most likely your robot description package. On the event, you have to provide us your robot container and a copy of the folder simulation_files. This contains all files needed to visualise your robot in the simulation.



Where is this documented?

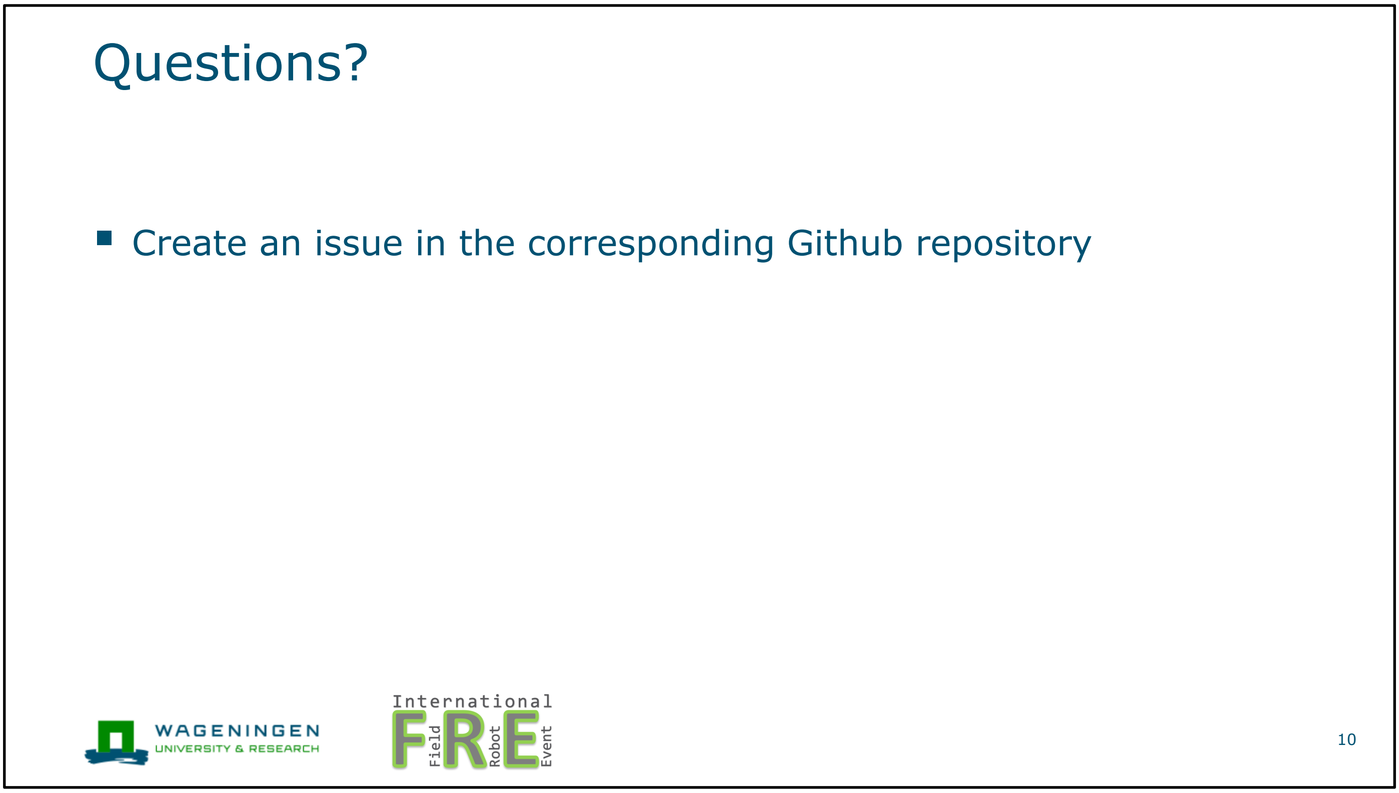
- Requirements on your robot, tasks and rules (TBD):

  https://www.fieldrobot.com/event/
- Create and build your own workspace:

  https://github.com/FieldRobotEvent/example_ws
- Run your robot in the competition environment:

  https://github.com/FieldRobotEvent/competition_environment

As said before, all information I told in this presentation is also available online. The requirements on your robot, tasks and rules are on the field robot site. An explanation to create and build your own robot workspace is available on github as is the information to run your robot in the competition environment.



Questions?

- Create an issue in the corresponding Github repository

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If you have technical questions, create an issue on the corresponding github page. In this way, everyone with the same question can see the answer. And also, you are free to ask question now.