**Introduction**

Yogurt can easily get bacteria contamination when improperly stored. Considering the health hazard of spoiled yogurt and the lack of convenient detecting methods, our team aims to create a handy approach to determine whether a cup of yogurt is safe for eating. We aim to develop a method that detect AI-2, a signal molecule constantly produced by pathogens, and report their existence in yogurt with a visible pigment protein.

**Inspiration**

- Yogurt can benefit human and is a popular food item.
- The number of coliform bacteria in yogurt kept at 35°C for 0.5 h significantly exceeded the qualify standard.
- We generally cannot determine whether a cup of yogurt is safe for eating just through checking its appearance.

**Human Practice**

- Visiting a dairy factory
- Organizing public
- Attending the CCiC summit
- Making online surveys
- Flight iGEM

**Future Application**

- Our yogurt guarader can still be used in yogurt fermentation.
- We will use our Yogurt Guarder to make testing yogurt tubelets.
- If the testing yogurt in a tubelet turns blue, the yogurt in the cup may have spoil.

**Results**

- Quorum sensing is a process of bacterial cell-to-cell communication involved by autoinducers.
- The major pathogens in spoiled yogurt including E. coli, Salmonella and Bacillus generate AI-2 constantly.
- We chose 3 types of plasmids with different replication origins and antibiotics.
- Linearized expression vectors are stably integrated into the genome of the host.

**Modeling**

1. **Dynamic Model**
   - (1) The equations of intracellular synthesis of proteins
   - (2) The equations of AI-2 in the cells

2. **Predictor**
   - (1) Connection of three values
   - (2) Sobol' sensitivity analysis

We can use Sobol' sensitivity analysis method to determine the contribution rate of the parameters to the results. The sensitivity coefficient of parameter $K_{lsr}$ is:

$$S_{lsr} = \frac{D_{lsr}}{D} = \frac{D_{lsr}}{D_{lsr} + D_{lsr}}$$

**Acknowledgement**

**References**