September 2010

University of Illinois iGEM 2010 Newsletter

Inside this issue:

Jamboree Preparations:

The month of September held a number of deadlines for the iGEM competition including track selection, abstract submission, team roster confirmation, and jamboree registration. The Wetlab team chose to compete in the Information Processing track which includes projects that use cells to interpret inputs. We plan on focusing on the decoder aspect of our project while using our bio-remediation work as an application of the decoder. The final goal of our project is to create a cell that is capable of sensing gold and arsenic in its environment and using logic gates to facilitate a designated response.

The Software team chose to participate in, as their title suggests, in the Software-Tools track. This track focuses on developing computational tools to assist in the field of synthetic biology. The Wetlab project abstract can be found on page two of this newsletter while the Software team abstract can be found in the article below.

We also are excited to confirm our trip to Boston for the Jamboree. We recently purchase our plane tickets and paid our registration fees so there's no backing out now! We can't wait to get to the competition and present our work.

Software Team Project Abstract:

In order to facilitate the design process for novel bacterial metabolism, our team has created a tool suite known as BioMortar which will automate plasmid design for metabolic processes as well as model cell growth. BioMortar begins with a much improved version of IMPtools, which uses an algorithm over a network generated by the KEGG database, to determine the optimal metabolic pathway according to specified conditions. At this point, it accesses the DNA sequences for each recommended enzyme for each reaction and searches the BioBrick database for related gene sequences. Then, BioMORTAR designs and displays the advised, usable plasmid(s) in BioBrick format for the user. Finally, the program models the growth of the organism, with the addition of the new metabolic pathway(s). By automating the design process, BioMORTAR streamlines the development of bacteria with novel metabolic processes.

Wetlab Abstract: sRNAs in Artifical Gene Circuits and Bioremediation

Previously, the majority of engineered, genetic regulation within bacteria has been achieved through the use of transcriptional regulators. However, the recent explosion of interest from the emerging field of RNA regulation provides new insights into the dynamic nature of genetic regulation. Small non-coding RNAs (sRNAs) comprise the chief regulatory mechanism for eliciting primary responses to environmental stresses. Acting in conjunction with proteins such as hfq (RNA chaperone), sRNAs provide a cost-effective, specific and rapid response that is essential in targeting gene transcripts for regulation.

The Illinois iGEM team has worked to create a set of endogenous and artificial sRNA regulator Biobricks to be used in cellular stress responses and which contribute to bistability in artificial gene circuits. A bacterial metal detection system of arsenic and gold demonstrates the capacity of sRNA regulation in artificial gene circuits.

Lab Update: As the Jamboree approaches we're working on submitting biobricks to the parts registry. This involves uploading sequences and applicable information to the registry website at http://www.partsregistry.org/Main_Page. We also have been continuing assays of each of our parts to characterize them and gather information for our Jamboree presentation.

Upcoming Events:

BioE120 Presentation:

We're excited to have the opportunity to give a presentation regarding iGEM and synthetic biology to freshman in bioengineering in October. The class serves as an introduction to various research opportunities within bioengineering and we glad to have been invited to share our work.

General Meetings:

After the great response we received on Quad Day, we're looking forward to meeting prospective iGEM applicants at our general meetings on September 29th and 30th. We plan on introducing synthetic biology and the iGEM competition in order to recruit new team members for next year. The meetings will be held in Noyes 163 at 7:30 PM for those interested.

We Need Your Support!

Financial support and supply donation is vital to completion of iGEM projects and the team's success. If you are interested in making a donation to the team please contact Co-Director Meagan Musselman at musselm1@illinois.edu or Melissa McKillip at mmckilli@igb.uiuc.edu. We appreci-

If you would like to stop receiving the monthly iGEM newsletter and be removed from the iGEM listserve please email either Erin Borchardt at eborcha2@illinois.edu or Anna Kropornicka at akropor2@illinois.edu