



RobMoSys ITP Presentation

Composable Models for Compliant Interaction Control (CMCI)

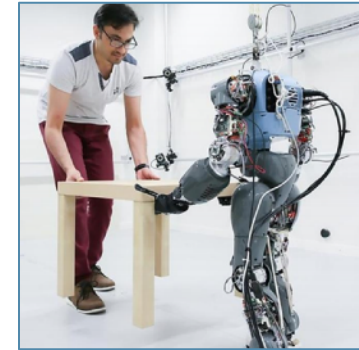
Pouya Mohammadi, Jochen Steil, Dennis Wigand, Sebastian Wrede

Use Case and Benefits

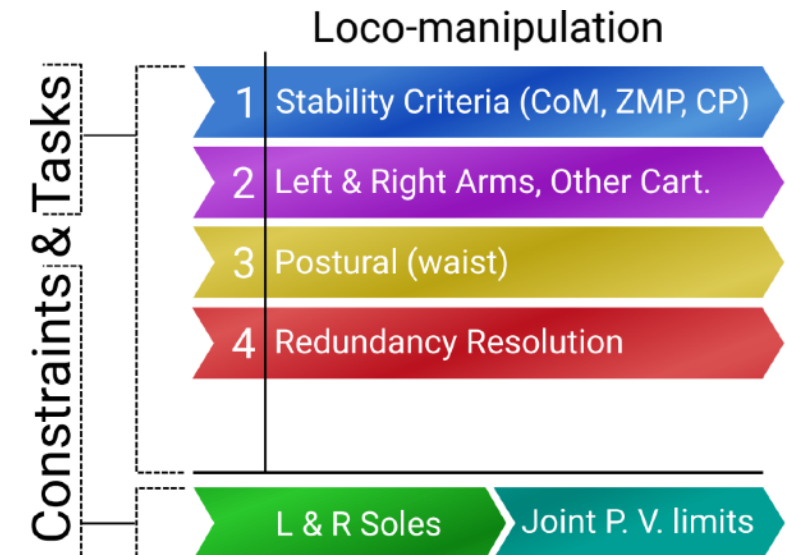


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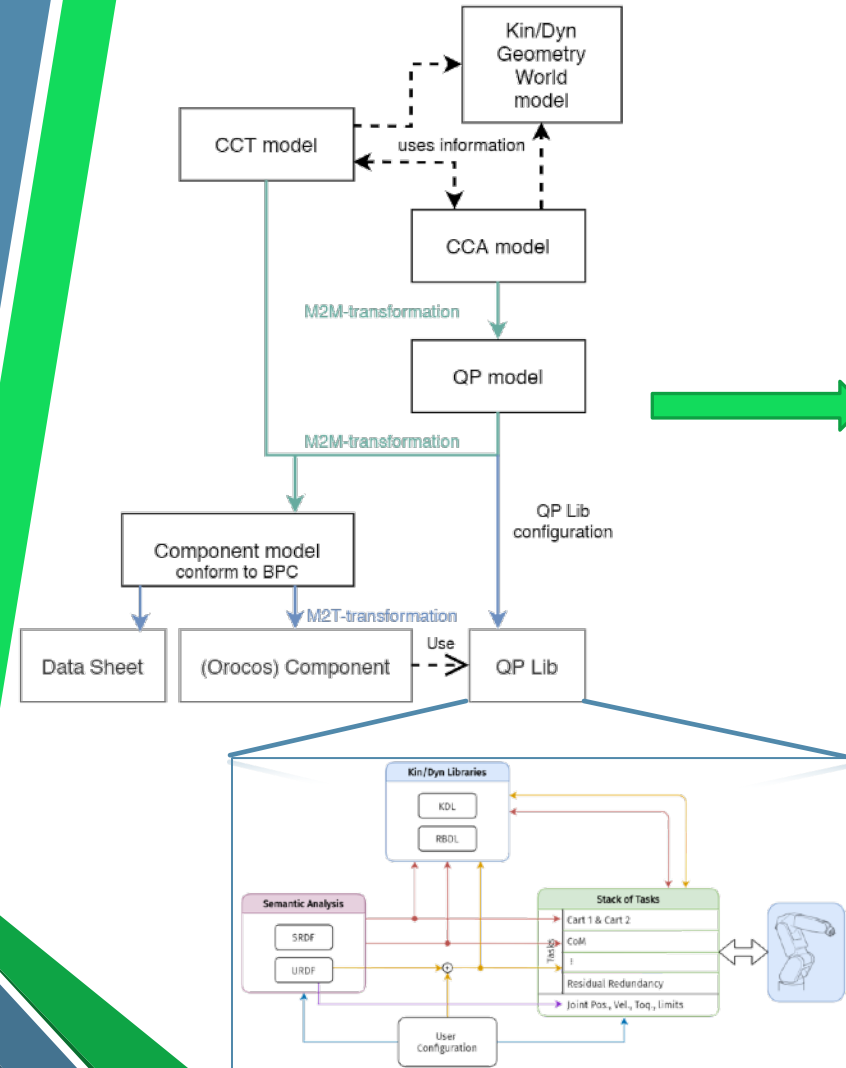
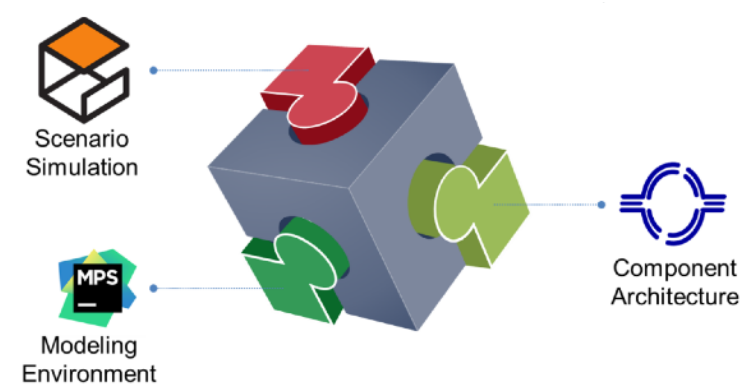
- Support the **Behavior Developer** in modeling compliant control tasks, e.g., polishing, force-based assembly and physical collaboration etc.
- Provide the **System Builder** a configured Stack-of-Tasks (SoT) control component based on QPs integrable into larger RobMoSys applications
- **Benefits** for these roles (and RobMoSys):
 - Early feedback at design time during modeling of compliant control tasks
 - Easier modeling of compliant control tasks with complex constraints through synthesis of QP-based solver configurations
 - Model-based configuration of a standalone QP-based constraint solver



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Approach and Workflow



```
SoT {
    regularization_factor: 0.05
    solver: OSQP

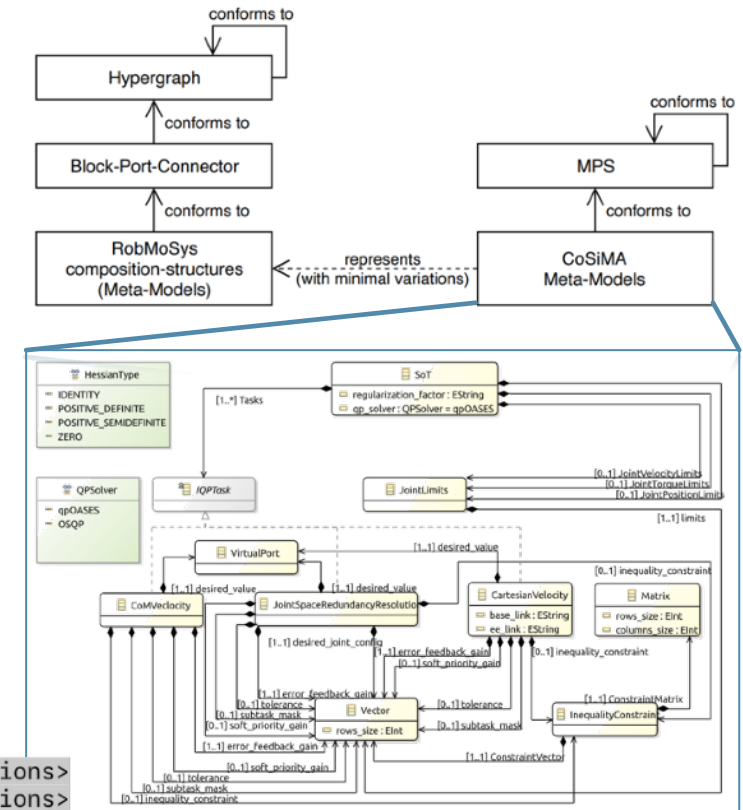
    tasks {
        Cartesian Velocity LeftLegVel {
            priority: 1
            hessian: POSITIVE_DEFINITE
            kinematic_chain: "LeftLeg"

            desired_value: <virtual_port>
            error_feedback_gain:
                [0.5]
            soft_priority_gain:
                [0.5 0.5 0.5 0.5 0.5 0.5]
        }

        Cartesian Velocity RightLegVel {
            priority: 1
            hessian: POSITIVE_DEFINITE
            kinematic_chain: "RightLeg"

            desired_value: <virtual_port>
            error_feedback_gain:
                [0.5]
            soft_priority_gain:
                [0.5 0.5 0.5 0.5 0.5 0.5]
        }
    }

    joint_position_limits: <from_robot_descriptions>
    joint_velocity_limits: <from_robot_descriptions>
    joint_torque_limits: <not required>
}
```



Example: QP Metamodel

Scenarios and Roadmap



RobMoSys



- Meta-models & models ☐
- SoT/QP-Framework ☐
- Demonstrator ☐
- Video ☐
- Website: ☐
<https://github.com/rosym-project>

Support specification and execution of compliant control tasks in the Flexible Assembly Cell and Human-Robot Collaboration scenarios



Initial Release of Modeling Environment and SoT/QP-Framework by **June, 2020**

Our Team



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Please contact us to discuss inter-ITP synergies and
collaboration opportunities!

