



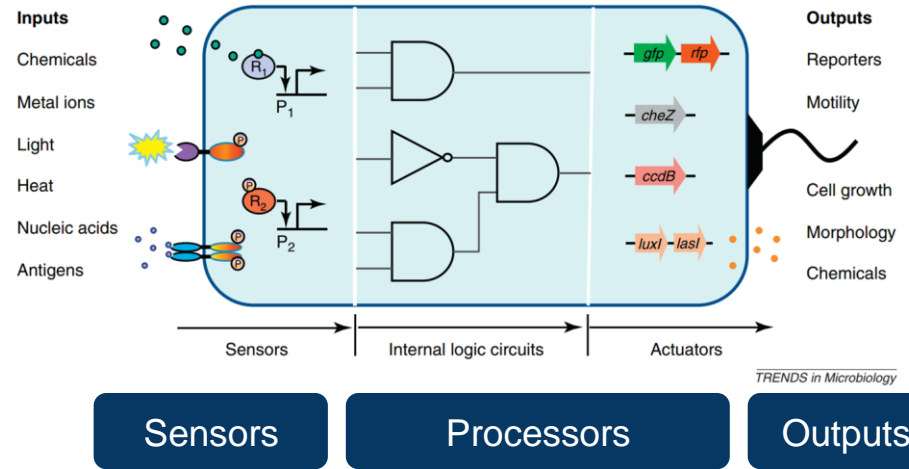
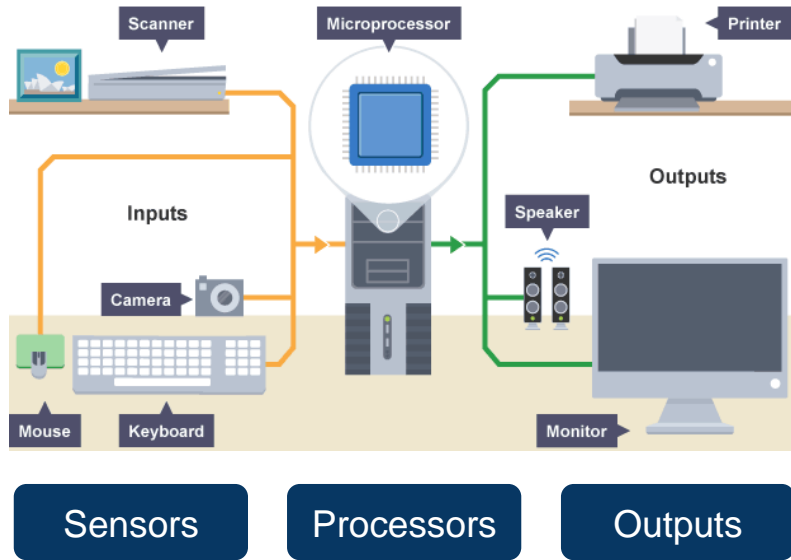
— International Genetically  
Engineered Machine Competition —

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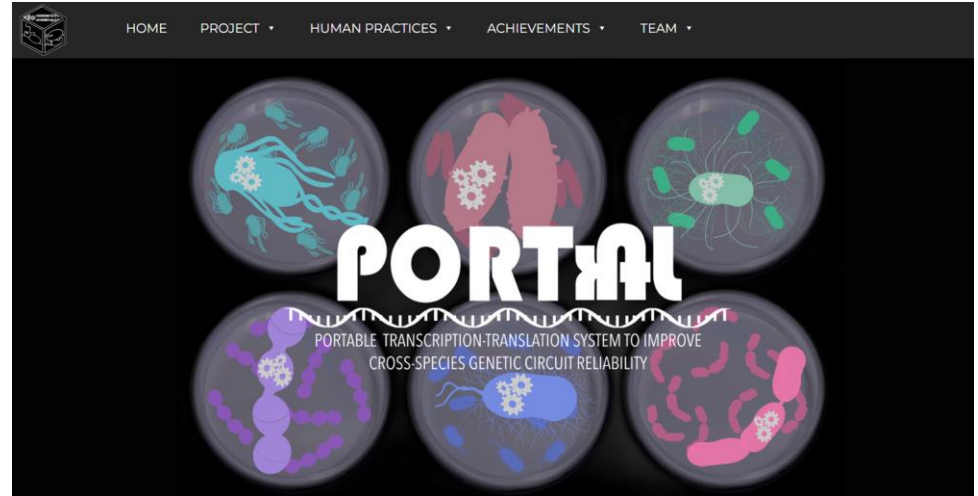
Solve the  
world's  
problems  
through  
Synthetic  
Biology

# Goal: make living organisms as easy to engineer as electronic systems



# iGEM competition has several components

Wetlab • Modeling • Wiki • Human Practices



<http://2018.igem.org/Team:Rice>

# Giant Jamboree in Boston!!



<https://naturalsciences.rice.edu/igem>

# hermoplant

Conferring climate resilience  
to crops through engineered  
rhizobacteria

# Desired Behavior and Properties

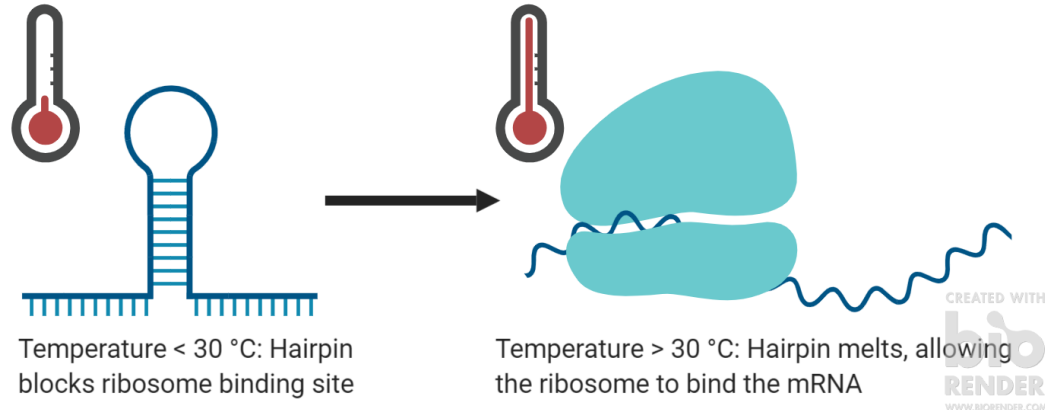
**Objective:** Engineer soil bacteria (*P. putida*) that can confer climate resilience to plants.

**Behavior:**

- Interact with plant roots
- Sense ambient temperature changes
- Produce proteins that can help that plant

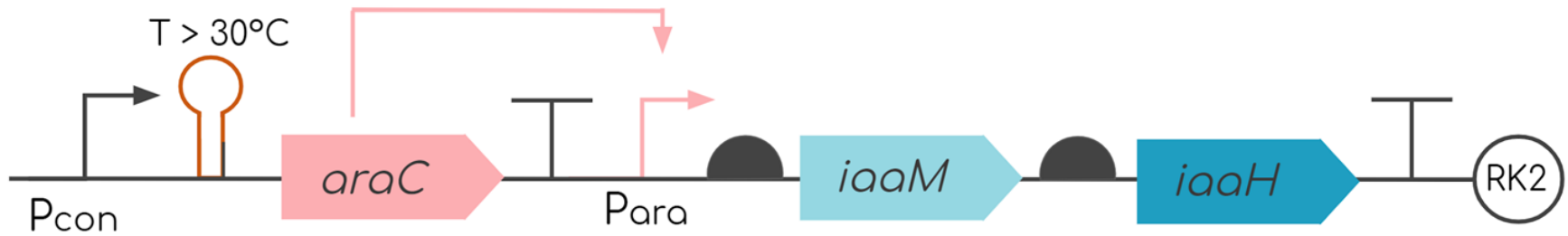
# Input/Output

Input	Output
Hot temperature ( $T > 30^{\circ}\text{C}$ )	Auxin, ethylene remover, trehalose (sugar)





# Genetic Circuit



# Experimental Plan

Step 1: Research project idea

Step 2: Test circuit design in bacteria

Step 3: Introduce bacteria to plant root system

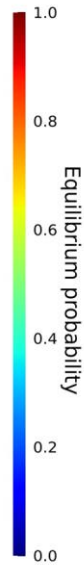
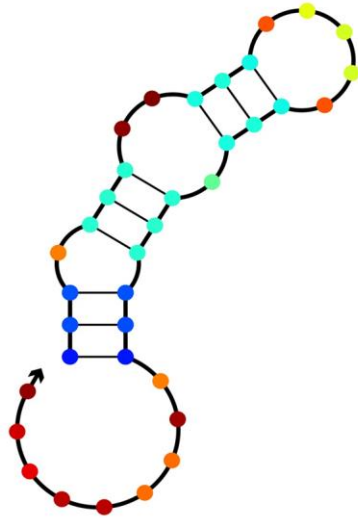
Step 4: Test effect of bacteria on plant growth



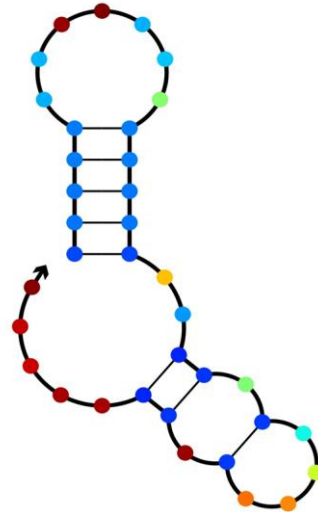
# Software

- Create a software to help find appropriate RNA thermometer

Structure at 25 °C

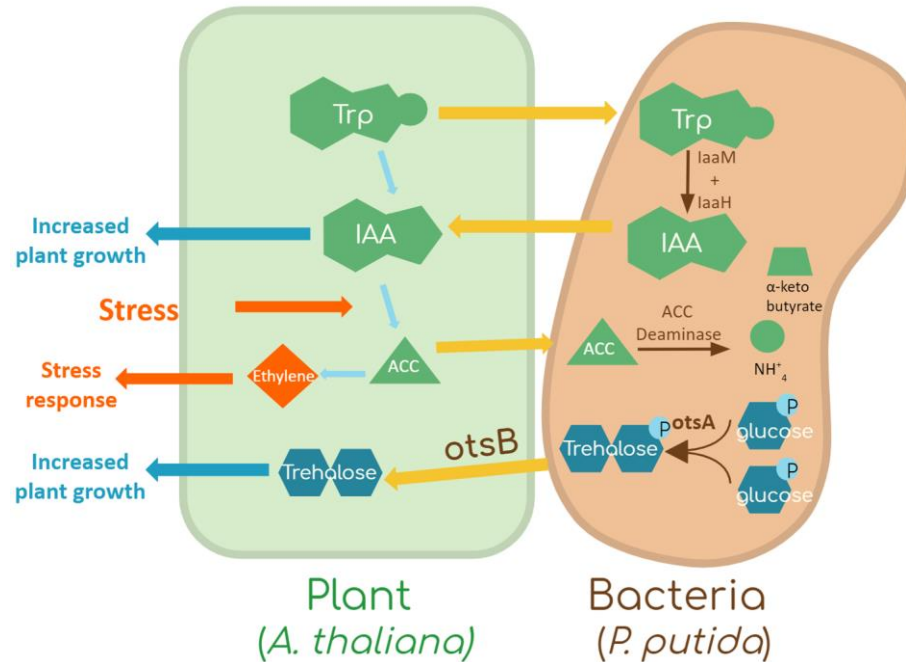


Structure at 30 °C



# Modeling

- Use differential equations to model plant interactions



Plant  
(*A. thaliana*)

Bacteria  
(*P. putida*)

# Integrated Human Practices

- Building on the philosophy and the environmental impact of this project
- Addressing challenges in applying this project to the real world
- Possible challenges:
  - What is a GMO?
  - Can farmers implement our idea?

## Impact Report

*An Analysis of a Novel Approach to Crop Climate-Resilience*



# Reaching out to experts

- Talking to people in the field: environmental scientists, farmers, lawyers, government employees, students like you!
- On site interactions with experts



# Outreach Projects

- Reaching out to the community
- Working with other university iGEM teams
- College class: Engineering Biology

**COLL 189 &  
RICE iGEM 2019**



Our Texas iGEM meetup with UT and Texas Tech at UT Austin!

Contact us if you have any questions about Rice or want to join iGEM!

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Survey Link: <https://forms.gle/DUuGc5jyT8fxhxa69> or in the Rice University iGEM instagram bio!