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## Tutorial FT Servo Toolbox

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```
% 2020-09-30: Yannick Krieger/Korbinian Rzepka, MIMED, Prof. Lueth - Technische Universität München, Germany
% (URL: <https://www.mw.tum.de/mimed>) - Last Change: 2020-09-30
```

### 1. Motivation for this tutorial

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This tutorial explains control of Feetech Servos via MATLAB using a MATLAB-Servo-Lib (FT Servo Toolbox) written by Dominik Rumschoettel

### 2. List of functions introduced in this tutorial

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The tutorial shows the basic functions of the FT Servo Toolbox by Dominik Rumschoettel

### Toolbox FTServo

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Install of the Toolbox by double click on the Toolbox file FTservo Toolbox  
Minimum Matlab Version: 2019b

### Initializing bus object for servos.

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The bus needs the COM Port and the BAUDRATE of the used servos.

- SM Servo default BAUDRATE = 115200
- SC Servo default BAUDRATE = 1000000
- COM port can be found using devicemanager or Feetech Debug software. (<http://www.feetechrc.com/software.html>)

```
baudrate = 115200;
% Bus = FTBus("COM9",baudrate);
try
    Bus = FTBus("/dev/cu.usbserial-14520",baudrate)
catch
    warning('Robot or FeeTech-Sensors are not connected');
    return
end
```

Warning: Robot or FeeTech-Sensors are not connected

### Initializing servos

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To initialize a servo a BUS object and the respective ID is needed.

- Default ID = 1
- Depending on the Servo that is used there are different methods for initializing.

```
servo_id = 1;
Servo = SBLServo(Bus,servo_id);    % Use for SM40BL and SM120BL
%   Servo = SCLServo(Bus,servo_id);    % use for SM85CL
```

## Reading servo data

An input cycle stores the data of the servo in the servo object.

```
Servo.Input();
%
%   Servo.actPos;                % Current position of servo
%   Servo.actSpeed;             % Current Speed
```

## Setting configurations Variables

To set configuration variables it is necessary to use the right Servo object, because the servos have different values for their eeprom lock.

```
Servo.cfgID = 2;                % Setting servo ID.

Servo1.cfgCtrlP = 100;          % Setting controller P value.
Servo1.cfgCtrlI = 50;          % Setting controller I value.
Servo1.cfgCtrlD = 0;           % Setting controller D value.

Servo.Output();                % Writes the configuration.
```

## Control Servo

To control the servos a goal position and the speed has to be set.

```
Servo.setPos = 3000;            % Sets the goal position. 0-4096
Servo.setSpeed = 1000;         % Sets the speed. 0-4096

Servo.Output();                % Writes the variables to servo.
```

## Disabling Torque for free Movement by hand

To make the servos movement free of torque the max torque value needs to be set to 0.

```
Servo.cfgLimitVoltMax = 0;     % Sets value for maximum voltage to 0 V
Servo.Output();

Servo.cfgLimitVoltMax = 160    % Sets value for maximum voltage to 16 V
Servo.Output();
```

## Example LCL Robot 1

Components 2x Feetech SM120BL <http://www.feetechrc.com/> 1x Feetech SM85CL <http://www.feetechrc.com/> 1x Feetech SM40BL <http://www.feetechrc.com/> 1x FE-URT-1 <http://www.feetechrc.com/> 3x MINI SPOX Kabel (20cm/50cm/75cm) [https://www.deutsch.molex.com/molex/products/part-detail/crimp\\_housings/0050375043](https://www.deutsch.molex.com/molex/products/part-detail/crimp_housings/0050375043) 1x MINI SPOX Verlängerung SM120BL [https://www.deutsch.molex.com/molex/products/part-detail/crimp\\_housings/0050375043](https://www.deutsch.molex.com/molex/products/part-detail/crimp_housings/0050375043) 1x Mini USB Kabel 1x 15V Netzteil <https://www.conrad.de/de/p/mean-well-gsm120a15-r7b-tischnetzteil-festspannung-15-v-dc-7-a-105-1837910.html> 1x Netzteil Stecker <https://www.conrad.de/de/p/kycon-dc-4pol-panel-kpjax-pm-4s-s-1594181.html> 1x Spacemouse 1x SLS Bauteilsatz 20x M3x8 20x M3x12 20x M3x16 20x M3x25

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