Alpha Delivery: RUP Artifacts

Packer for Control Systems

Github repository Link

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Version History

Editor’s Name	**Date** (DD/MM/YYYY)	**Reason for Changes/Sections Updated**	**Version**
Anton Buguev+Timur Galeev+Mirna Alnoukari	25/08/2021	Initial Information for planning	1.0
Kirill Glinskiy	04/09/2021	The stakeholders list have changed	1.01
Kirill Glinskiy	05/09/2021	Non-Functional Requirements added Glossary (~40%) added	1.02
Anton Buguev+Kirill Glinskiy	05/09/2021	Non-Functional Requirements ways of implementation added	1.03
Timur Galiev	28/09/2021	Added Epics, Reworked User stories	1.04

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1. Business Goals and Objectives

The main goal for this project is to generate multiple different libraries that transfer any mechanical system into a control system that is used by the control and robotics engineers, without anyone having to write his own library manually every time.

1.1. The goal is to create a packer that turns physical equations into a control system in the form of a usable library or a packet for some hardware.

1.2. It has to unify a solution for a lot of control problems, including simulation, control of robots and creation of interactive systems.

1.3. The packer should give the opportunity to easy access to the control system from any language or hardware.

1.4. The system should coexist with existing libraries.

1.5. The packer should have high performance.

1.6. The result libraries should be applicable for different projects.

2. Roles and responsibilities

Stakeholder's Name	Roles	Responsibilities
Simeon Nedulchev	Project owner	Provide us with information about the system that needs to be controlled
Anton Buguev	Developer, tester	Can run builds, view logs ● Make calculations to transform physical equations into the system
Timur Galiev	Developer, tester	Can run builds, view logs ● Addition of integration of the control system. ● Create C headers.
Mirna Alnoukari	Product manager, technical documentation writer	Manage the process between team members. Write documentation
Kirill Glinskiy	Developer	Assist in the development process
Users	End users	check if this software works, and use it if it does
name2	Admins	add

Note: The previous names of team members will be written in short taking the first letters of the first and last name of each person.

3. Requirement Analysis and Specifications

3.1. Features

ID #	Epic Title	Priority	Any Other Label
1	Creation of the system from physical equations.	Must have	
2.1	Library creation	Should have	

3.2. User Stories

Epic Title	User Story Title	User story
Creation of the system from physical equations.	Code portability	● As a developer I want my physical equations transformed into a control system so that I can use them in my code.
	Parameterization	● As a developer I want the system to be parameterized so that I can use it with different parameters.
	Control System Creation	● As a robotics developer, I want to get a control system out of my robot's physical equations so that I can import them into my robot for control.
Libraries Creation	C header Creation	● As a developer, I want to be able to convert the system into a C headers so I can use them for any hardware.
	Python Library	● As a developer, I want the system to be converted into a Python library so that I can easily import it into my Python project.
	C++ Library	● As a developer, I want to be able to use the system as a C++ library so that I can easily import it into my C++ project.

4. Software Development plan

Inception Phase				
#Iteration	**Timeline**	**Stakeholders**	**Activities**	**Artifacts**
#1	24/08/2021-25/08/2021	KG, SN	Determine goals and objectives with valid justification	Deliver the documentation of achieved milestones
#2	25/08/2021-26/08/2021	TG	Requirement engineering(20% user stories) Identify Risks	Update the documentation of achieved milestones with User stories and Risk Lists
#3	24/08/2021 - 25/08/2021	MN	Identify the stakeholders Establish roles and responsibilities	Update the documentation with plans and responsibilities.

Elaboration Phase				
#Iteration	**Timeline**	**Stakeholders**	**Activities**	**Artifacts**
#1	26/08/2021-05/09/2021	TG, MN, AB	Revise User Stories (100%)	Document 100% user stories
#2	25/08/2021-06/09/2021	KG MN	Software development planning	Iteration Plan
#3	30/08/2021 - 10/09/2021	AB	Software Architecture Test Plan	Software architecture document Test Plan Document

Construction Phase				
#Iteration	**Timeline**	**Stakeholders**	**Activities**	**Artifacts**
#1	01/09/2021-05/09/2021	AB,KG,MN	Implement Feature 1/ user story 1 Unit test cases for feature 1	Deliver the documentation of achieved milestones
#2		TBD	Implement Feature 2 Unit test cases for feature 2	Working feature 1 branch Unit test results

Transition Phase				
#Iteration	**Timeline**	**Stakeholders**	**Activities**	**Artifacts**
#1	24/08/2021- 25/08/2021	MN	Integration, End to end testing Training for Users and Developers	Github repository Merged branches Integration and ended to end test results README for developers and Users
#2		TBD	Final product release	Working Product

5. Non-Functional Requirements

ID #	Parameter	Sub Characteristic	Requirement	How we will reach the requirements
1.	Portability	Installability	The system must be usable on major operating systems (WinOS / Linux-based systems).	C headers, .py files, .cpp files are available for use on both platforms. We must avoid OS-dependent code (e.g. multiprocessing)
2.	Compatibility	Co-existence	The system should be able to coexist with any other subroutine libraries.	The code should take as minimum RAM as possible with max - 4 MB (in order not to hurt other libraries performance) and not use third-party modules.
3.	Maintainability	Modifiability	The system should be up to date and compatible with users needs	Users can commit their changes to the GitHub repository and create pull requests
		Reusability	The system can be used in different mechanical/electrical systems	Users can have their own mechanical/electrical systems and use our user guide to work with our library
		Modularity	There should be a possibility of addition and removal of library creation classes without effect to the remaining code.	Create a Factory class and a Library creation Interface, making Library creating classes modular.
4.	Performance	Speed	The system should be executed in less than 1 minute.	Using low-level libraries that are executed fast so we can reach high performance.

* Non functional requirements are made by the ISO 25010 quality model.

6. Glossary

Packer - a program that allows you to turn input (energy equations) into compact libraries for various programming languages.

Control system - a system, which provides the desired response by controlling the output.

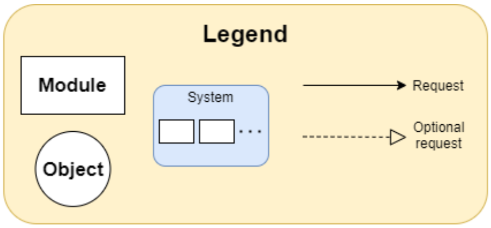
Header - a file containing C language declarations and macro definitions to be shared between several source files.

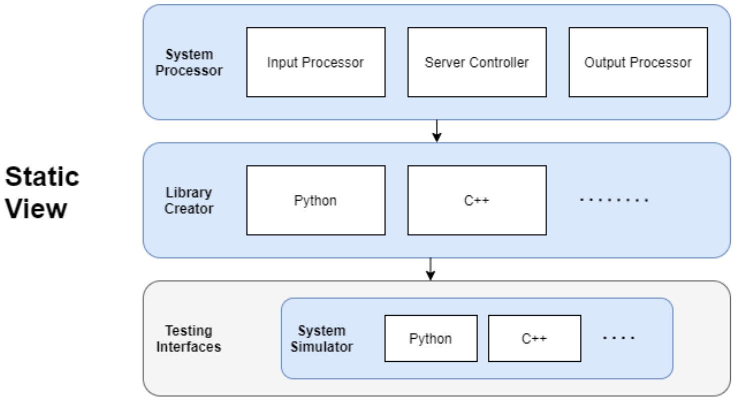
Library - a collection of non-volatile resources used by computer programs for software development.

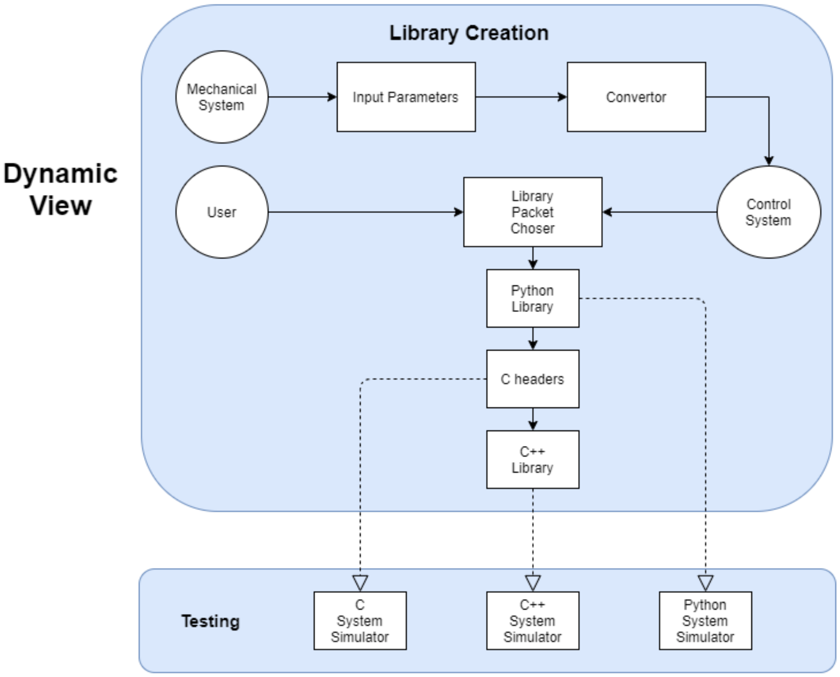
Energy equations - potential and kinetic energies equations in symbolic format.

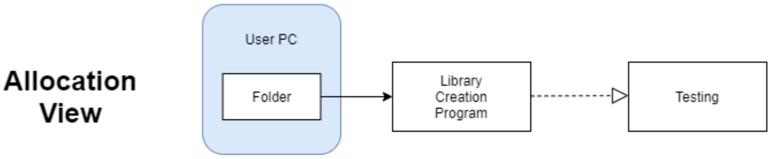
Method of Lagrange multipliers - strategy for finding the local maxima and minima of a function subject to equality constraints.

Perspectives


Legend
Module
Object
System
Request
Optional request


Static View
System Processor
Input Processor
Server Controller
Output Processor
Library Creator
Python
C++
Testing Interfaces
System Simulator
Python
C++


Dynamic View
Library Creation
Mechanical System
Input Parameters
Convertor
User
Library Packet Choser
Control System
Python Library
C headers
C++ Library
Testing
C System Simulator
C++ System Simulator
Python System Simulator


Allocation View
User PC
Folder
Library Creation Program
Testing