## Rolling Road:

### Block ”:Power sensor”

The Power sensor receives power from the external power source (battery). Signals representing the voltage and current emit from the Power sensor as voltage 0-5V.

Interface description:

#### :power

Direction: [External power source] -> [Power sensor]

The power received from the external power source.

#### Power\_V:Voltage

Direction: [Power sensor] -> [Control unit]

An analog signal in the interval 0-5V, which represents the voltage of the power received from the external power source.

#### Power\_I:Voltage

Direction: [Power sensor] -> [Control unit]

An $XXX signal in the interval 0-5V, which represents the current of the power received from the external power source.

### Block ”:Wheel”

After:Torque from the Rolling Road wheel, Wheel, represents the Before:Torque from the external car.

Interface description:

#### Before:Torque

Direction: [external car wheel] -> [Wheel]

Torque from car wheel.

#### After:Torque

Direction: [Wheel] -> [Torque sensor]

The Torque of the Rolling Road wheel, Wheel, goes into the Torque sensor and the Load system.

### Block ”:Torque sensor”

Torque from the Rolling Road wheel, Wheel, goes into the Torque sensor and the Torque sensor transmits two analog Voltage signals that represents the Torque and the Velocity.

Interface description:

#### Velocity:Voltage

Direction: [Torque sensor] -> [Control unit]

An analog signal in the interval 0-5V, which represents the rotational velocity of the Wheel.

#### Torque:Voltage

Direction: [Torque sensor] -> [Control unit]

An analog signal in the interval 0-5V, which represents the torque from the car through the Wheel.

### Block ”:Load system”

Torque from the Rolling Road wheel, Wheel, goes into the Load system. The Load system receives, from the Control unit, a digital signal which controls the Load system and the Load system transmits a Voltage which represents the current in the Load system to the Control unit.

Interface description:

#### :Torque

Direction: [Wheel] -> [Load system]

The Torque of the Rolling Road wheel, Wheel, goes into the Load system.

#### :PWM

Direction: [Control unit] -> [Load system]

A digital signal 0V/5V, which controls the Load system.

#### :Voltage

Direction: [Load system] -> [Control unit]

An analog signal in the interval 0-5V, which represents the current in the Load system.

### Block ”:Computer”

The Computer receives data from the Control unit via an UART connection.

Interface description:

#### :UART

Direction: [Control unit] -> [Computer]

UART connection to transmit data from Control Unit to Computer.

### Block ”:Control unit”

The Control Unit receives analog voltage signals from the Power Sensor that represents the voltage and current of the power from the external power source. The Control Unit also receives analog voltage signals from the Torque Sensor that represents the torque and angular velocity of the torque of the Wheel. The Control Unit controls the Load System with a digital signal and receives an analog signal that represents the current through the Load System. The Control Unit transmits data to the Computer via an UART connection.

Interface description:

#### Power\_V:Voltage

Direction: [Power sensor] -> [Control unit]

An analog signal in the interval 0-5V, which represents the voltage of the power received from the external power source.

#### Power\_I:Voltage

Direction: [Power sensor] -> [Control unit]

An $XXX signal in the interval 0-5V, which represents the current of the power received from the external power source.

#### Velocity:Voltage

Direction: [Torque sensor] -> [Control unit]

An analog signal in the interval 0-5V, which represents the rotational velocity of the Wheel.

#### Torque:Voltage

Direction: [Torque sensor] -> [Control unit]

An analog signal in the interval 0-5V, which represents the torque from the car through the Wheel.

#### :PWM

Direction: [Control unit] -> [Load system]

A digital signal 0V/5V, which controls the Load system.

#### :Voltage

Direction: [Load system] -> [Control unit]

An analog signal in the interval 0-5V, which represents the current in the Load system.

#### :UART

Direction: [Control unit] -> [Computer]

UART connection to transmit data from Control unit to Computer.

## AU2:

### Block ”:Battery”

The battery transmits power to the Battery Management System.

Interface description:

#### :Power

Direction: [Battery] -> [Battery Management System]

The supplied power from the Battery.

### Block ”:Battery Management System”

The power transmitted from the Battery is distributed to Motor Control Unit and DC Motor.

Interface description:

#### CU:Power

Direction: [Battery Management System] -> [Motor Control Unit]

The distributed power from the Battery Management System to the Motor Control Unit.

#### DC\_Motor:Power

Direction: [Battery Management System] -> [DC Motor]

The distributed power from the Battery Management System to the DC Motor.

### Block ”:Horn”

The Horn receives a PWM signal from the Motor Control Unit when the Horn should sound and with a frequency represented as the frequency of the sound.

Interface description:

#### :Power

Direction: [Motor Control Unit] -> [Horn]

The PWM signal from the Motor Control Unit to the Horn, which controls the frequency of the sound.

### Block ”:DC Motor”

The DC Motor receives the distributed power from the Battery Management System. Furthermore receives the DC Motor a PWM signal from the Motor Control Unit when the DC Motor must speed up, and a duty cycle on zero when the DC Motor must coast.

Interface description:

#### :Fixed PWM

Direction: [Motor Control Unit] -> [DC Motor]

The PWM signal from the Motor Control Unit is at a fixed PWM duty cycle when the DC Motor must speed up. When the DC Motor is coasting the PWM duty cycle becomes zero.

#### DC\_Motor:Power

Direction: [Battery Management System] -> [DC Motor]

The distributed power from the Battery Management System to the DC Motor.

#### :Torque

Direction: [DC Motor] -> [External Car Wheel]

The Torque from the DC Motor to the External Car Wheel.

### Block ”:Stop Switch”

The Stop Switch transmits a “high” XXXVoltage to the Motor Control Unit when the Stop Switch is pressed and thereby closed. A “low” XXXVoltage is transmitted to the Motor Control Unit when the Stop Switch is open, which makes the car able to drive.

Interface description:

#### :Voltage

Direction: [Stop Switch] -> [Motor Control Unit]

A digital signal from the Stop Switch to the Motor Control Unit XXXXVoltage. When the digital signal is “high” the car must stop, and when “low” the car must be able to drive.

### Block ”:Deadman Switch”

The Deadman Switch transmits a “high” XXXVoltage to the Motor Control Unit when the Deadman Switch is pressed. A “low” XXXVoltage is transmitted to the Motor Control Unit when the Stop Switch is open, which must stop the car.

Interface description:

#### :Voltage

Direction: [Deadman Switch] -> [Motor Control Unit]

A digital signal from the Deadman Switch to the Motor Control Unit XXXXVoltage. When the digital signal is “high” the car must be able to drive, and when “low” the car must stop.

### Block ”:Motor Control Unit”

The Motor Control Unit controls the DC Motor and the Horn with PWM signals. The Motor Control Unit receives power from the Battery Management System, a digital signal from the Stop Switch and a digital signal from the Deadman Switch.

Interface description:

#### CU:Power

Direction: [Battery Management System] -> [Motor Control Unit]

The distributed power from the Battery Management System to the Motor Control Unit.

#### :Power

Direction: [Motor Control Unit] -> [Horn]

The PWM signal from the Motor Control Unit to the Horn, which controls the frequency of the sound.

#### :Fixed PWM

Direction: [Motor Control Unit] -> [DC Motor]

The PWM signal from the Motor Control Unit is at a fixed PWM duty cycle when the DC Motor must speed up. When the DC Motor is coasting the PWM duty cycle becomes zero.

#### :Voltage

Direction: [Stop Switch] -> [Motor Control Unit]

A digital signal from the Stop Switch to the Motor Control Unit XXXXVoltage. When the digital signal is “high” the car must stop, and when “low” the car must be able to drive.

#### :Voltage

Direction: [Deadman Switch] -> [Motor Control Unit]

A digital signal from the Deadman Switch to the Motor Control Unit XXXXVoltage. When the digital signal is “high” the car must be able to drive, and when “low” the car must stop.