Spectacles, Eugene, and Kepler
Managing Synthetic Biology Device Development
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Project Motivation
Teams are making **MORE** parts! Berkeley iGEM 2009 Wetlab made over 800 parts this summer!!!

**Project Motivation**

**Clotho Infrastructure**

**Tool-to-tool Interaction**

**Tool-to-database Interaction**

**Reconfigurable Data Model**
Design Flow Example

Clotho Core API
Revamped Clotho Core and Data Model

Abstract design

Device Specification

Physical Assembly

Eugene

Kepler

Spectacles

Abstract Design

Eugene

Clotho - Sequence View - Algorithm Manager

Choose a part
Modify name, sequence, or implementation
Map to physical part in database
Export to Eugene

Tool API
Realize an abstract design from Spectacles:

- **<part declarations>**
  - Specify instances of physical parts

- **<rule declarations>**
  - Specify rules on how parts can interact with each other on devices

- **<device declarations>**
  - Construct devices while enforcing rules

- **<function calls on devices>**
  - Perform functions on devices

Diagram:

- Eugene Compiler ➔ XML ➔ Tool X ➔ XML To Eugene Header Tool ➔ Eugene Header Files ➔ Database Of Parts ➔ XML.
Physical Assembly

Clotho

Files for robot

Human Instructions
1. Dilution file for robot
2. Reaction file for robot
3. File with human-readable instructions

Stage 1 Processing

Stock Plate

Buffer pre-filled
Assignments to wells

Reaction Plate

+ Digestion Mix
+ Ligation Mix
Workflow design environment

- Visual
- Extensible

Director: controls the execution of actors

Actor: a process step in the workflow

Kepler

Kepler Demo
Conclusions

• Abstract device development, device specification, and physical assembly are key activities in Synthetic Biology.
• Developed Spectacles, Eugene, and Kepler based software tools on top of a revamped Clotho framework.
• Demonstrated the usefulness of these tools as a continued effort toward a complete design flow for Synthetic Biological Systems.
• Collaborated with other institutions
  • Stanford, U Minnesota, SynBERC

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For more info be sure to stop by our poster and get a demo!

Also be sure to check out:
- [http://sourceforge.net/projects/keplerclotho/](http://sourceforge.net/projects/keplerclotho/)