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## Polymorphism for State Machines

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2012

[Link to publication](#)

*Citation for published version (APA):*

Theorin, A., & Johnsson, C. (2012). *Polymorphism for State Machines*. Paper presented at ISA Automation Week 2012, Orlando, United States.

*Total number of authors:*

2

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# Polymorphism for State Machines

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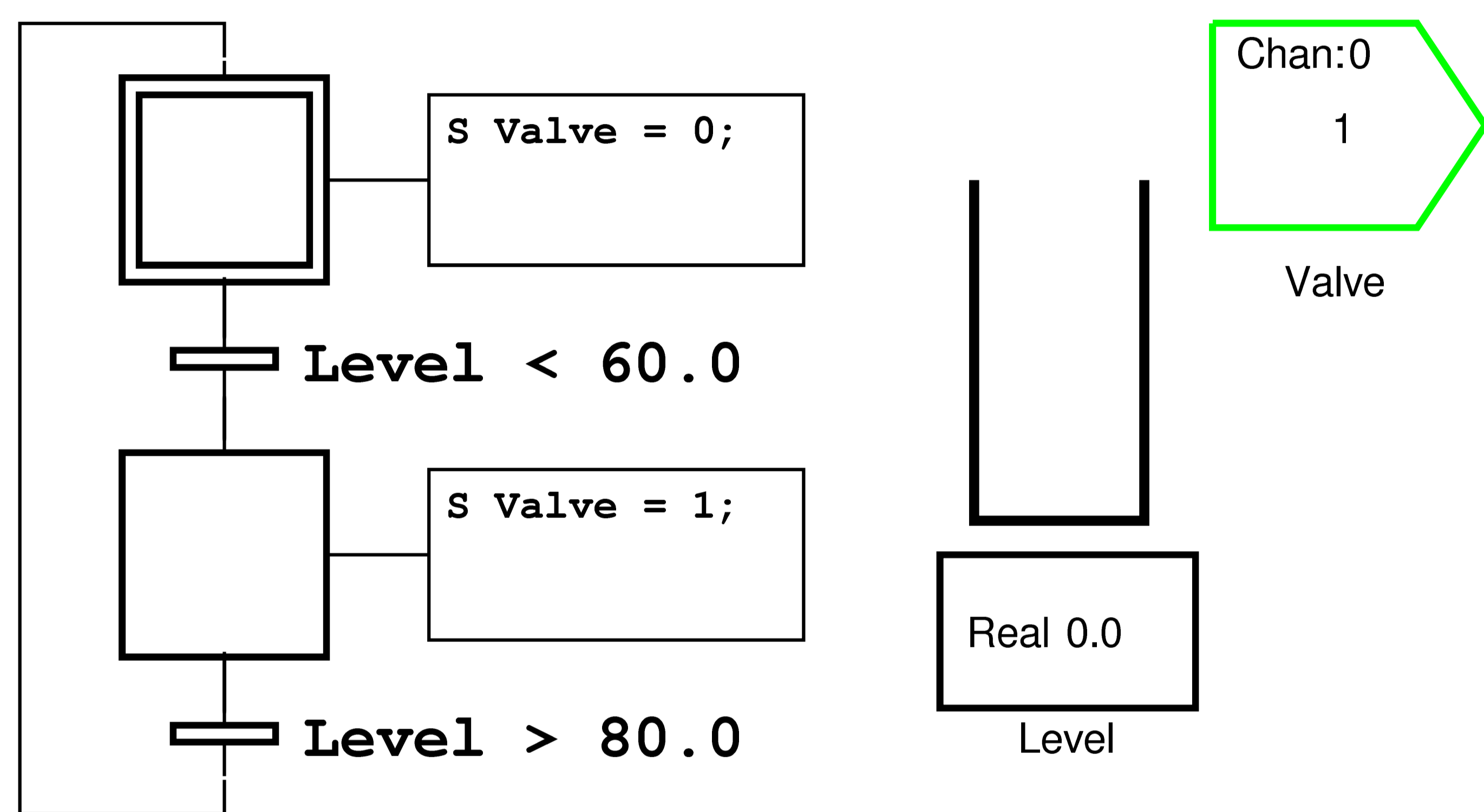
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## Motivation

Much engineering time is needed to develop control applications, partly since the automation languages are relatively primitive.

**Goal:** More efficient engineering by extending Grafset/SFC.

## Grafchart



Grafchart is a graphical programming language for sequential control applications based on Grafset/SFC. Previous extensions make development more efficient, convenient, and scalable:

- Hierarchical structuring
- Reusable sub-sequences
- Rudimentary object orientation
- Various means for exception handling

## Proposed Idea

Extending Grafchart with polymorphism similar to Java

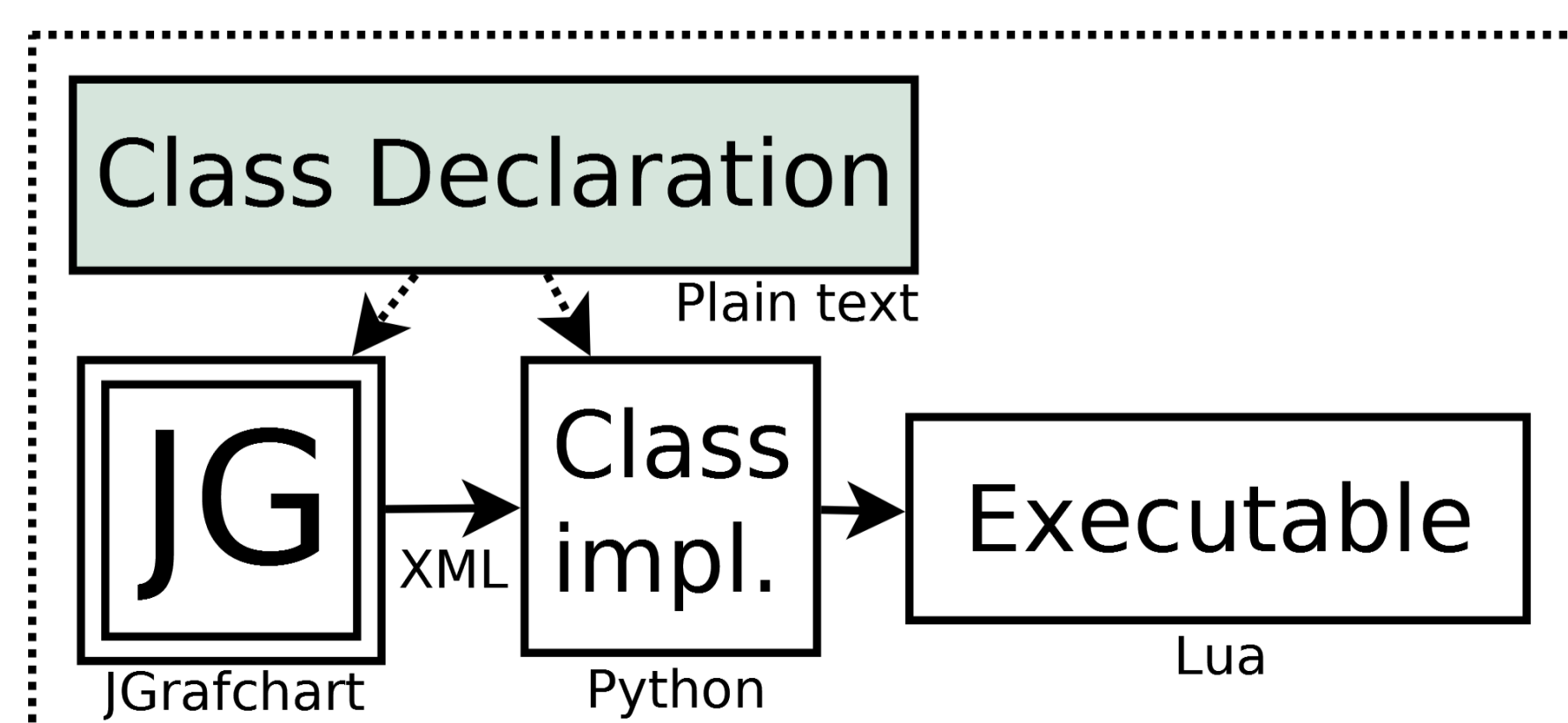
This has the following advantages:

- Classes are reusable in various control applications
- Control applications are reusable in various contexts
- Enables encapsulation in Grafchart

## The BRICS Challenge

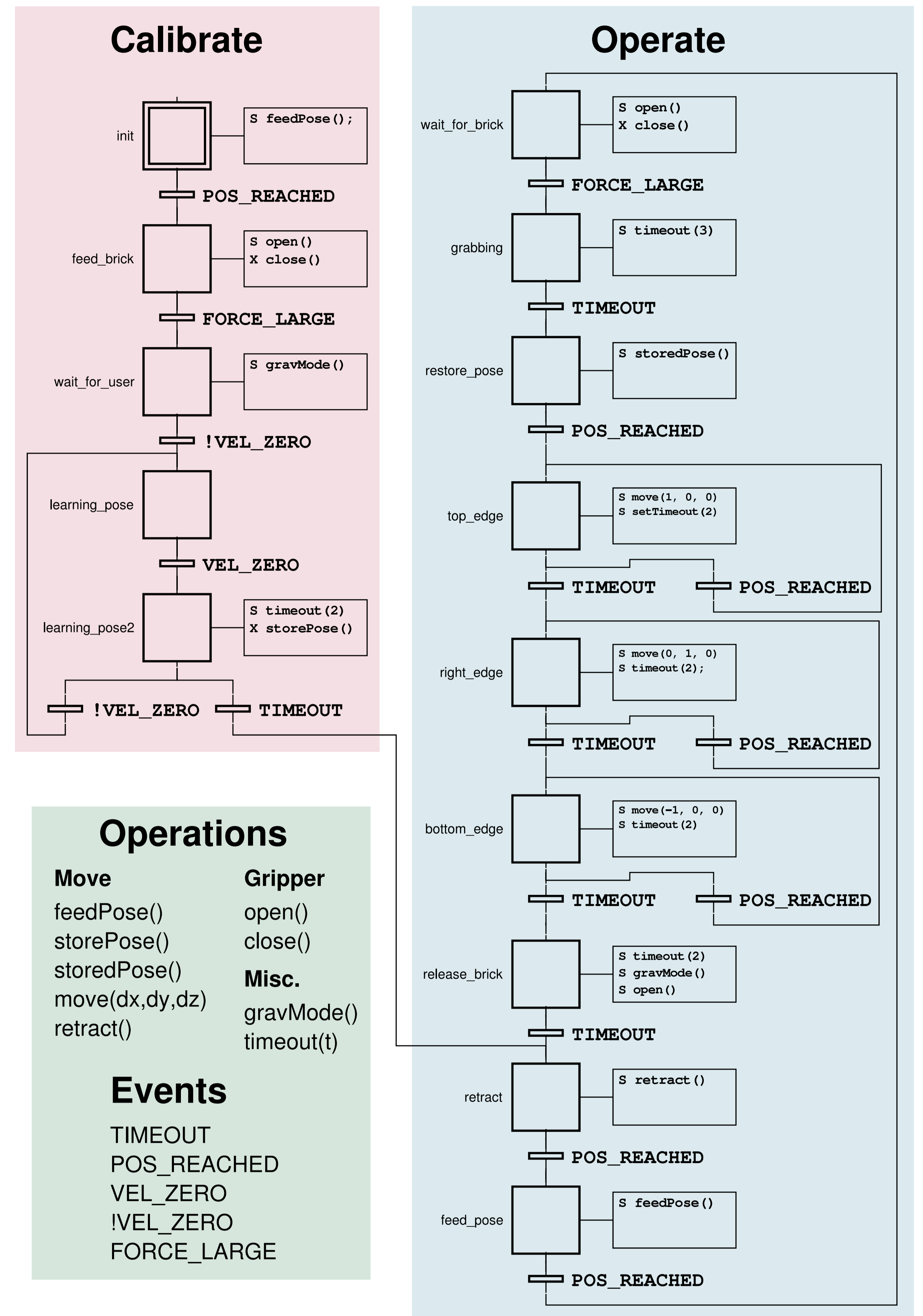


The task at the BRICS 3rd research camp was to use a KUKA youBot, a mobile robot with a gripper, to fill a box with bricks.



Overview for prototyping of the proposed idea.

## Prototyping



**Calibrate** The location of the box is taught.

**Operate** A brick is grabbed when pushed against the gripper. It is then automatically placed properly in the box.

## Conclusions

Polymorphism for state machines was prototyped for a robotics task and resulted in an implementation that is reusable for any device for which the class can be implemented.

### Future Work

- Implement polymorphism in the free tool JGrafchart
- Evaluate in other domains
- Evaluate scalability – How much is gained in a realistic setup?

## Acknowledgements

We would like to thank the research camp organizers and group members for valuable discussions and feedback, and also all participants for making the camp a stimulating environment.

