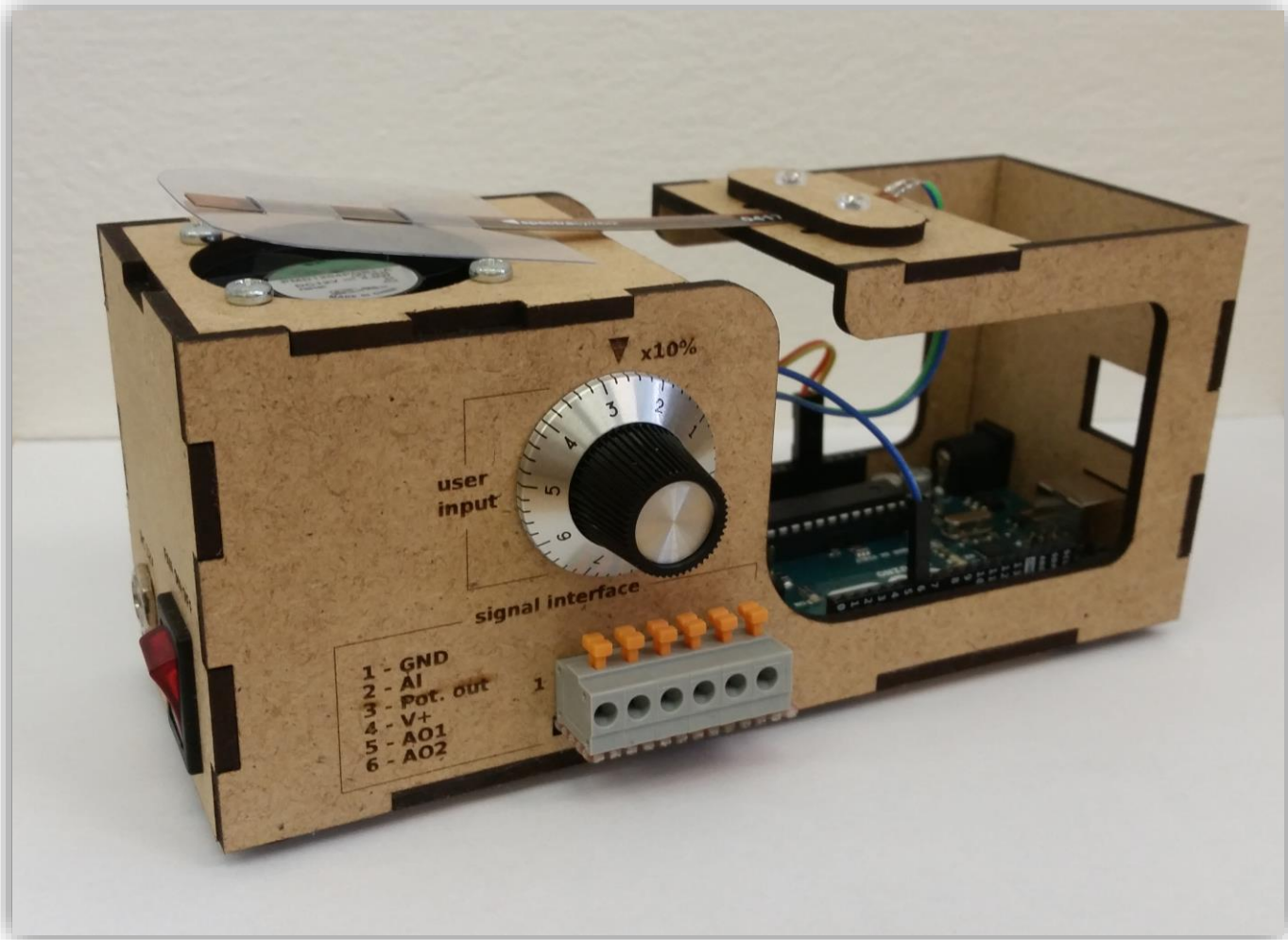


Flexy

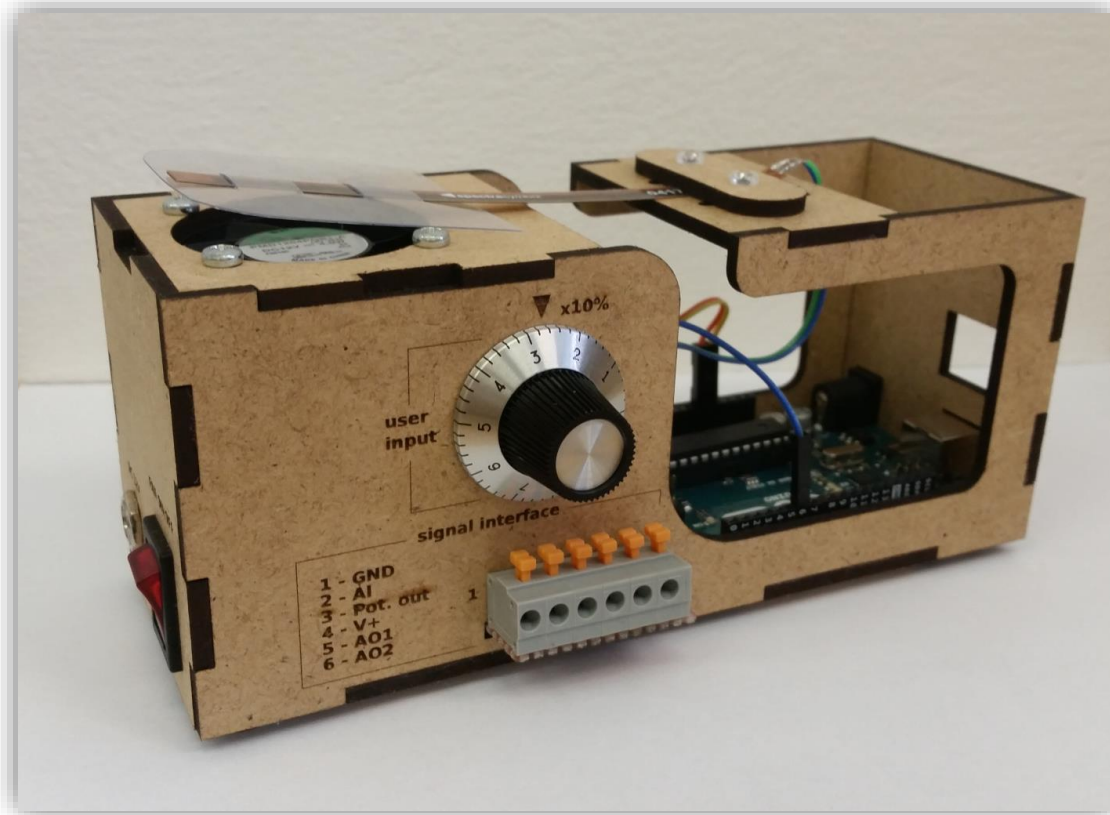


github.com/martin-kaluz/flexy-arduino/wiki

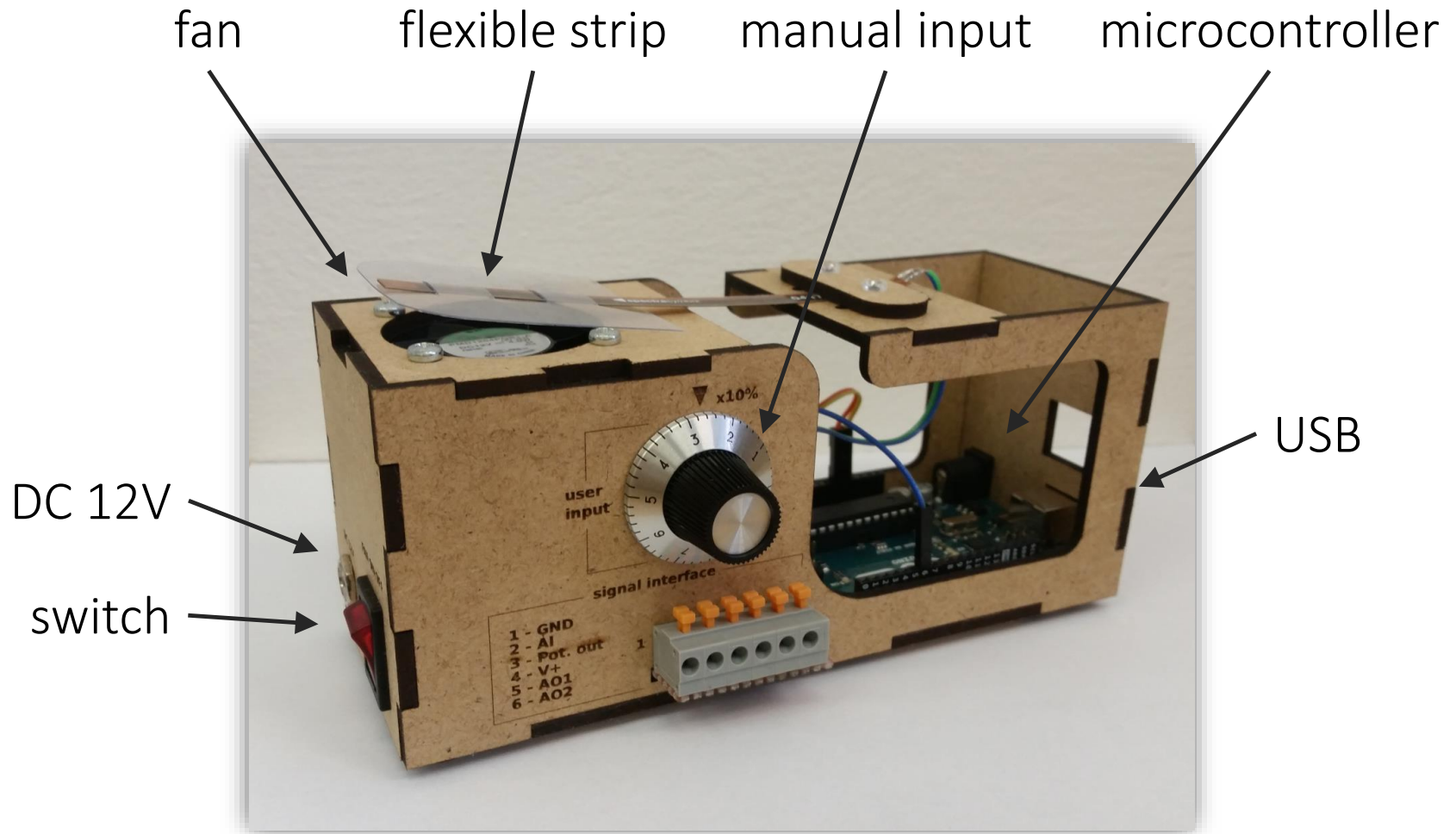
Flexy

- open-source hardware device for process control training and education,
- dynamical system with one actuator (fan) and one sensor (flex resistor),
- system allows to measure and control an air flow produced by fan,
- air flows around an obstacle that is mounted on a flexible strip.

github.com/martin-kaluz/flexy-arduino/wiki



Flexy – Parts



Flexy – Drivers

`www.arduino.cc/en/main/software`



HOME BUY SOFTWARE PRODUCTS LEARNING COMMUNITY SUPPORT



SIGN IN



ARDUINO 1.8.4

The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software.

This software can be used with any Arduino board. Refer to the [Getting Started](#) page for Installation instructions.

Windows Installer

Windows ZIP file for non admin install

Windows app

Mac OS X 10.7 Lion or newer

Linux 32 bits

Linux 64 bits

Linux ARM

[Release Notes](#)

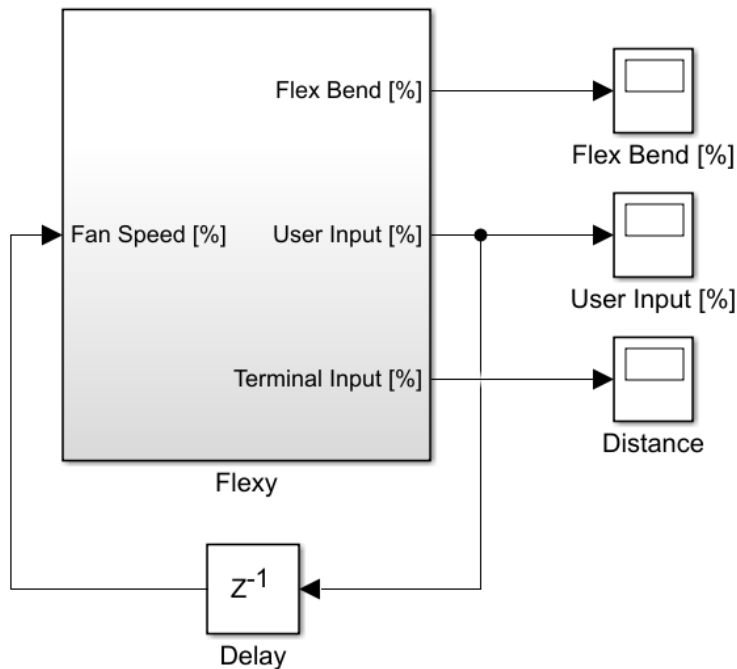
[Source Code](#)

[Checksums \(sha512\)](#)

Flexy – Manual Control

flexy_model.slx

runme.m



```
%% prerequisites
```

```
addpath('RealTime_Pacer')  
slCharacterEncoding('UTF-8')
```

```
%% Setup
```

```
% define sampling time
```

```
Ts = 0.05;
```

```
% define COM port address
```

```
Port = 'COM4';
```

```
% calibration on/off
```

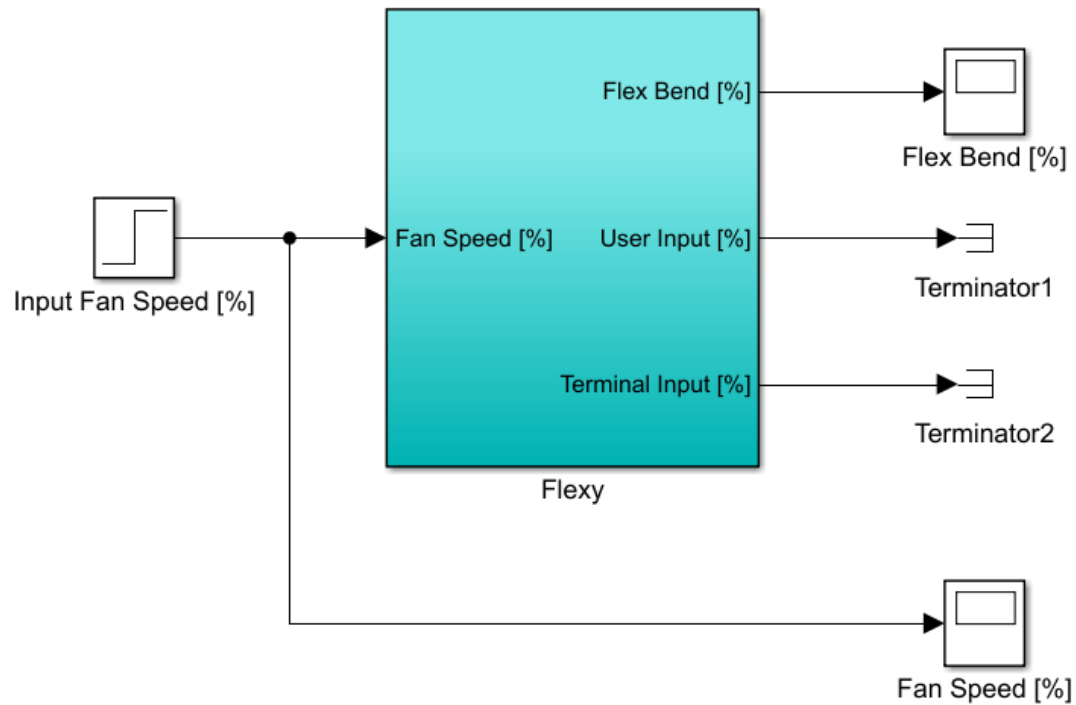
```
calibrate = 1;
```

```
%% Simulink model
```

```
open('flexy_model.slx');
```

Flexy – Identification

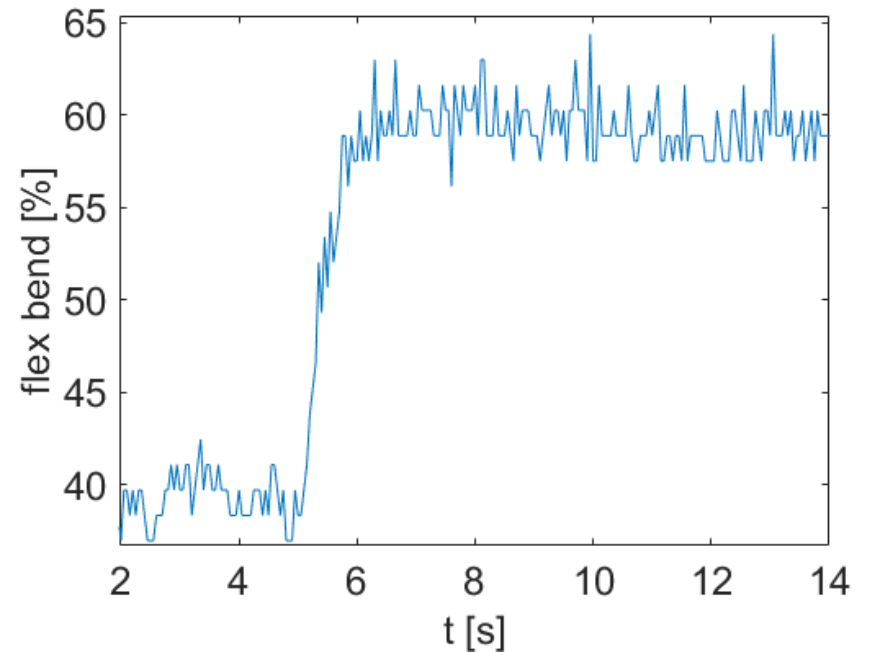
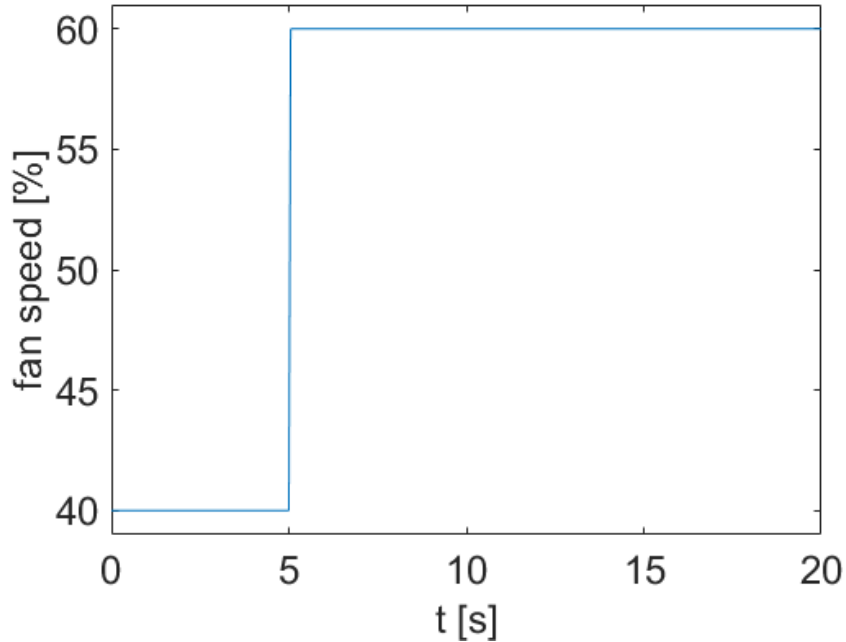
flexy_identification.slx



Flexy – Identification

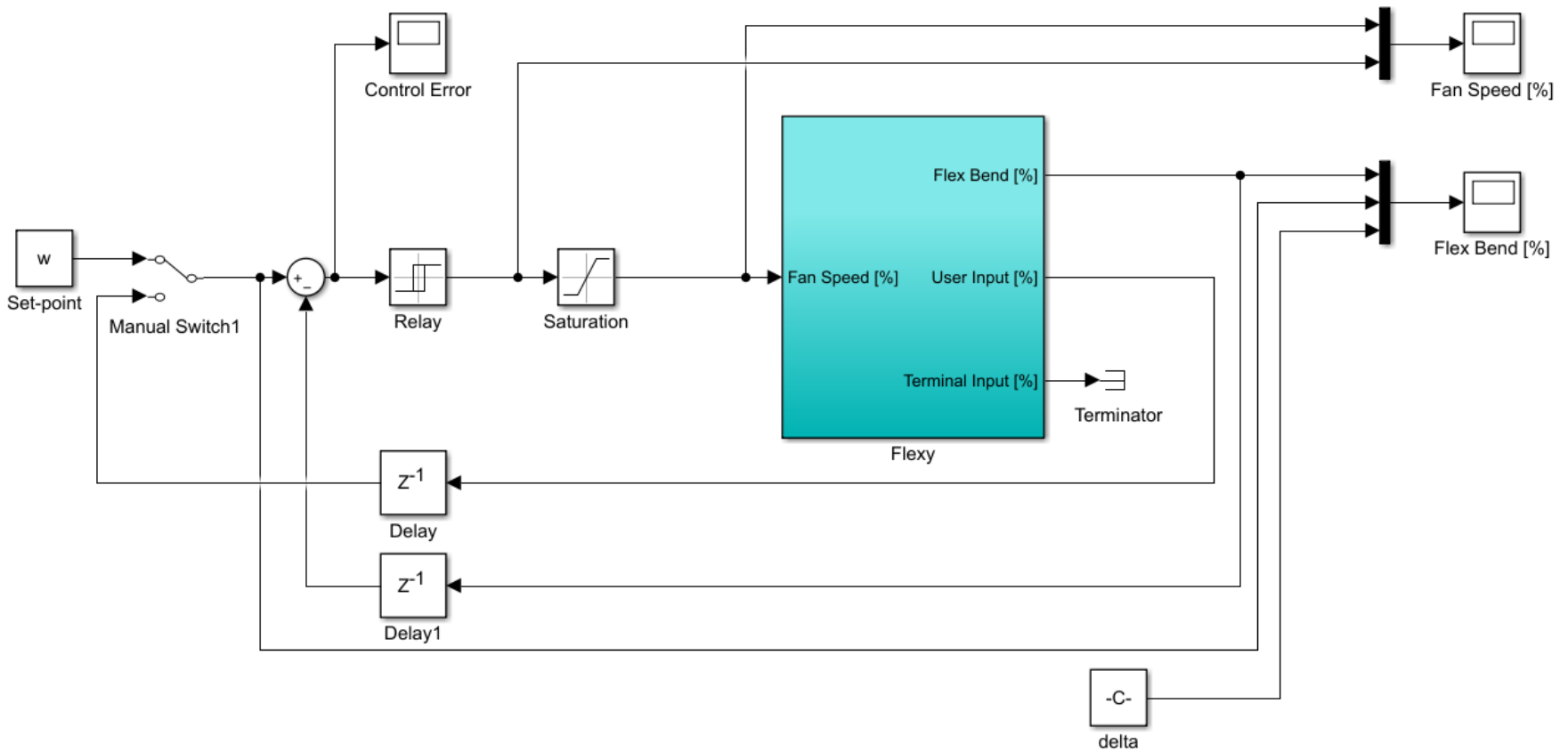
flexy_identification.slx

$$G(s) = \frac{1.1}{0.4s+1} e^{-0.01s}$$

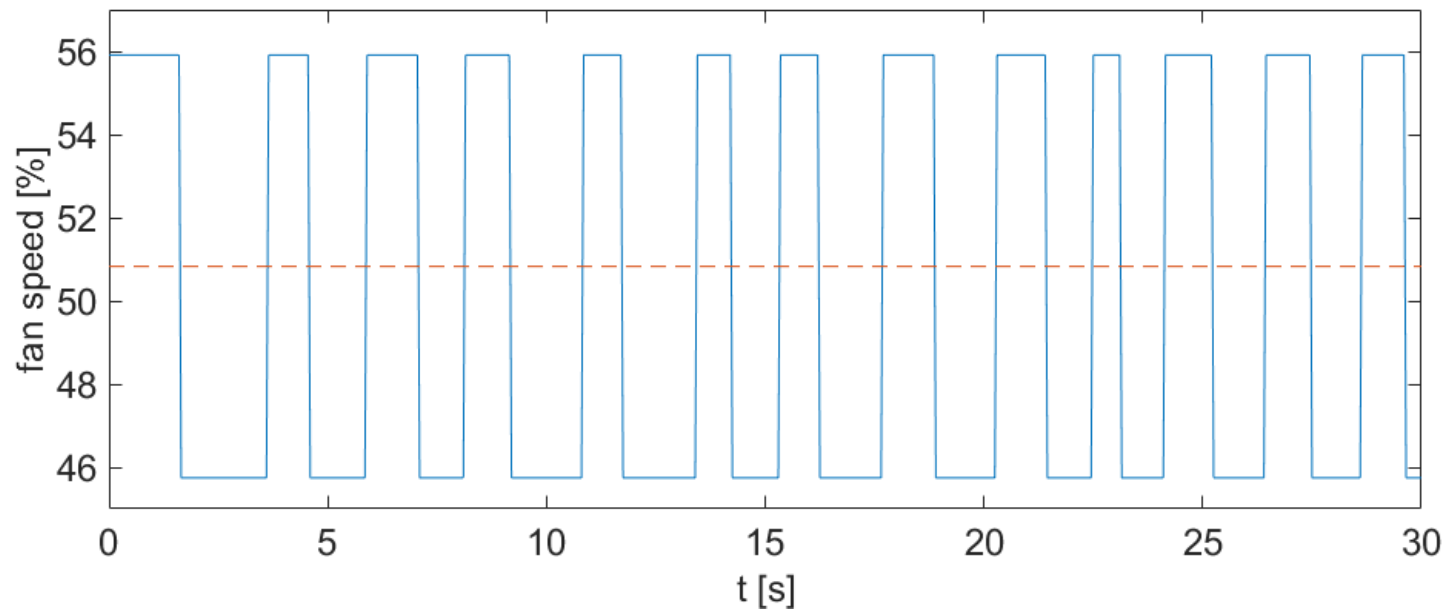
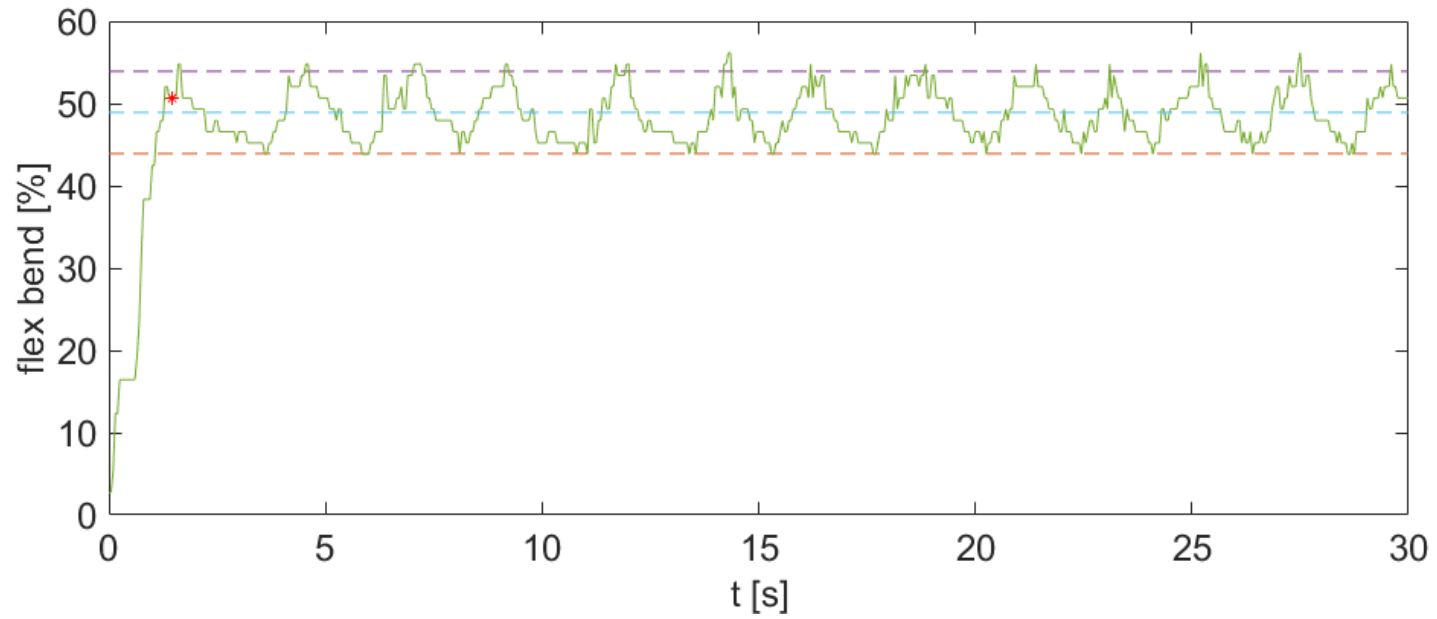


Flexy – Autotuning

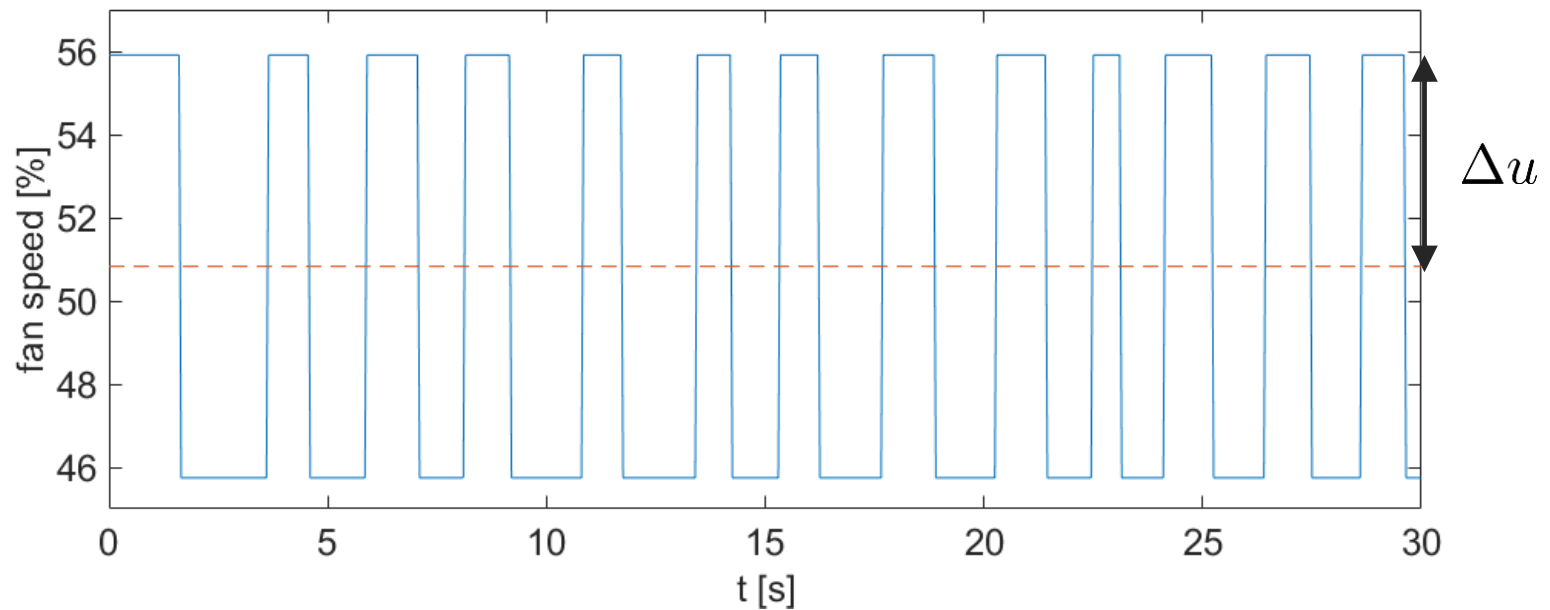
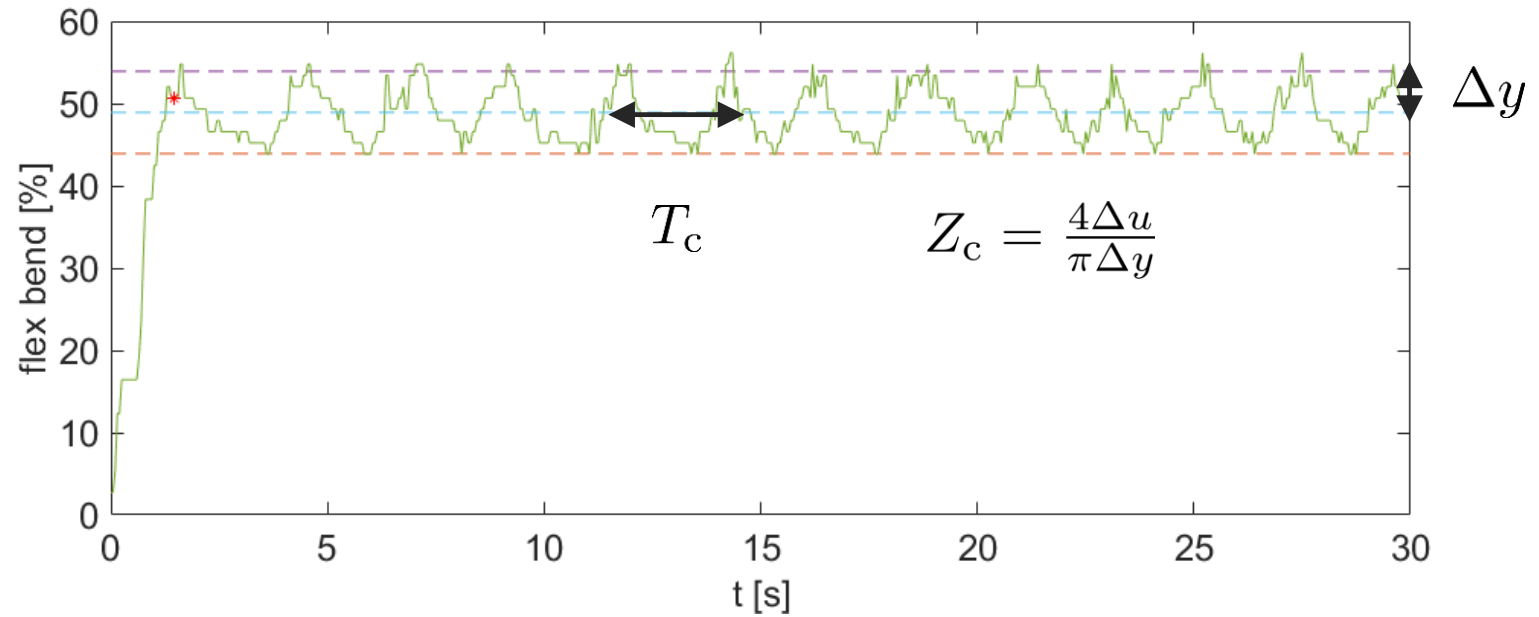
flexy_autotuning.slx



Flexy – Autotuning

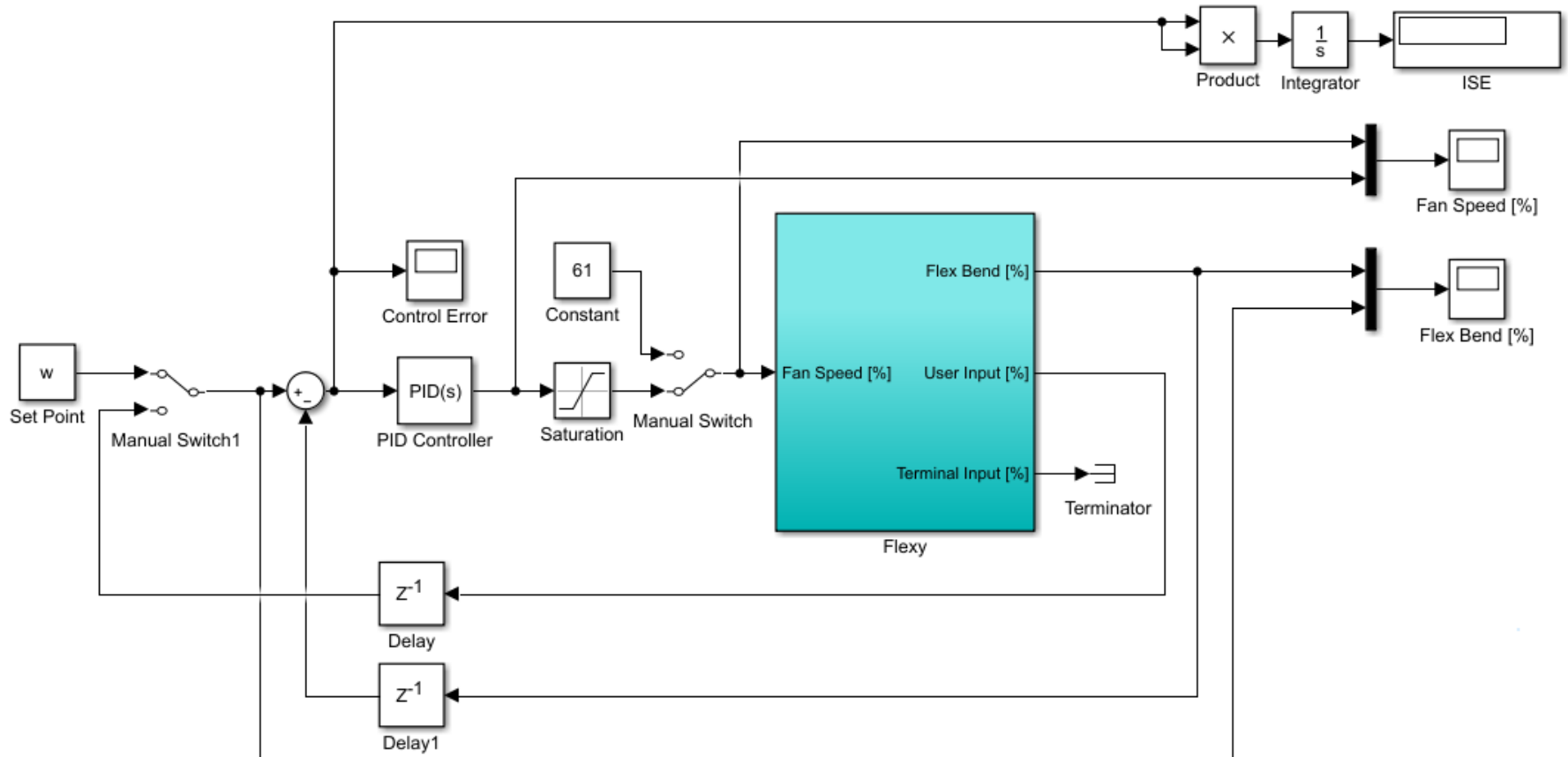


Flexy – Autotuning



Flexy – PID Control

flexy_pid_control.slx



Flexy – PID Control

flexy_pid_control.slx

Controller	Z_R	T_I	T_D
P	$0.5 Z_c$	†	†
PI	$0.4 Z_c$	$0.8 T_c$	†
PID	$0.6 Z_c$	$0.5 T_c$	$0.125 T_c$
PID - small overshoot	$0.33 Z_c$	$0.5 T_c$	$T_c/3$
PID - undershoot	$0.2 Z_c$	$0.5 T_c$	$T_c/3$