BioSoc Society hopes to empower all community members to be makers and creators rather than passive recipients. Everyone is encouraged to contribute, no matter what skill level. We support over a dozen applications in the synthetic biology community and many on Github. Contributions require testing, bug reports, user documentation, and code examples.

- Sources

BioSoc Software

- SBOLDesigner
- assembly - Software for Microfluidic and Biological Automation - Biosoc.org
- dataops - Data Management - biosoc.org
- design - Projects Overview - biosoc.org
- test
- tools - Synthetic Biology Tools - Biosoc.org

SBOL Designer

SBOLDesigner is a simple, biologist-friendly CAD software tool for creating and manipulating the sequences of genetic constructs using the Synthetic Biology Open Language (SBOL) 2.2 data model.

- Project Website
- Demo

Key Features

SBOLDesigner is a user-friendly computer-aided design (CAD) software tool specifically designed for biologists. It allows users to create and manipulate genetic construct sequences using the Synthetic Biology Open Language (SBOL) 2.2 data model. With SBOLDesigner, researchers can efficiently design and analyze genetic constructs for synthetic biology projects.

1. **Biologist-Friendly Interface:** SBOLDesigner is designed with biologists in mind. Its user-friendly interface makes it accessible to researchers who may not have extensive computational or programming experience.

2. **SBOL 2.2 Support:** The software adheres to the Synthetic Biology Open Language (SBOL) 2.2 data model. This standard allows users to represent genetic constructs, parts, and sequences in a consistent and interoperable format.

3. **Construct Design and Manipulation:** SBOLDesigner enables users to create, edit, and manipulate genetic constructs. You can assemble DNA parts, specify their sequences, and organize them into functional units.

4. **Visual Representation:** The tool provides visual representations of genetic constructs, making it easier to understand and communicate complex designs. Graphical views help users visualize the arrangement of parts and their interactions.

5. **Annotations and Metadata:** SBOLDesigner allows users to annotate constructs with additional information, such as functional descriptions, provenance, and experimental data. Metadata enhances the documentation and traceability of designs.

6. **Export Options:** You can export your designs in SBOL format for sharing with other tools or collaborators. This interoperability ensures seamless integration with other software in the synthetic biology workflow.

Sources

- SBOLDesigner DEMO on youtube
- SBOLDesigner Description by Myers Research Group

Software for Microfluidic and Biological Automation - Biosoc.org

This repository provides a comprehensive list of tools designed to facilitate the design and automation of microfluidic devices and other biological tasks. Each tool comes with a description, relevant links to project websites, source code, and demo videos. Feel free to explore the links provided for more information and access to each software tool. For any additional inquiries or support, refer to the respective project websites and repositories.

Table of Contents

3DµF

3DµF is a visual CAD tool for designing microfluidic devices. It offers outputs in STL for CNC milling, SVG for lithography, and also provides a textual JSON representation.

- **Project Website:** 3DµF Website
- **Source Code:** GitHub Repository
- **Demo Video:** YouTube Demo

PyHamilton

PyHamilton provides a set of standardized libraries developed for use with Hamilton liquid handling robots.

Resources

- **Source Code:** GitHub Repository

Fluigi

Fluigi automates the design of microfluidic devices used in synthetic biology by optimizing their layout based on specifications in the text-based MINT language.

Resources

- **Project Website:** Fluigi Website
- **Source Code:** GitHub Repository
- **Demo Video:** YouTube Demo

Primer3

Primer3 is a tool used for designing and analyzing primers for PCR reactions. It also allows for the selection of primers for sequencing reactions and hybridization probes.

Resources

- **Project Website:** Primer3 Website
- **Source Code:** SourceForge Repository
- **Demo Video:** YouTube Demo

Data Management - biosoc.org

Welcome to biosoc.org, a suite of advanced tools aimed at streamlining data management in synthetic biology. Tools provides comprehensive solutions for data management in synthetic biology. Each application offers specialized functionalities to support and enhance your research endeavors. For more information and to access the resources, please refer to the links provided. Should you have any questions or require further assistance, do not hesitate to contact us or visit our project repositories.

Clotho

Clotho is a versatile framework for engineering synthetic biological systems and managing the data associated with their creation. It allows users to author data schemas, execute functions and algorithms, and integrate with pre-existing applications seamlessly.

Resources

- Source Code
- Demo

Knox

Knox is a web-enabled repository designed for the storage, modification, and tracking of genetic design spaces. It manages thousands of genetic design variants and represents them as directed graphs. Knox can be accessed via domains in the format `<insert-name>.knoxcad.org`.

Resources

- Project Website
- Source Code

OWL

OWL is an automatic datasheet generator specifically designed for synthetic biology, facilitating efficient datasheet creation and management.

Resources

- Source Code

Projects Overview - biosoc.org

This README provides a structured overview of various software tools developed by cidarlab.org, genedesign.org, hicsail, salislab, synbiohub.org, and others focusing on

those for designing synthetic biology constructs. Each tool has its specific use cases, features, and resources available for further exploration.

Constellation

Parses a rich set of operators as defined by GOLDBAR and enumerates genetic designs that satisfy user-defined specifications through mathematically rigorous graphs.

Resources

- Project Website
- Source Code
- Demo

GeneDesign

Web-based synthetic gene designer with various modules for sequence manipulation such as reverse translator and codon juggler.

Resources

- Project Website
- Source Code

Pigeon

Web-based tool for translating a textual description of a synthetic biology design into an image, allowing for the programmatic generation of design visualizations.

Resources

- Project Website

Raven

Uses a dynamic programming algorithm to design high-quality DNA assembly plans and produces SBOL-compliant images with human-readable instructions.

Resources

- Project Website
- Source Code
- Demo

TASBE

Synthetic biology automation software for tasks from high-level specification to part assignment and assembly.

Resources

- Project Website
- Source Code
- Demo

DAFD

First microfluidic design automation software that uses machine learning to deliver a user-specified desired performance.

Resources

- Project Website
- Source Code

Mage

Java part of MERLIN for analyzing genetic packages.

Resources

- Source Code

Puppeteer

Web-based planning and instruction generation tool for automating DNA assembly tasks, translating protocols into human- and machine-readable instructions.

Resources

- Project Website

Sequence Refiner

Sequence alignment tool that refines a multiple sequence alignment by iterative realignment with a predetermined conserved core model of a protein family.

Resources

- Project Website

Vector Editor

Web-based DNA sequence-editing and analysis tool with features like restriction enzyme manager, amino acid translation, and gel digest prediction.

Resources

- Project Website
- Source Code
- Demo

Double Dutch

Tool for designing combinational libraries of biological systems using response surface methodology.

Resources

- Demo

Phoenix

Framework for designing complex genetic systems focusing on behavior over time rather than steady-state behavior.

Resources

- Project Website
- Source Code
- Demo

RBS Calculator

Predicts and controls translation initiation and protein expression, also optimizes synthetic RBS sequences to achieve targeted translation initiation rates.

Resources

- Project Website
- Demo

SynBioHub

Design repository for uploading and sharing DNA and protein designs.

Resources

- Project Website

iBioSim

Tool for modeling, analysis, and design of genetic circuits, also applicable to other biological and chemical systems.

Resources

- Project Website
- Source Code
- Demo

Feel free to explore the provided links for further details and resources related to each project.

Program Type

Aquarium

Software Type: Test

Analysis and comprehension tool that uses the open-source statistical language, R; AMI and Docker images are available

Project Website

Source Code

Copasi

Software Type: Test

COPASI is a stand-alone program that supports models in the SBML standard and can simulate their behavior using ODEs or Gillespie's stochastic simulation algorithm; arbitrary discrete events can be included in such simulations.

Project Website

Source Code

Demo

Road Runner

Software Type: Test

A portable simulation engine for systems and synthetic biology models in SBML format; RoadRunner is written in C# and incorporates C, Cþþ, and Python APIs

Project Website

Source Code

BioConductor

Software Type: Test

Analysis and comprehension tool that uses the open-source statistical language, R; AMI and Docker images are available

Project Website

Source Code

Morpheus

Software Type: Test

A modeling environment for simulating cell-based models with ordinary differential

equations and reaction–diffusion systems; multiscale biological models can be
defined in biological terms and mathematical expressions

Project Website

Source Code

Tinkercell

Software Type: Test

Incorporates a diagram that is detailed enough so that it can be mapped to models or experimental results; various mathematical analyses can then be run on those models

Project Website

[Demo](#)

BioPSy

Software Type: Test

Performs guaranteed parameter set synthesis for ODE biological models expressed in SBML given a desired behavior expressed by time-series data

[Source Code](#)

Pysces

Software Type: Test

Provides a variety of tools for the analysis of cellular systems; these include a human readable model description language, a structural, and a bifurcation analysis module—PySCeS supports SBML and SED-ML

[Project Website](#)

[Source Code](#)

gro

Software Type: Test

gro is a language for programming, modeling, specifying and simulating the behavior of cells in growing microcolonies of microorganisms.

[Project Website](#)

[Source Code](#)

Synthetic Biology Tools - Biosoc.org

This documentation provides a comprehensive overview of various software tools useful for synthetic biology applications. These tools cover a range of purposes including modular model definition, flow cytometry data analysis, genetic circuit creation, metabolic pathway mapping, genomic reprogramming, and DNA sequence generation.

Contents

1. [Antimony](#)
2. [FloCal](#)
3. [Kera](#)
4. [CELLO](#)
5. [GLAMM](#)
6. [Merlin](#)
7. [Eugene](#)
8. [GSL](#)

9. [MoSec](#)

Antimony

Software Type: Text-based modular language

A text-based modular human-readable/writable model definition language with capabilities of easy translation into SMBL.

Resources
- **Project Website**: [Antimony Project Website](#)
- **Source Code**: [Antimony Source Code](#)

FloCal

Software Type: Library for flow cytometry data

A library for reading, analyzing, and calibrating flow cytometry data; accepts FCS files as input and is compatible with different calibration particles, fluorescent probes, and cell types.

Resources
- **Project Website**: [FloCal Project Website](#)
- **Source Code**: [FloCal Source Code](#)

3. Kera

Software Type: Object-oriented programming language

An object-oriented programming language for synthetic biology, tempered by the biopart rule library, Samhita.

Resources
- **Source Code**: [Kera Source Code](#)

4. CELLO

Software Type: Genetic circuit design tool

Software for creating genetic circuits, using as input a high-level logic specification written in Verilog.

Resources
- **Project Website**: [CELLO Project Website](#)
- **Source Code**: [CELLO Source Code](#)
- **Demo**: [CELLO Demo](#)

5. GLAMM

Software Type: Metabolic pathway mapping

Provides maps for metabolic pathways, biosynthesis of secondary metabolites, and microbial metabolism.

Resources

- **Project Website**: GLAMM Project Website
- **Source Code**: GLAMM Source Code

6. Merlin

Software Type: Genomic reprogramming application

A web-based application for genomic reprogramming via a rapid and efficient method known as Multiplex Automated Genome Engineering (MAGE).

Resources

- **Project Website**: Merlin Project Website
- **Source Code**: Merlin Source Code

7. Eugene

Software Type: Language for rule-based design

An ecosystem of languages tailored for rule-based design of synthetic biological systems, devices, parts, and DNA sequences.

Resources

- **Project Website**: Eugene Project Website
- **Source Code**: Eugene Source Code
- **Demo**: Eugene Demo

8. GSL

Software Type: DNA construct design language

A language that facilitates the design of large and complex DNA constructs used to engineer genomes; incorporates a set of low-level DNA manipulation primitives.

Resources

- **Source Code**: GSL Source Code

9. MoSec

Software Type: DNA sequence generation application

Java application capable of generating DNA sequences, and exporting formats such as FASTA, GenBank, EMBL, and SBOL from SBML and CellML models.

Resources

- **Source Code**: MoSec Source Code

This document provides a brief overview and resource links for synthetic biology tools to aid in various applications. For further information, visit the respective project websites and source code repositories.

Sources

- download biosoc-software.pdf

- Modular Documentation made possible by the FlatEdit project.