b3b33lar: Turtlebot

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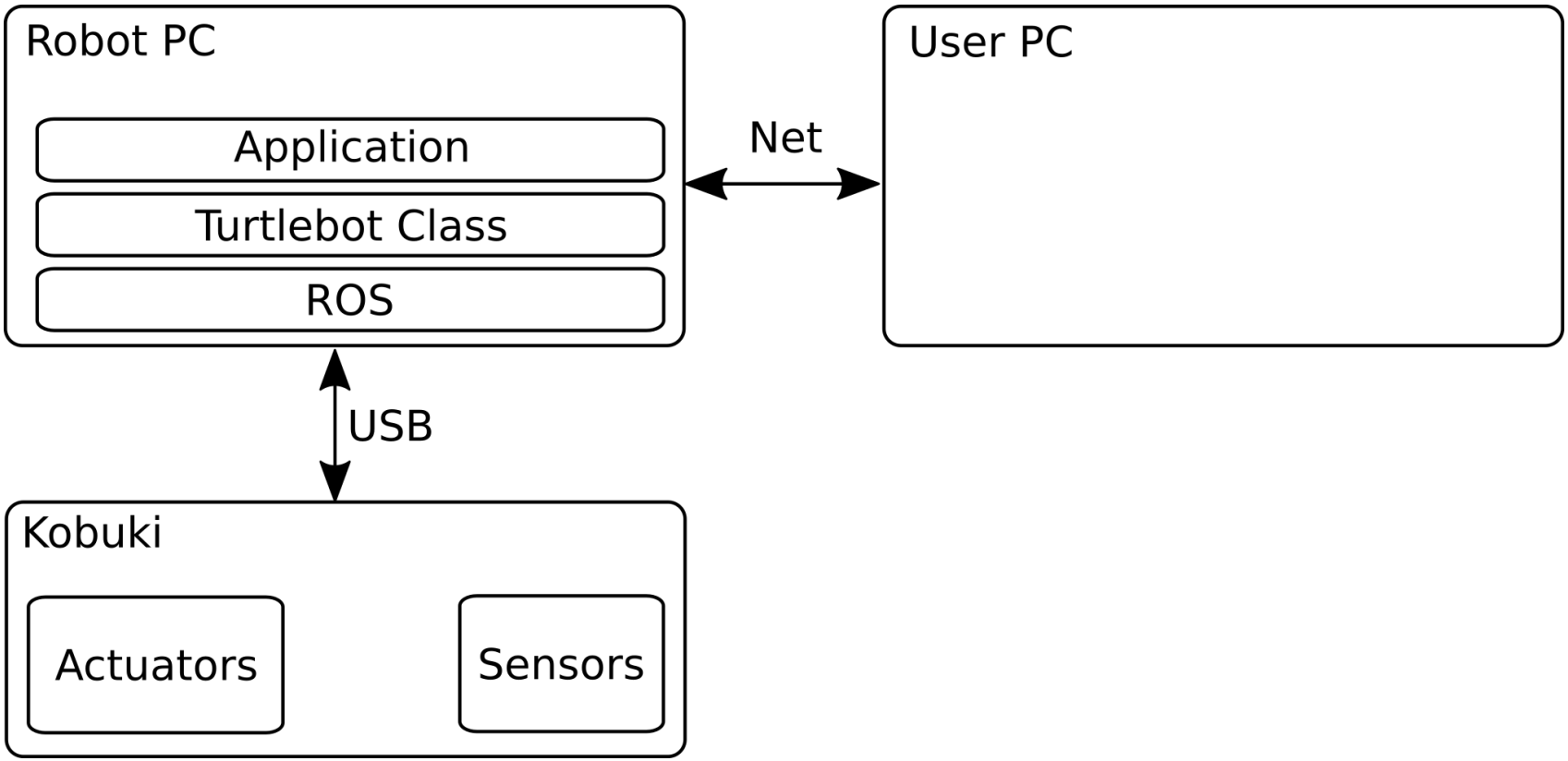
Turtlebot 2

- Kobuky base
  - Controll
  - Odometry
  - Bumper
  - ...
- NUC PC
  - SSH
  - Wifi
  - ROS
- RGBD Sensor
  - Intel RealSense
  - Orbex Astra

System overview



Robot Operating System (ROS)

- Middleware that integrates, sensors, robots and logic into modular system.
- In barebones it prowides communication layer between processing units.
- Suportsu multiple language and multiple machines.
- The main building blocks are Nodes, Topics and Services.

- Node - buildig block of robotic system. (camera driver, robot controller, image filter ...)
- Topic - named stream of data with same type.(rgb camera image, odometry, robot cmd ...)
- Service - named function, with specific request and response. (reset odometry, open gripper, compute ik ...)

Turtlebot Python Class

- `cmd_velocity(linear=0, angular=0) -> None`
  commands linear and angular velocity to the robot, this command has to be called repeatedli to ensure that the robot is moving.
- `get_odometry() -> [x,y,a]`
  get current position, estimated from the encoders and gyroscope.
- `reset_odometry() -> None`
  sets current position as an origin.

Turtlebot Python Class continue

- `get_rgb_image() -> image`
  gets RGB image from the RGBD camera.
- `get_depth_image() -> image`
  gets depth image from RGBD camera.
- `get_point_cloud() -> point_cloud`
  gets pointcloud from RGBD camera.
- `get_rgb_K(self) -> K`
  gets calibration matrix K for RGB camera.
- `get_depth_K(self) -> K`
  gets calibration matric K for Depth camera.

Turtlebot Python Class continue

- `register_button_event(fun) -> None`
  register button event callback.
- `register_bumper_event(fun) -> None`
  register bumper event callback.
- `play_sound(sound_id=0) -> None`
  plays one of the predefined sounds.

Examples: Move straight 1m

```
1  from turtlebot import Turtlebot, Rate, get_time
2
3  turtle = Turtlebot()
4  rate = Rate(10)
5
6  t = get_time()
7
8  while get_time() - t < 10:
9      turtle.cmd_velocity(linear=0.1)
10     rate.sleep()
```

Connect to robots

- Network in the e210 essid: e210bot, key: j6UsAC8a
- Using ssh: `ssh ros@turtle01` pass: r0sr0s
- Start robot driver: `turtle_start`
- Examples are in `./examples/`
- To start one: `python example_move_1m.py`

Resources

- Turtlebot
  - https://gitlab.fel.cvut.cz/wagnelib/turtlebot
  - http://www.turtlebot.com/turtlebot2/
  - http://wiki.ros.org/Robots/TurtleBot
  - http://wiki.ros.org/kobuki
- Python
  - https://www.python.org
  - https://docs.python.org/2.7/
- ROS
  - http://www.ros.org
  - http://wiki.ros.org
  - https://answers.ros.org