MIMIC

TRAINING MATERIAL

Contents

Human skills,
robot precision

We developed this kit with the purpose to help future robot operators learn Mimic features that enable automation of surface treatment in a variety of applications such as sanding, grinding and polishing.

The kit consists of a set of different shapes, exercise cards and this educator's guide.

Mimic is a software platform that enables flexible no-code automation of surface treatment applications such as sanding, grinding, and polishing by capturing and recreating hand movements through demonstration.

Depending on an application challenges and needs, the Mimic software can be used with different tracking technologies based on 1) Infrared light (IR) or 2) force torque sensing (FT).

Mimic Trackers

Mimic with IR Tracker
A wireless tracking system using infrared light to record human motions and transfer them to a robot.

Mimic with FT Tracker
Consisting of a force torque sensor making it possible to guide the robot in real-time.

Custom joysticks

Mimic users can create their own joysticks that resemble the tools they work with and makes the experience of teaching the robots even more intuitive.

Different surface treatment applications dictate different processes to achieve the results required. The process is often defined by the material, shape, size and the desired outcome.
Many of the processes can be automated once a robot operator learns how to control position, speed and force with Mimic software. The exercises in combination with the shapes will guide the students through learning that in three levels.

01 CAPTURE ORGANIC MOVEMENTS
There are many processes that have not been automated yet because traditional point-to-point programming methods are time-consuming, inflexible, expensive and require robot programming expert on site. The Mimic training kit provides materials that guide capturing organic hand movements of different complexities.

02 ACHIEVE PRECISION
Human hands are not precise when repeating the same task again and again. This is where Mimic features for controlling position, speed and force provide the accuracy different applications require.

03 BUILD PROCESSES
In some applications objects require work on both flat and organic surfaces at different precision levels. With Track, Teach, Tune and Play nodes and the different feature controls within them, students can learn and practice how to build complete surface treatment processes.

To make sure that the students and the educator get the most out of the Mimic training experience, we ask to make sure that the following are fulfilled before introducing Mimic to the students.

01

UR-specific requirements

• Update the robot to the newest version of Polyscope:
Universal Robots CB-series:
Polyscope 3.15+
Or
Universal Robots e-series:
Polyscope 5.11+

• Basic knowledge of Robot programming on UR (how to create robot programs and calibrate TCP).

Equivalent to:
www.academy.universal-robots.com/free-e-learning/e-series-e-learning
E-series Core Track or CB-series Core Track

02

Mimic - specific requirements

• IR: Mount the large pointer on the robot flange, calibrate TCP and set as default and mount the small pointer on the joystick.

• FT: Mount the FT and the angle bracket, using the rubber vibration dampeners and mount the angle bracket on the robot flange.

PROGRAM FLOW

The training kit is modular and therefore can facilitate training in different levels: basic, intermediate and advanced.

01 BASIC

The Basic Mimic training introduces the students to the key features. Besides learning how to capture hand movements on simple flat objects using the Track method, students learn how to lock axis, lock rotation and override the robot's speed.

02 INTERMEDIATE

Once familiar with the key Mimic functions, students learn how to offset recorded paths both in specific areas (local) and the whole recording (global) as well as control robot speed in specific areas. The students are also introduced to Teach, which is another method for capturing hand movements.
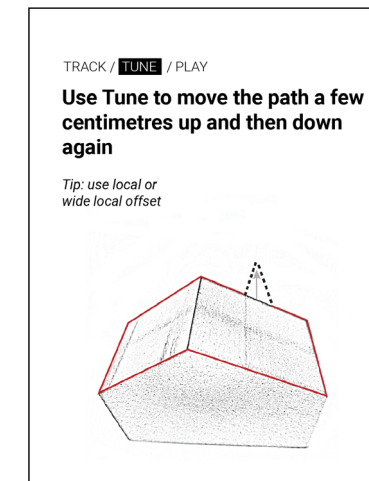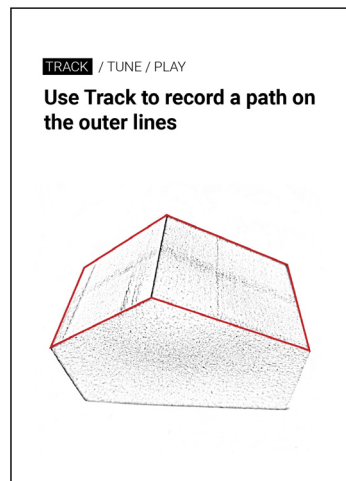
03 ADVANCED

The more advanced Mimic training introduces the students on how to create planes and lock the robot's movements to them. They learn to create more complex processes by combining the features they used in previous trainings using a variety of Track, Teach, Tune and Play nodes.

EXERCISE EXAMPLES

There are many different ways that the cards and the shapes can be used together to create exercises.
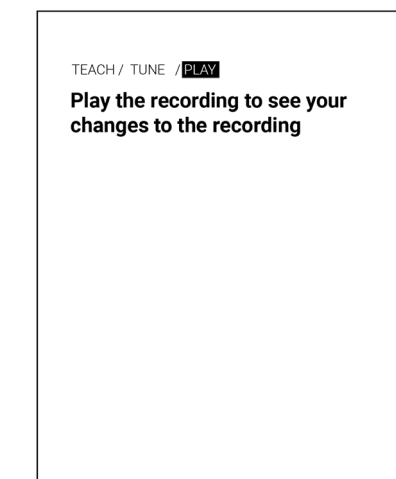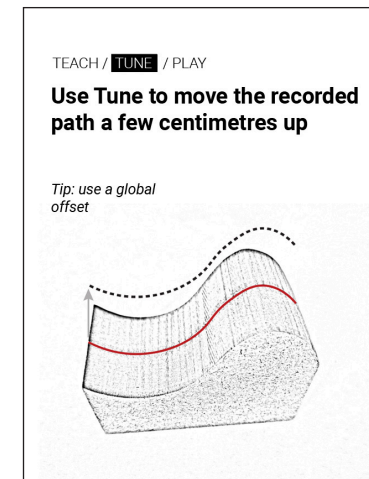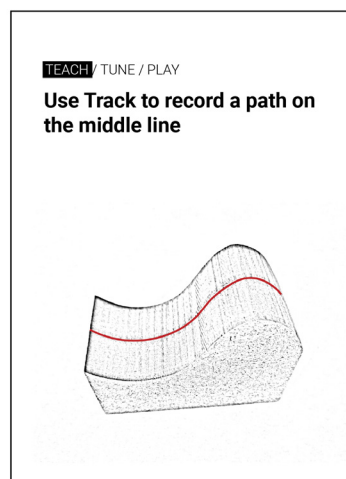
01 BASIC

TRACK / TUNE / PLAY

Use Track to record a path on the outer lines

TRACK / TUNE / PLAY

Use Tune to move the path a few centimetres up and then down again

Tip: use local or wide local offset

TRACK / TUNE / PLAY

Play the recording to see your changes to the recording

02 INTERMEDIATE

TEACH / TUNE / PLAY

Use Track to record a path on the middle line

TEACH / TUNE / PLAY

Use Tune to move the recorded path a few centimetres up

Tip: use a global offset

TEACH / TUNE / PLAY

Play the recording to see your changes to the recording

03 ADVANCED

TRACK / TUNE / PLAY
Use Track to record a path on the middle line

TRACK / TUNE / PLAY
Use Tune to change the recorded speed to a constant speed of 20 mm/s

Tip: use overwrite robot speed

v = 20 mm/s

TRACK / TUNE / PLAY
Use Tune to move the recorded path a few centimetres up

Tip: use a global offset

TRACK / TUNE / PLAY
Play the recording to see your changes to the recording

01 TRACK

TRACK / TUNE / PLAY
Use Track to record a path on the outer lines

TRACK / TUNE / PLAY
Use Track to record a path on the middle line

TRACK / TUNE / PLAY
Use Track to record on the outer lines

TRACK / TUNE / PLAY
Use Track to record a path with a constant height on the outer lines

Tip: lock the z-axis

TRACK / TUNE / PLAY
Use Track to record a path with an angle of 90 degrees between the pointer and the object and follow the outer lines

Tip: lock the rotation

90°

TRACK / TUNE / PLAY
Use Track to record a path on the middle line

TRACK / TUNE / PLAY
Use Track to record a path on the middle line

02   TUNE

Use Tune to move the path a few centimetres up and then down again

Tip: use local or wide local offset

Use Tune to change the recorded speed to a constant speed of 20 mm/s

Tip: use overwrite robot speed

v = 20 mm/s

Use Tune to move the recorded path a few centimetres up

Tip: use a global offset

Use Tune to change the recorded speed to a constant speed of 20 mm/s

Tip: use overwrite robot speed

v = 20 mm/s

Use Tune to move the recorded path a few centimetres up

Tip: use a global offset

03   TEACH

Use Teach to record a path on the outer lines

Use Teach to record a path on the middle line

Use Teach to record a path on the outer lines

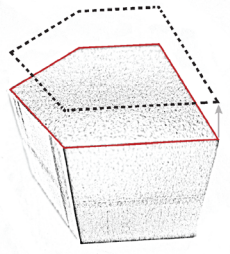**Use Track to record a path on the middle line**

Use Track to record a path on the middle line

04	TUNE

TEACH / **TUNE** / PLAY

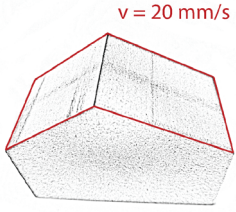**Use Tune to move the recorded path a few centimetres up**

Tip: use a global offset

TEACH / **TUNE** / PLAY

Use Tune to change the recorded speed to a constant speed of 20 mm/s

Tip: use overwrite robotic speed
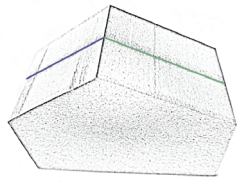
v = 20 mm/s

TEACH / **TUNE** / PLAY

Use Tune to change the recorded speed to speed intervals of 10 mm/s and 50 mm/s

Tip: use overwrite robotic speed

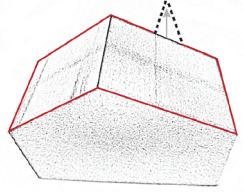$v_1 = 10$ mm/s
$v_2 = 50$ mm/s

TRACK / **TUNE** / PLAY

Use Tune to move the path a few centimetres up and then down again

Tip: use local or wide local offset

05	PLAY

TRACK / TUNE / **PLAY**

Play the recording to see your changes to the recording

TEACH / TUNE / **PLAY**

Play the recording to see your changes to the recording

ABOUT NORDBO ROBOTICS

Nordbo Robotics is a Danish company developing robotic software that enables No code automation of complex surface treatment and quality inspection. By combining the process know-how from craftsmen with the repeatability and precision of robots, we help companies improve their manufacturing capabilities and scale their businesses.

NORDBO ACADEMY