IGEM 2015 Project Description.

While last year’s team was able to take the nif cluster from a cyanobacteria and get it to function in E. coli, nitrogenase activity was minimal. This year’s team is dedicated to increasing the nitrogenase activity of E. coli with the nif cluster from Cyanothece 51142. The team members at Pennsylvania State will use high level computational modeling to optimize metabolic pathways within E. Coli, which will relieve the strain of nitrogen fixation. The team members at Washington University will create a minimal nif cluster of only those genes necessary for nitrogenase production and activation. In addition, they will silence and overexpress several genes in order to maximize nitrogenase activity.

In doing such, we hope to create a system for nitrogen fixation for transformation into a photosynthetic system. After we come to a greater understanding of how the system works and perfect it, we can move on to working in a more complex organism, such as a cyanobacteria like *Synecosystis*spp. 6803.   
  
The end goal is to create plants that can fix their own nitrogen by moving from the cyanobacteria into the chloroplast of the plant. Endosymbiotic theory postulates that cyanobacteria are the ancestors to chloroplasts, so this is the natural progression.