

- This kit contains over 1,500 individual pieces. Please ensure you are familiar with the contents.
- All the files needed to setup and run your robot can be found at the bottom of the Studica WorldSkills page at <https://www.studica.co/worldskills>

- Documentation & Training Material - <https://docs.wsr.studica.com>

- Training Videos – You can start with the following,

#### **Day 1 - Getting started with WorldSkills Mobile Robotics**

( <https://www.youtube.com/watch?v=cFx3ld-mhvY> )

1. Competition Overview and Requirements
2. Introduction to the World Skills Collection
3. Hardware Construction Tips and Tricks

#### **Day 2 – Building a basic robot**

( <https://www.youtube.com/watch?v=SBETsYISEag> )

1. Mechanical Build
  - Base Structure (Drive System)
  - Drive Type and Working Principles
  - 3 wheeled omni drive build
  - Sample Training Platform
2. Electrical build
  - Sample wiring of the Electrical System

#### **Day 3 – Programming in Java**

○ ( <https://www.youtube.com/watch?v=aKBEbiiGRyg> )

1. Introduction to Programming
2. Starting Java
3. Example Projects for WorldsSkills-<https://github.com/studica/WorldSkills-Example-Projects>
4. Configuring and Testing the SR Camera

#### **Day 4 – Core Programming**

○ ( <https://www.youtube.com/watch?v=aSXyphb5jBo> )

1. Creating a Sample Project (Java)
2. Basic Digital I/O
3. Cobra Line Sensor Board
4. Sharp I/R Sensor
5. Ultrasonic Distance Sensor
6. Basic Control of a DC Motor
7. Basic Control of a Servo Motor
8. Adding the Shuffleboard user Interface to see data











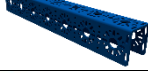





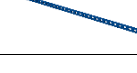
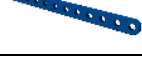

#### **Day 5 - Design of a Basic Robot Control System**


• ( <https://www.youtube.com/watch?v=YLAldHITJ28> )





















1. Introduction to Programming the IMU (NavX)
2. Gamepad Setup to Control and test robot functionality
3. Introduction to Vision with the SR Camera
4. Introduction to the Quick Driver Console
5. Driving the Base Robot
6. Review of Configuring the Titan QUAD




# Worldskills Mobile Robotics Shanghai 2022 Parts List

Description	Part #	Image	In Pack	In Kit
<b>Electronics and Accessories</b>				
IR Range Sensor (10 cm to 80 cm)	40117		1	2
IR Range Sensor Bracket	40118		1	2
Zip Ties, Blue, 150mm (100 pack)	70010		100	1
12V 3,000 mAh NiMH Battery Pack, PP45	70018		1	2
NiMH Battery Pack Charger, PP45	70019		1	1
Powerpole 45 Extension Cable, 14AWG, 50cm	70021		1	2
Robotics Toolbox	70055		1	1
Remote Control Device	70111		1	1
2.5mm Hex Ball End Screwdriver	70142		1	1
Hex Key Metric 7 Piece Set (1.5, 2, 2.5, 3, 4, 5, 6)	70144		1	1
Combination Wrench, 5.5mm	70145		1	1
Cobra Line Follower Sensor	70151		1	1
Titan Quad Motor Controller	70152		1	1
VMX Cable Pack	70160		1	1
Titan Cable Pack w/1 CAN Cable & 2 JST-VH to JST-VH Cable	70162		1	1
Power Control Panel	70170		1	1
VMX Robotics Controller	70176		1	1
USB Cable, Type A to Type C, Blue, 2M	70186		1	1
Ultrasonic Distance Sensor	70753		1	2
Ultrasonic Distance Sensor Bracket	40238		1	2

Analog Module w/JST-SH to JST-GH Cable	70755		1	1
PWM cable Set - TJC8 3 pin, 22AWG, F-F - 12 pcs	71011		12	1
Dupont Single Pin, 4 wire, F-F Cable - 2 pack	71014		2	1
SR-Pro Camera	71045		1	1
Short Lever Limit Switch (4 pack)	72060		4	1
Maverick 12V DC Gear Motor w/Encoder	75001		1	4
Multi-Mode Smart Servo	75002		1	3
Smart Robot Servo Programmer	75003		1	1
6V DC AA Battery Holder w/TJC8 Female, 22AWG	75004		1	1
Servo Power Block	75006		1	1
<b>U-Channel</b>				
336mm U-Channel	76012		1	3
288mm U-Channel (2 pack)	76013-2		2	2
144mm U-Channel (2 pack)	76016-2		2	1
96mm U-Channel (2 pack)	76017-2		2	1
48mm U-Channel (2 pack)	76018-2		2	4
288mm Low U-Channel (2 pack)	76028-2		2	1
<b>Flat Beams</b>				
288mm Flat Beam (2 pack)	76043-2		2	2
96mm Flat Beam (2 pack)	76047-2		2	2
<b>Flat Brackets</b>				
288mm x 40mm Flat Bracket (2 pack)	76061-2		2	1

192mm x 40mm Flat Bracket (2 pack)	76063-2		2	1
144mm x 40mm Flat Bracket (2 pack)	76064-2		2	2
96mm x 40mm Flat Bracket (2 pack)	76065-2		2	3
192mm x 96mm Flat Bracket (2 pack)	76066-2		2	1
<b>Irregular Brackets</b>				
120 Degree Bracket (2 pack)	76080-2		2	3
90 Degree Bracket (2 pack)	76081-2		2	4
135 Degree Bracket (2 pack)	76082-2		2	1
96mm Adjustable Flat Bracket (2 pack)	76083-2		2	2
T Bracket (2 pack)	76084-2		2	1
X Bracket (2 pack)	76085-2		2	1
Inside U Bracket (2 pack)	76086-2		2	2
L Bracket (2 pack)	76087-2		2	4
Battery Clip (2 pack)	76088-2		2	1
Inside L Bracket (2 pack)	76089-2		2	4
<b>Mounting Plates</b>				
Motor Mount Plate	76140		1	4
Motor Mount Clamp Kit	76141		1	4
End Piece Plate (2 pack)	76143-2		2	4
Servo Standard Front Mount	76144		1	3
Servo Mount Flat Plate	76145		1	3

Servo Mount Offset Plate	76146		1	3
Servo Horn 25T	76148		1	3
6mm D-Shaft Servo Hub 25T	76149		1	3
<b>Axles, Slides, Rack &amp; Pinion</b>				
6mm x 35mm D-Shaft (6 pack)	76159-6		6	1
6mm x 70mm D-Shaft (6 pack)	76160-6		6	1
6mm x 96mm D-Shaft (6 pack)	76161-6		6	1
6mm x 432mm D-Shaft (2 pack)	76162-2		2	1
Rack & Pinion Set	76170-2		2	1
250mm Linear Slide Kit	72064		1	1
<b>Standoffs</b>				
42mm Standoff (12 pack)	76180-12		12	1
48mm Standoff (12 pack)	76181-12		12	1
25mm Standoff (12 pack)	76182-12		12	1
<b>Screws, Nuts</b>				
M3 x 8mm Socket Head Cap Screw (pack of 100)	76200-100		100	2
M3 x 10mm Socket Head Cap Screw (pack of 100)	76201-100		100	2
M3 x 12mm Socket Head Cap Screw (pack of 100)	76202-100		100	2
M3 x 10mm Button Head Cap Screw (pack of 50)	76203-50		50	1
M3 x 20mm Socket Head Cap Screw (pack of 50)	76209-50		50	1
M3 x 30mm Socket Head Cap Screw (pack of 50)	76206-50		50	1
M3 Kep Nut (pack of 100)	76204-100		100	2
M3 Nyloc Nut (pack of 100)	76205-100		100	1

<b>Gears, Sprockets, Pulleys, Belts</b>				
32 Tooth Gear (2 pack)	76220-2		2	2
64 Tooth Gear (2 pack)	76221-2		2	2
13 Tooth Bevel Gear, 6mm D-Shaft (2 pack)	76223-2		2	2
26 Tooth Bevel Gear (2 pack)	76224-2		2	2
24 Tooth - Sprocket (2 pack)	76226-2		2	1
32 Tooth Sprocket (2 pack)	76227-2		2	1
#25 Chain with Master Links, 5 feet(152cm)	76230		1	1
6mm Timing Pulley, 10 Tooth (2 pack)	76232-2		2	1
10mm Timing Belt (1 meter)	76233		1	1
<b>Bushings, Bearings, Coupling, Collars and Spacers</b>				
6mm Shaft Hub (4 pack)	76284-4		4	4
Bushing Bronze 6mm ID x 8mm OD (12 pack)	76300-12		12	1
Bushing Bronze 6mm ID x 14mm OD (12 pack)	76301-12		12	1
Flange Bearing 6mm ID, 14mm OD, 15mm Flange (12 pack)	76302		12	1
Coupling 6mm ID D-Shaft, 12mm OD (2 pack)	76303-2		2	2
Collar 6mm ID D-Shaft, 12mm OD (6 pack)	76304-6		6	2
Shaft Spacer Plastic 6mm ID x 10mm OD x 1mm L (24 pack)	76305-24		24	1
Shaft Spacer Plastic 6mm ID x 10mm OD x 2mm L (24 pack)	76306-24		24	1
Shaft Spacer Plastic 6mm ID x 10mm OD x 5mm L (12 pack)	76307-12		12	1
Shaft Spacer Plastic 6mm ID x 10mm OD x 20mm L (6 pack)	76308-6		6	1
<b>Wheels</b>				
Omni Wheel (100mm, Double Plastic, w/ integrated 6mm Hub)	76260		1	4