

How to become a Robotics Developer



The Future of Robot Development

RICARDO TÉLLEZ, PHD
WWW.THECONSTRUCT.AI



What do I mean by Robotics Developer?

I do not mean



I do mean



ROS and Robot Navigation Teacher at La Salle Univ. Barcelona

**Ricardo
Tellez, PhD**

CEO OF THE CONSTRUCT



theconstructsim.com

Join for free



CEO of The Construct creators of Robot Ignite Academy

Ricardo
Tellez, PhD

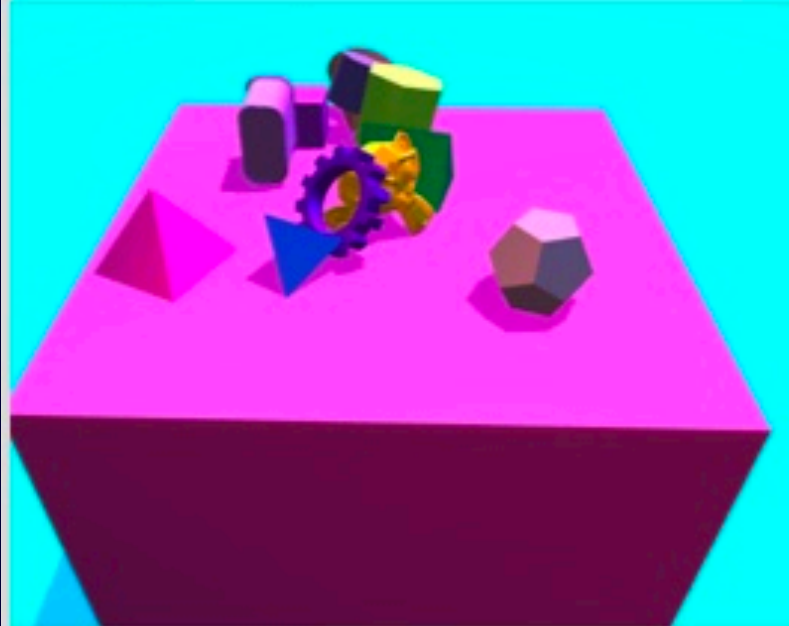
CEO OF THE CONSTRUCT

robotignite
ACADEMY

Deep Learning with Domain Randomization

LANGUAGE → English For Enterprise YUHONG

Domain Randomization In
Deep Neural Networks with
Keras in Gazebo with ROS



Come to this micro course! This course is intended for the people that:

- Want to know how to use Keras in a basic way
- Want to learn how to train a Deep Neural Network using a Gazebo Simulation
- Want to know how to work with ROS+Gazebo+Keras in tandem.
- Are interested in Deep Learning
- Want to know how the Random Environment generation works in Gazebo.

If you're one of these people, please continue reading.

Quick Demo

The best way to know if this course is for you is to see what you will be able to do at the end of it. So, please follow the below instructions:

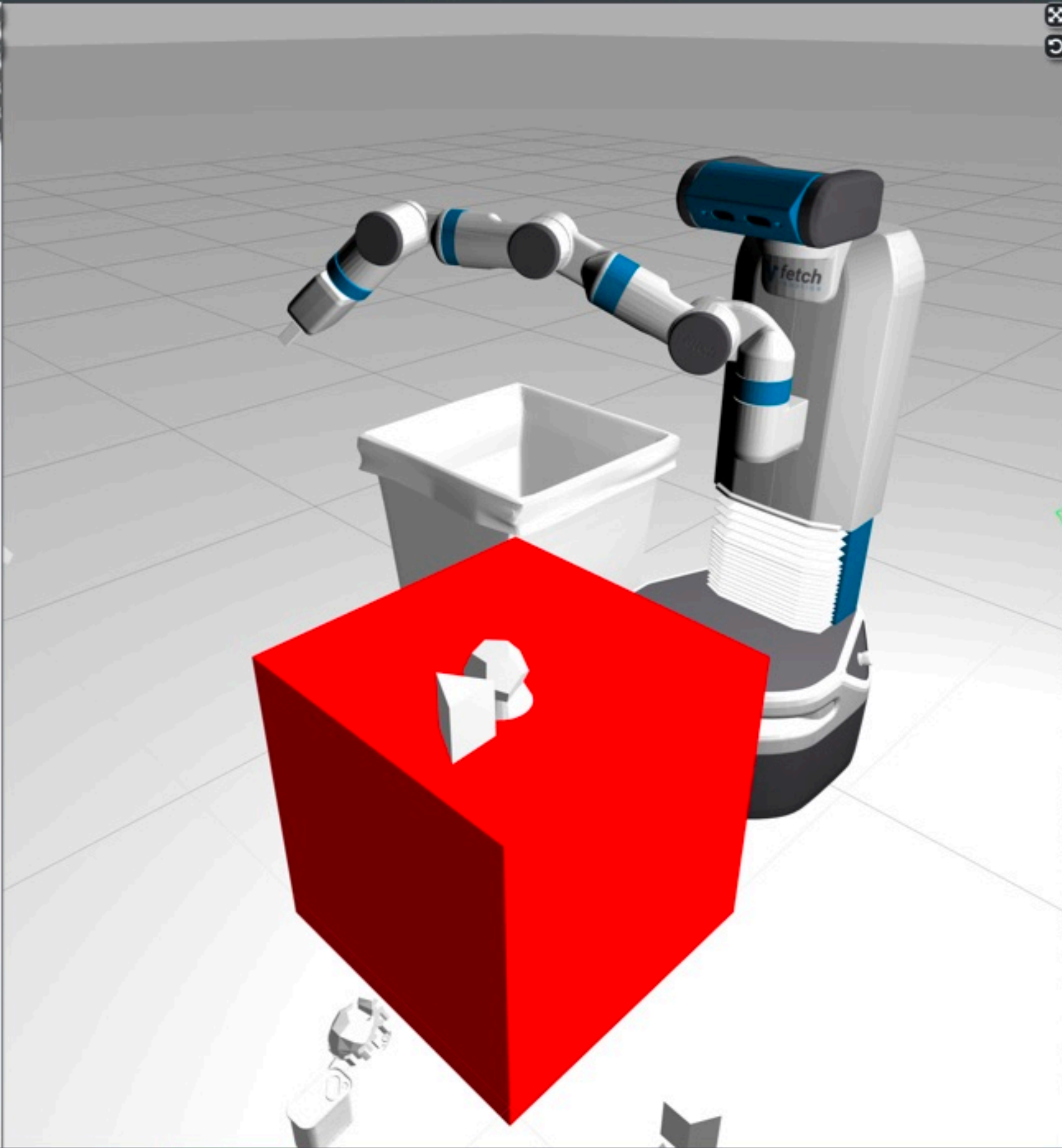
Workspace

src

CMakeLists.txt

```
1 # toplevel CMakeLists.txt for this project
2 # catkin/cmake
3
4 cmake_minimum_required(VERSION 3.0.2)
5 project(robot_ignite)
6
7 # Search for catkin
8 set(_catkin_FOUND FALSE)
9 set(_catkin_INCLUDE_DIRS "")
10 execute_process(
11   COMMAND ${CMAKE_COMMAND} -E echo "catkin not found"
12   OUTPUT_VARIABLE _catkin_INCLUDE_DIRS
13   ERROR_VARIABLE _catkin_INCLUDE_DIRS
14   OUTPUT_STRIP_TRAILING_WHITESPACE
15   ERROR_STRIP_TRAILING_WHITESPACE
16 )
17 if(NOT _catkin_FOUND)
18   # searching for catkin
19   string(REPLACE ";" " " _catkin_INCLUDE_DIRS "${_catkin_INCLUDE_DIRS}")
20   message(FATAL_ERROR "catkin not found")
21 endif()
22
23 # include catkin
24 include(catkin)
25
26 # The C compiler identification is GNU 4.0
```

Fetch



>_ #1

>_ #2

>_ #3

>_ #4

```
user:~$ cd /home/user/catkin_ws
user:~/catkin_ws$ rm -rf build/ devel/
user:~/catkin_ws$ source /home/user/.catkin_ws_python3/dnn_venv/bin/activate
(dnn_venv) user:~/catkin_ws$ source /home/user/.catkin_ws_python3/devel/setup.bash
(dnn_venv) user:~/catkin_ws$ catkin_make
Base path: /home/user/catkin_ws
Source space: /home/user/catkin_ws/src
Build space: /home/user/catkin_ws/build
Devel space: /home/user/catkin_ws/devel
Install space: /home/user/catkin_ws/install
1
####
#### Running command: "cmake /home/user/catkin_ws/src -DCATKIN_DEVEL_PREFIX=/home/user/catkin_ws/devel -DCMAKE_INSTALL_PREFIX=/home/user/catkin_ws/install -G Unix Makefiles" in "/home/user/catkin_ws/build"
####
-- The C compiler identification is GNU 4.0
```

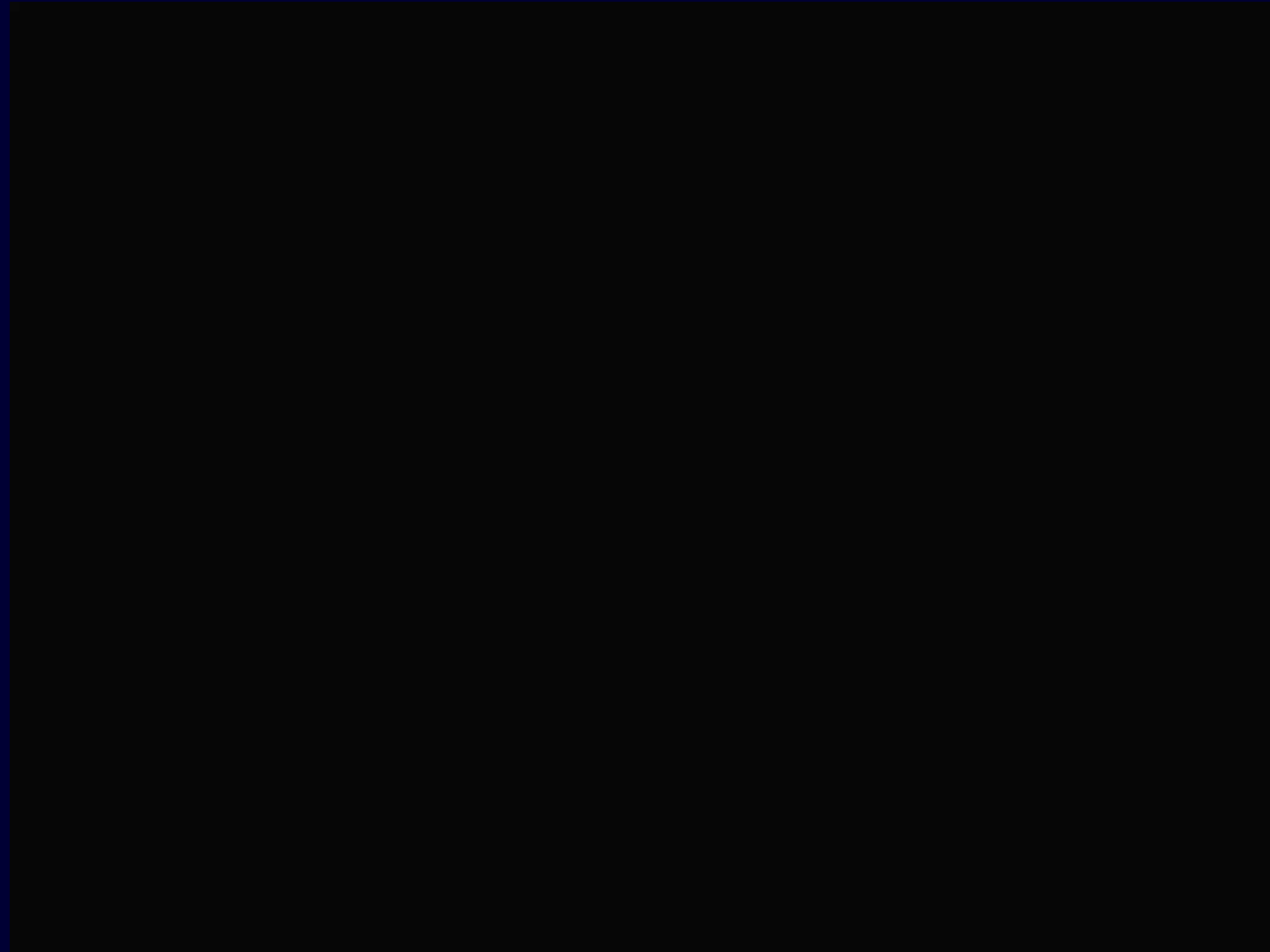
Next >

Feedback

Forum

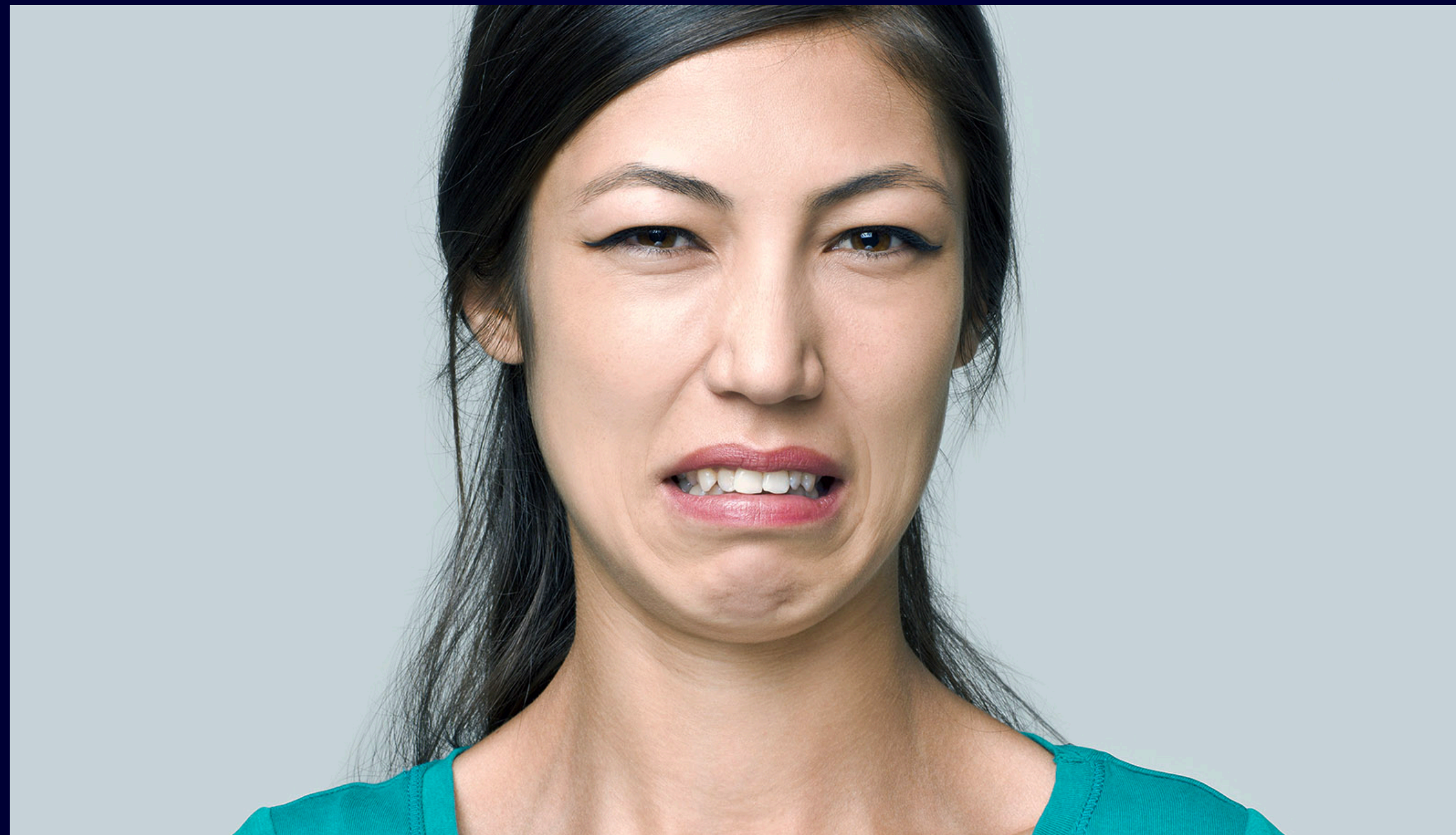
GET HELP

The future of intelligent robotics lies in the software, not in the hardware



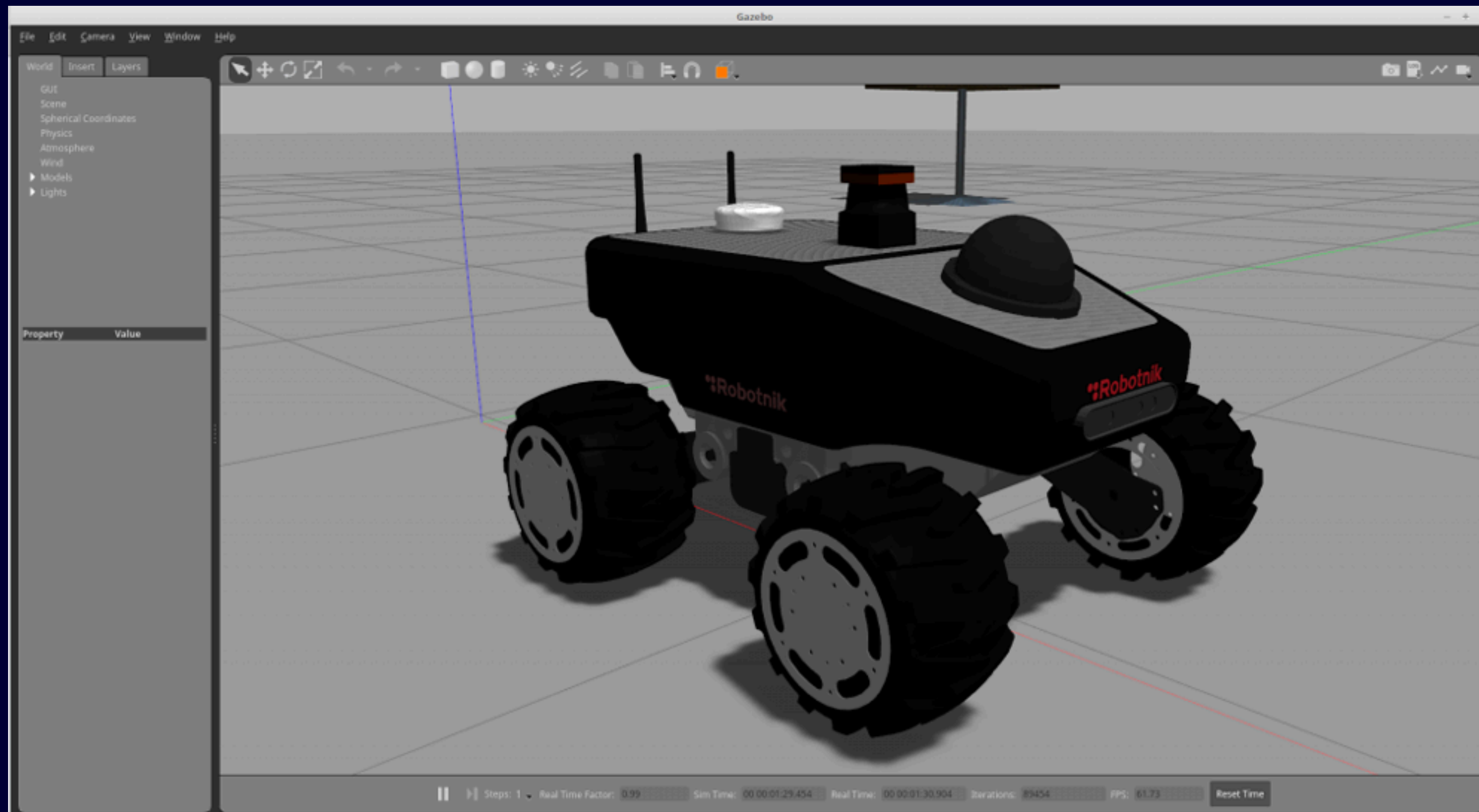
So far, the robotics software has been done by the roboticists not by the computer scientists

Computer Scientists want to keep out
of the hardware as much as possible



Now it is possible to isolate developers from hardware (to a certain extent)

By using robot simulations (based on ROS)!



A new type of developer



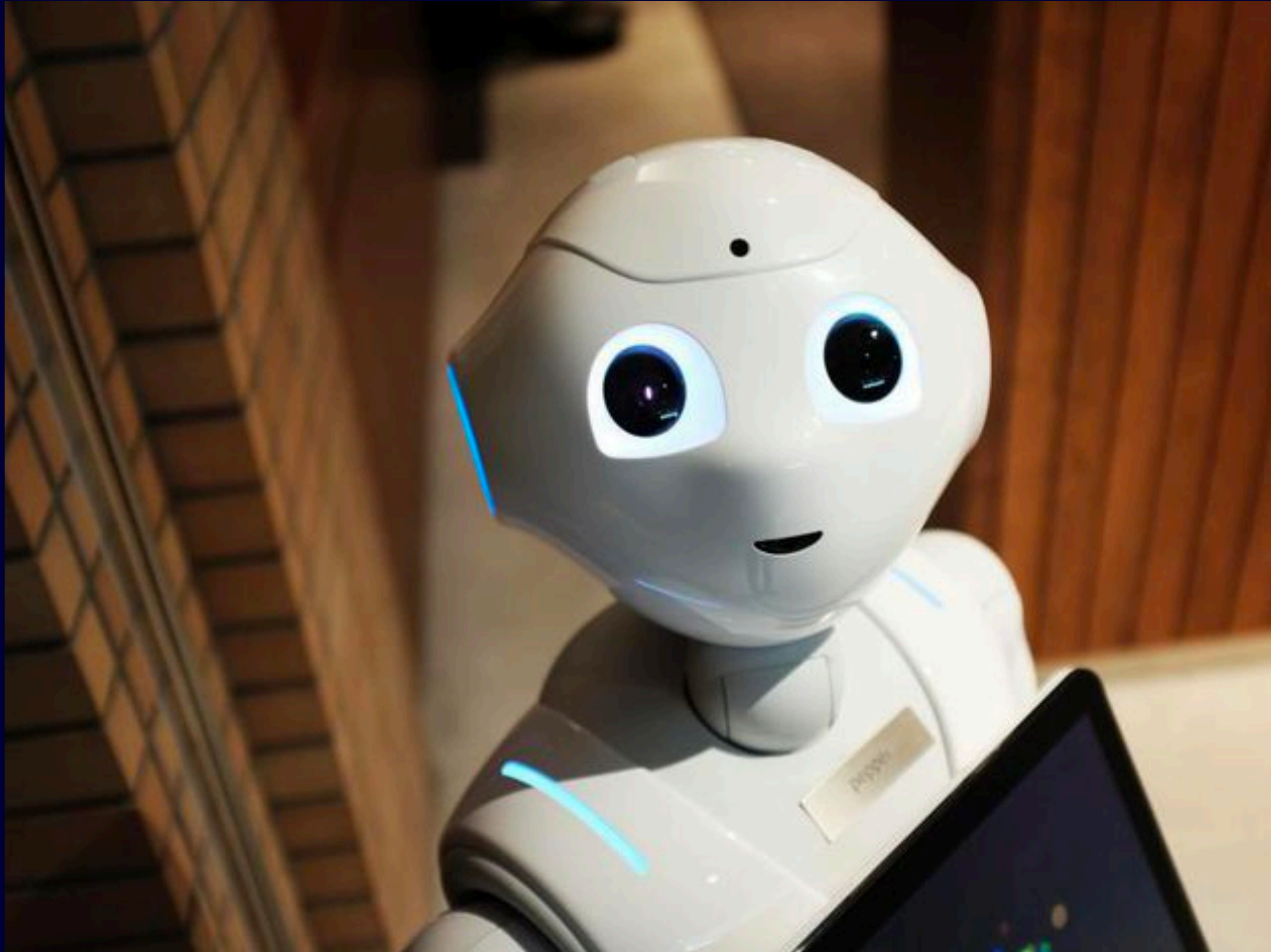
Full Stack Robotics Developer

Big three of the Full Stack Robotics Developer

- 1. Has to be based on ROS**
 - 2. Has to be based on Web technologies**
 - 3. Has to be based on AI applied to robotics**
-

Fully Remote Job!

1. Based on ROS



Why based on ROS?

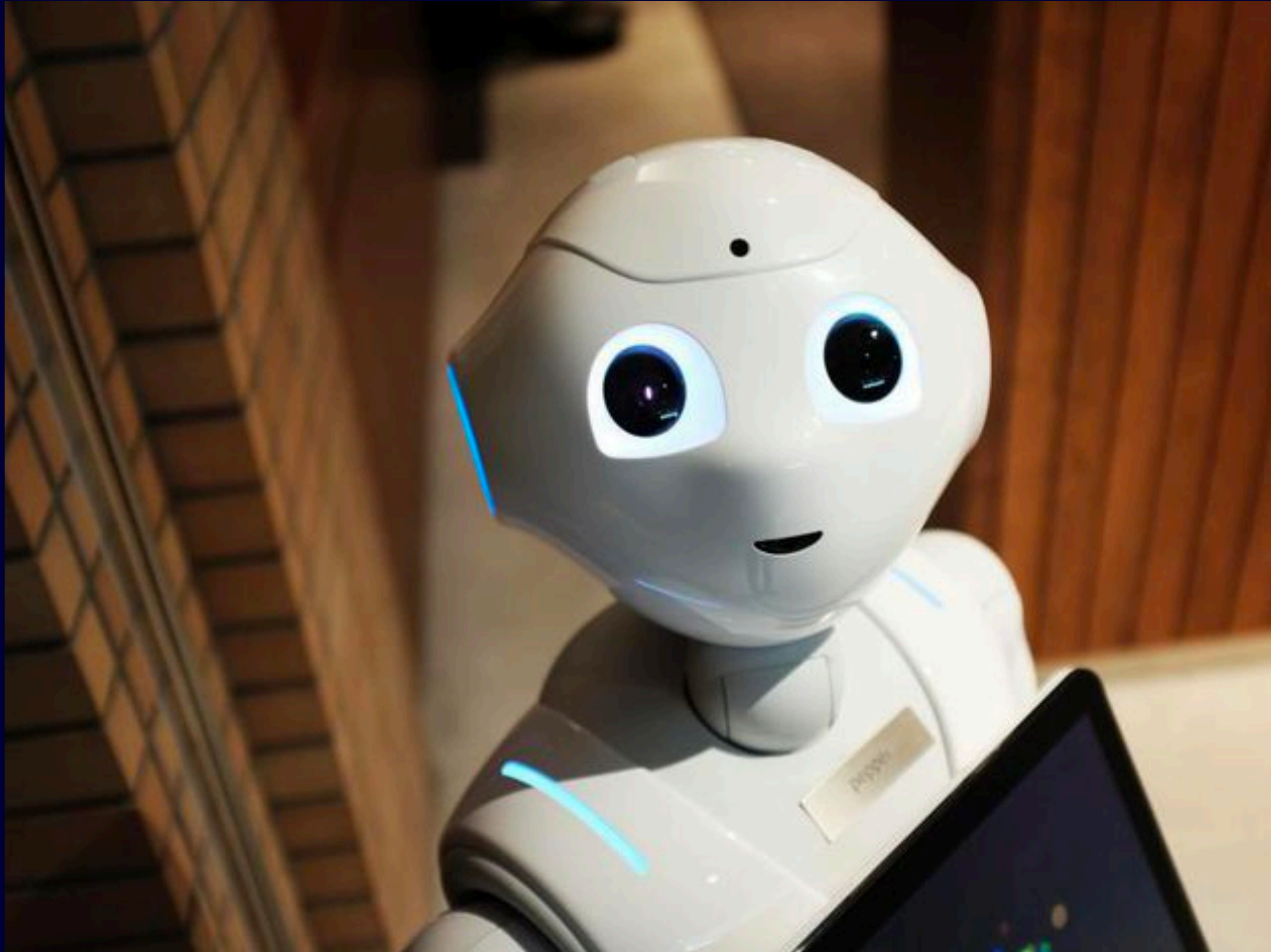
- * ROS provides a common interface to any robot: programs can be shared**

- * ROS provides a common interface for real robot and simulated robot: you can develop in simulation**

ROS at present

- * Mostly used in academia and research**
 - * Being used in many commercial robots**
 - * By 2025, 50% of commercial robots will contain ROS**
-

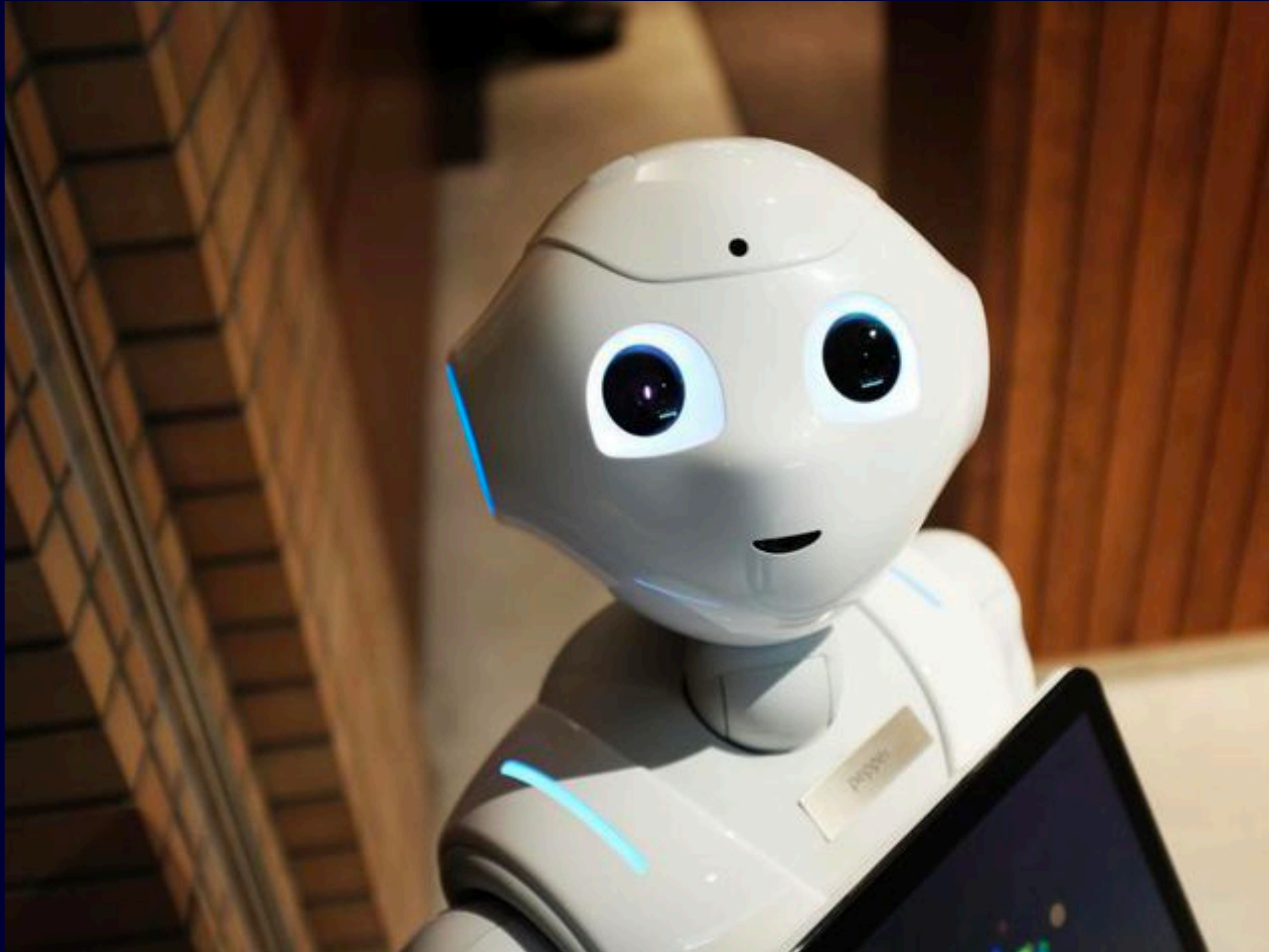
2. Web based



Why web based?

- * Universal interface for any device**
 - * User needs to install nothing**
 - * Simple usage interface for any user**
-

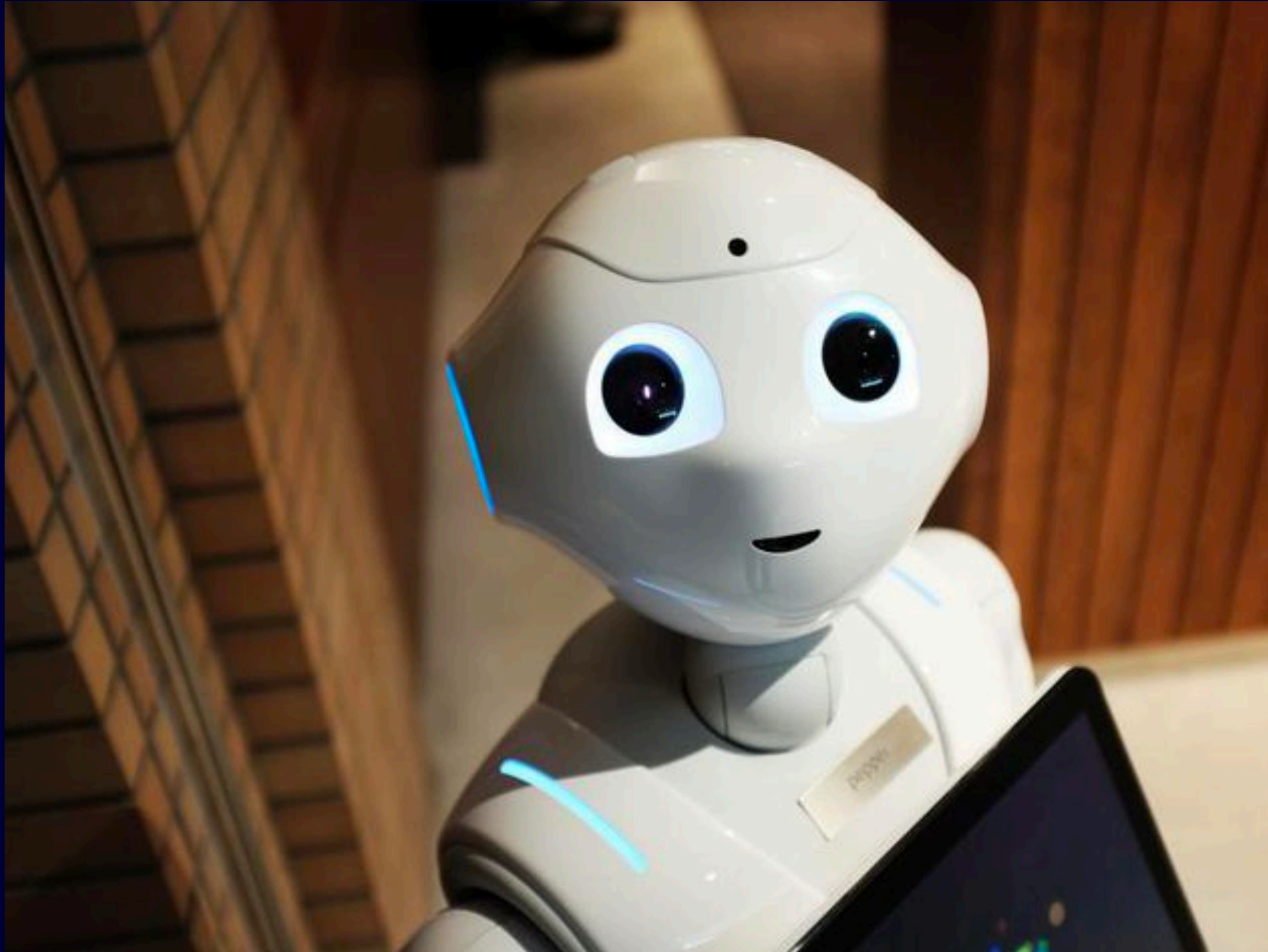
3. Based on AI for robots



Why AI for robots?

*** AI is the technology that can make robots intelligent enough to do the tasks**

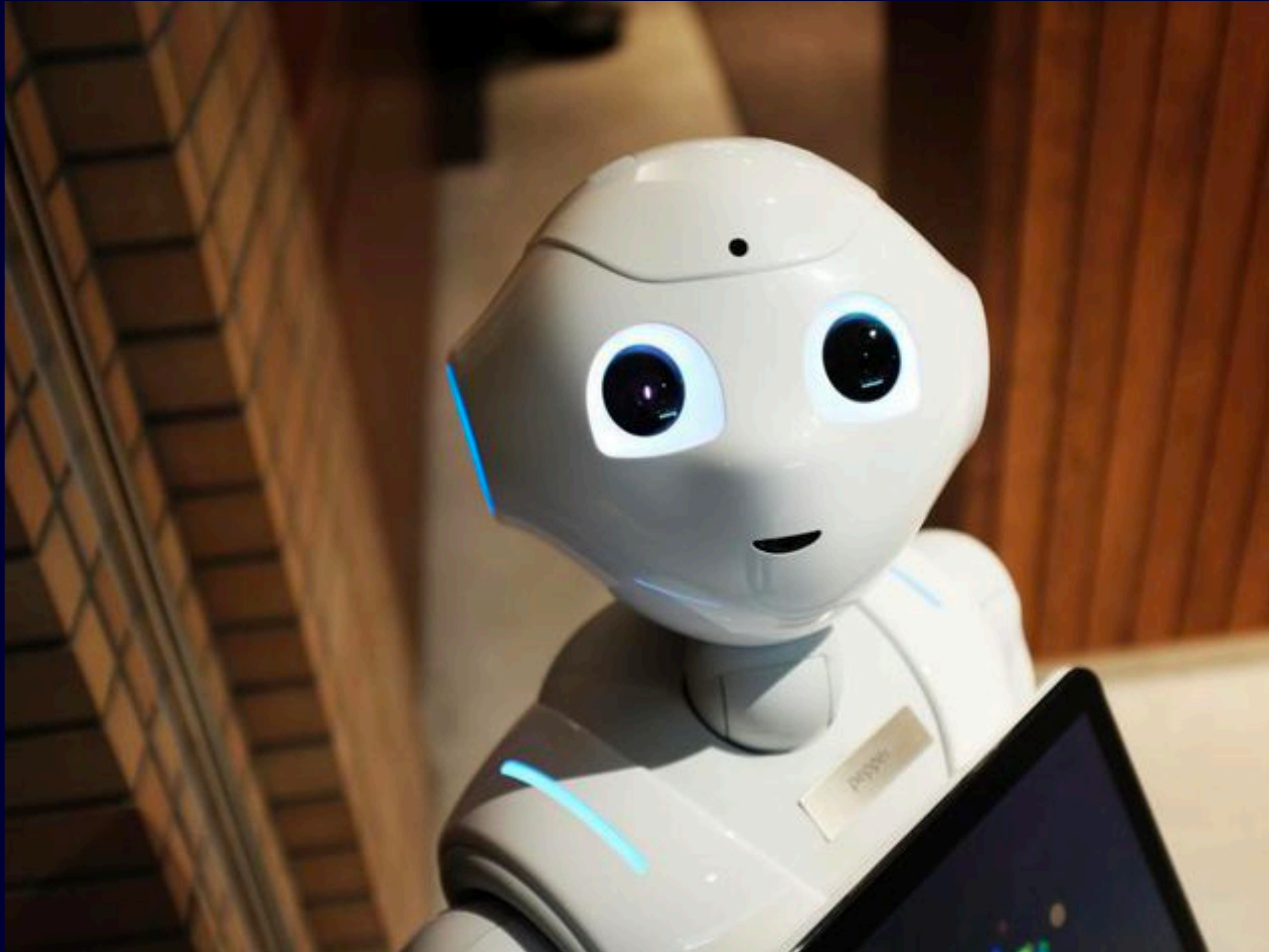
Programming Languages



Which programming languages for robots?

- * C++ for ROS development**
 - * Javascript for Web interfaces**
 - * Python for prototyping**
-

Additional Subjects to Learn



Which other subjects to learn?

- * Basic maths for robotics (algebra & probabilities)**

- * Robot kinematics**

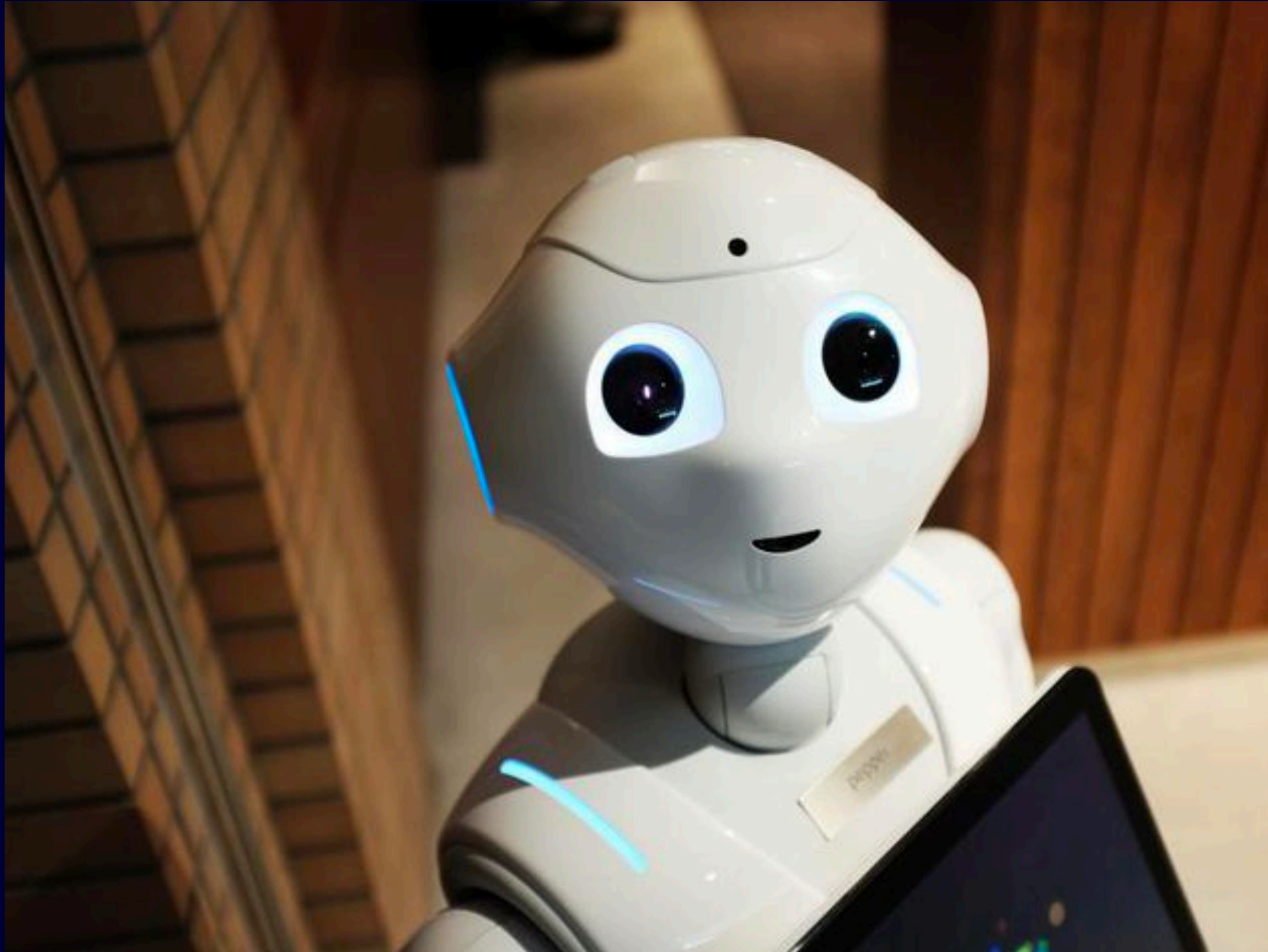
- * Robot dynamics**

- * Robot motion and control**

- * Robot simulations**

- * Real Time Control**

Is simulation enough?



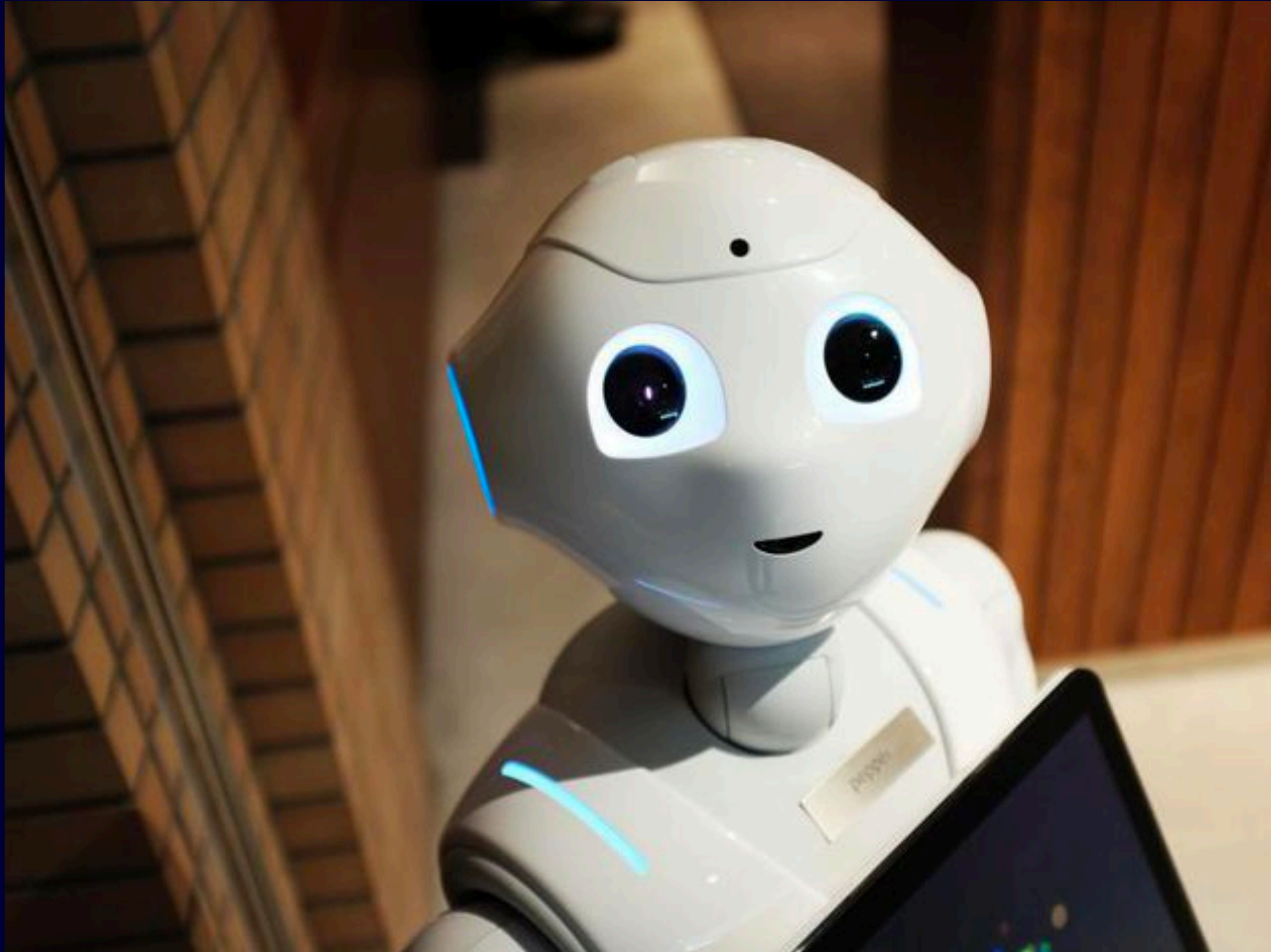
Is simulation enough?

*** No**

*** Use remote robotics labs**



How is the development procedure?



Developing for robots as a Full Stack Robotics Developer

0. You start with an existing robot and its simulation

1. Create a Python prototype of your idea

2. Test it on the simulation

3. If ok, develop the whole application on C++

4. Test in simulation

5. If it works, test in real robot

6. If it works, build a web interface for end-users

7. Add continuous integration and testing based on simulations

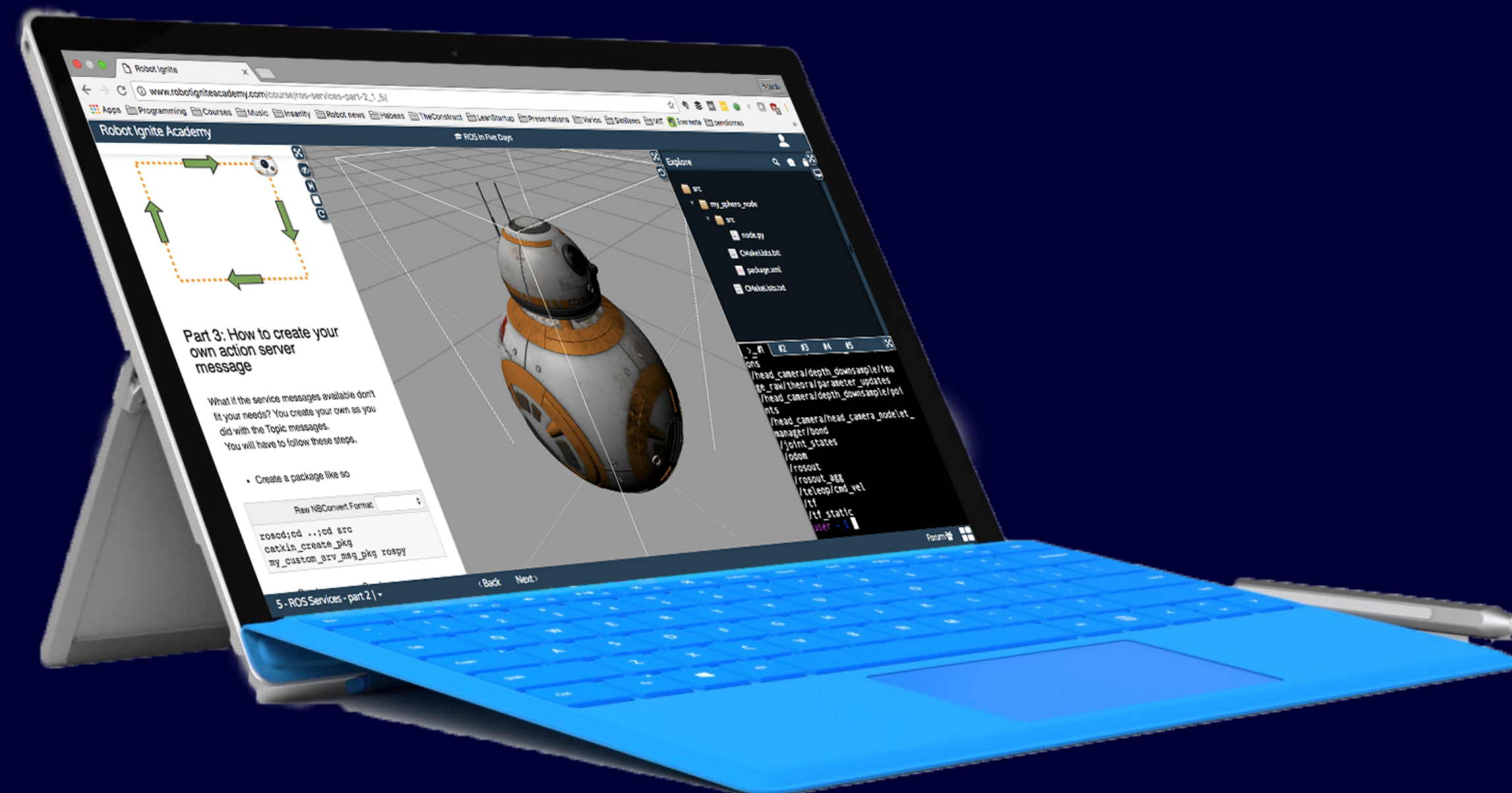
1. We need computer scientists to get intelligent robots
2. Full Stack Robotics Developer is a possible path
3. There are almost no competitors (at present)

Conclusions

In case you are interested in learning online

*** Start at our academy**

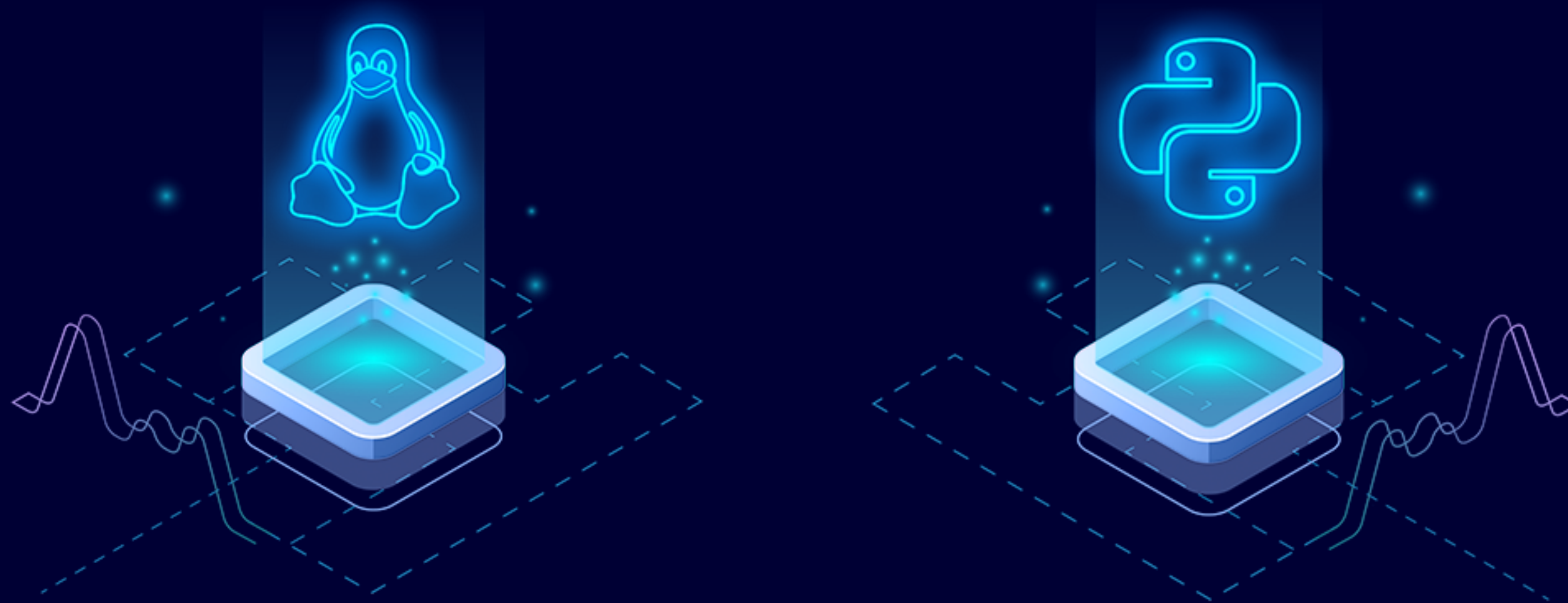
<http://robotignite.academy>



Free Online Courses to start:

1. Linux for Robotics: <https://bit.ly/2PACycJ>

2. Python for Robotics: <https://bit.ly/3gzPKdR>



Q&A

RICARDO TELLEZ
WWW.THECONSTRUCT.AI