Research Portfolio

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Contents

1 Series Spring Design of Open-Source Leg

1.1 Background
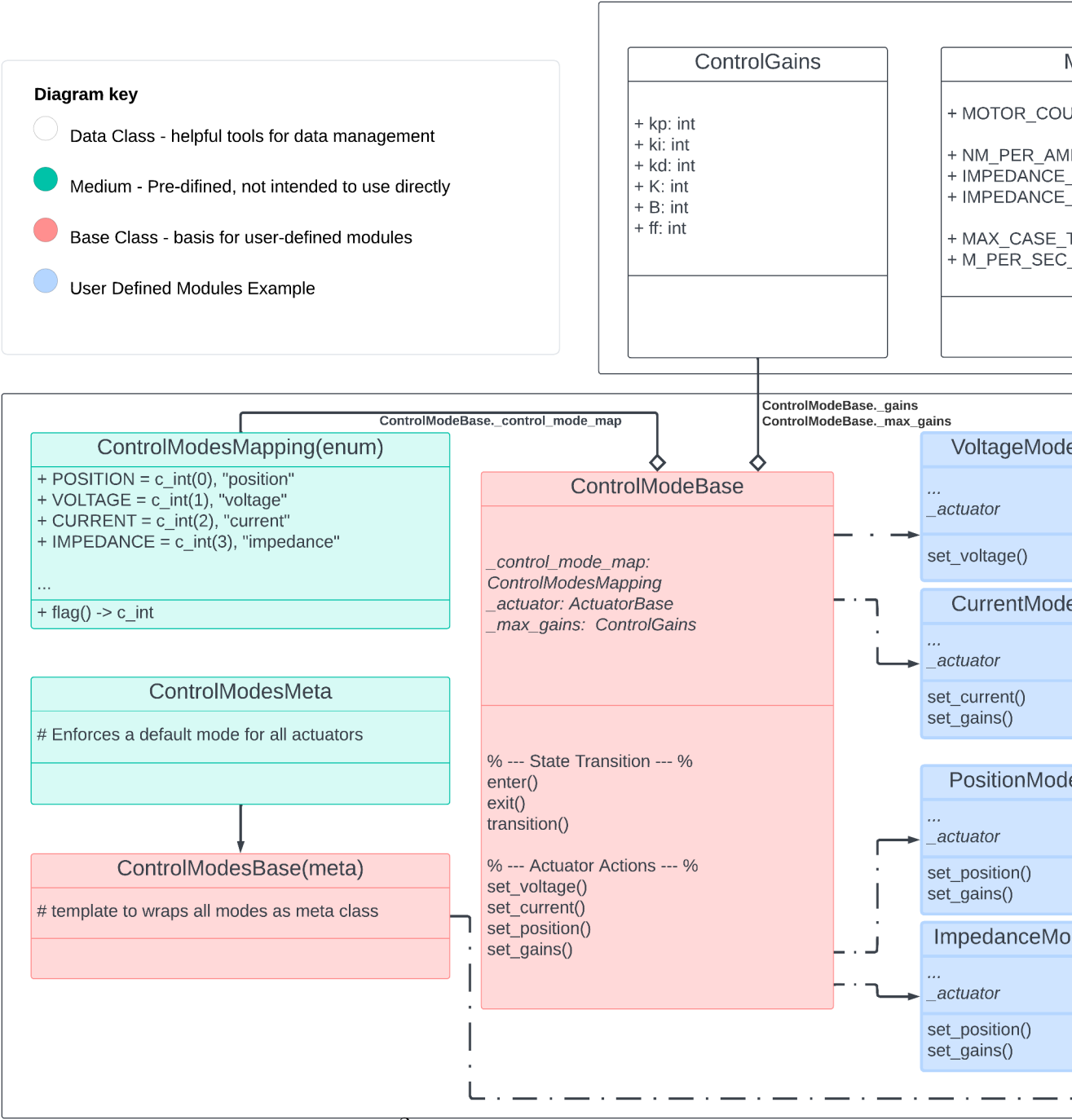
1.2 Objectives

1.3 Results

2 Software Library Generalization for Open-Source Leg

2.1 Background

Thus, a user-friendly, generalized version of the software library is needed to serve as a basis for alternative forks. Such library will allow other researchers to fork the prosthesis leg with lower costs and more standardized features, in order to offer a platform for researchers

2.2   Objectives

2.3   Results

Diagram key

○   Data Class - helpful tools for data management

●   Medium - Pre-difined, not intended to use directly

●   Base Class - basis for user-defined modules

●   User Defined Modules Example

ControlGains

+ kp: int
+ ki: int
+ kd: int
+ K: int
+ B: int
+ ff: int

M...

+ MOTOR_COU...

+ NM_PER_AM...
+ IMPEDANCE_...
+ IMPEDANCE_...

+ MAX_CASE_T...
+ M_PER_SEC_...

ControlModeBase._control_mode_map

ControlModeBase._gains
ControlModeBase._max_gains

ControlModesMapping(enum)

+ POSITION = c_int(0), "position"
+ VOLTAGE = c_int(1), "voltage"
+ CURRENT = c_int(2), "current"
+ IMPEDANCE = c_int(3), "impedance"

...

+ flag() -> c_int

ControlModeBase

_control_mode_map:
ControlModesMapping
_actuator: ActuatorBase
_max_gains: ControlGains

% --- State Transition --- %
enter()
exit()
transition()

% --- Actuator Actions --- %
set_voltage()
set_current()
set_position()
set_gains()

VoltageMode...

...
_actuator

set_voltage()

CurrentMode...

...
_actuator

set_current()
set_gains()

ControlModesMeta

Enforces a default mode for all actuators

PositionMode...

...
_actuator

set_position()
set_gains()

ControlModesBase(meta)

template to wraps all modes as meta class

ImpedanceMo...

...
_actuator

set_position()
set_gains()

3 Motion Analysis & Design of a Robot Swimmer Model

3.1 Background

3.2 Objectives

3.3 Results

4 Automated Vehicle with Tracking System

4.1 Background

4.2 Objectives

4.3 Results

5 Classification Model Development for Heart Diseases

5.1 Background

5.2 Objectives

5.3 Results