

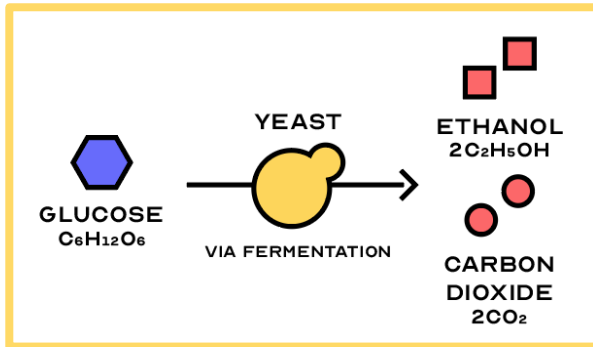
2022 Design and Prototype Finalists

Fermentation NanoLab

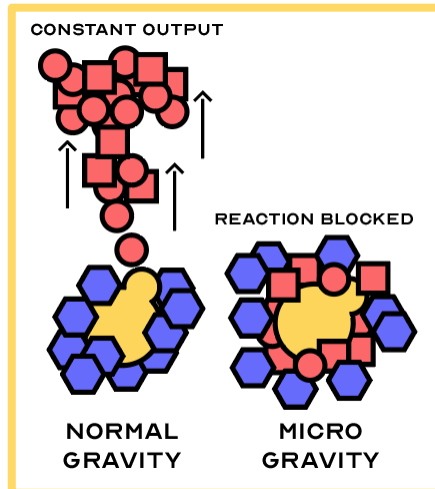
Students: Ben Kim, Asa Rishel, Temi Owojuyigbe
Teacher: Ray Gerstner
School: Glenelg, Maryland

Students: Braydon Schramm, Elias Saad
Teacher: Robin Merritt
School: Clear Creek, Texas

FERMENTATION STEM PRINCIPLES

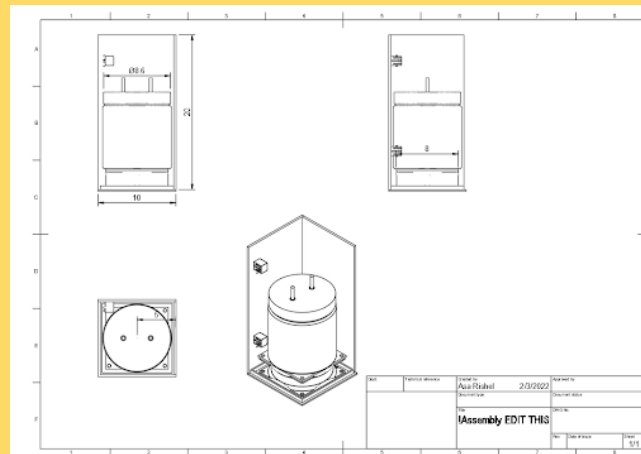


Ethanol fermentation proportionally converts one part glucose ($C_6H_{12}O_6$) into two parts ethanol ($2C_2H_5OH$) and two parts carbon dioxide ($2CO_2$) to respire. Oxygen gas (O_2) is not required.



Fermentation is stunted in microgravity because waste materials have no buoyancy and crowd the cell from its sustenance instead of rising to the top of the solution.

CAD Model



Project Lead The Way:
Engineering Design & Development

GLENELG FERMENTATION NANOLAB



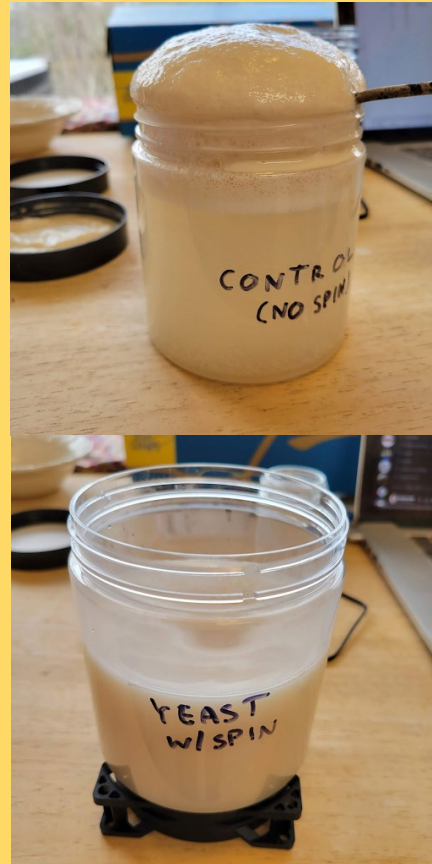
project by Ben Kim, Asa Rishel, and Temi
Owojuyigbe
under instruction of Mr. Raymond Gerstner

PROTOTYPE



- CPU powered by Arduino UNO
- Two neodymium magnets attached to CPU
- Jar filled with fermentation solution
- Spun by magnetic pill
- Carbon Dioxide leaves through tube

TESTING



Multiple samples were tested to see how fermentation acts with our design. The control was not spun at all and led to a high degree of foam. The second sample was spun with the magnetic pill and led to far less foam. The final sample was spun with a closed lid to prevent oxygen from getting into the system.



CONTACT

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or scan the QR code below:





FERMENTATION

NANO-LAB



Problem Statement

The problem is to create a fermentation lab for the school. The lab should be able to help students understand the effects of various factors on the growth of bacteria. The lab should also be able to help students understand the effects of various factors on the growth of bacteria. The lab should also be able to help students understand the effects of various factors on the growth of bacteria.

Research

A research study was conducted to determine the effects of various factors on the growth of bacteria. The study was conducted over a period of four weeks. The results of the study showed that the growth of bacteria was significantly affected by the presence of various factors. The results of the study showed that the growth of bacteria was significantly affected by the presence of various factors.

Solutions

The solutions to the problem were developed based on the results of the research study. The solutions were designed to help students understand the effects of various factors on the growth of bacteria. The solutions were designed to help students understand the effects of various factors on the growth of bacteria.

Features

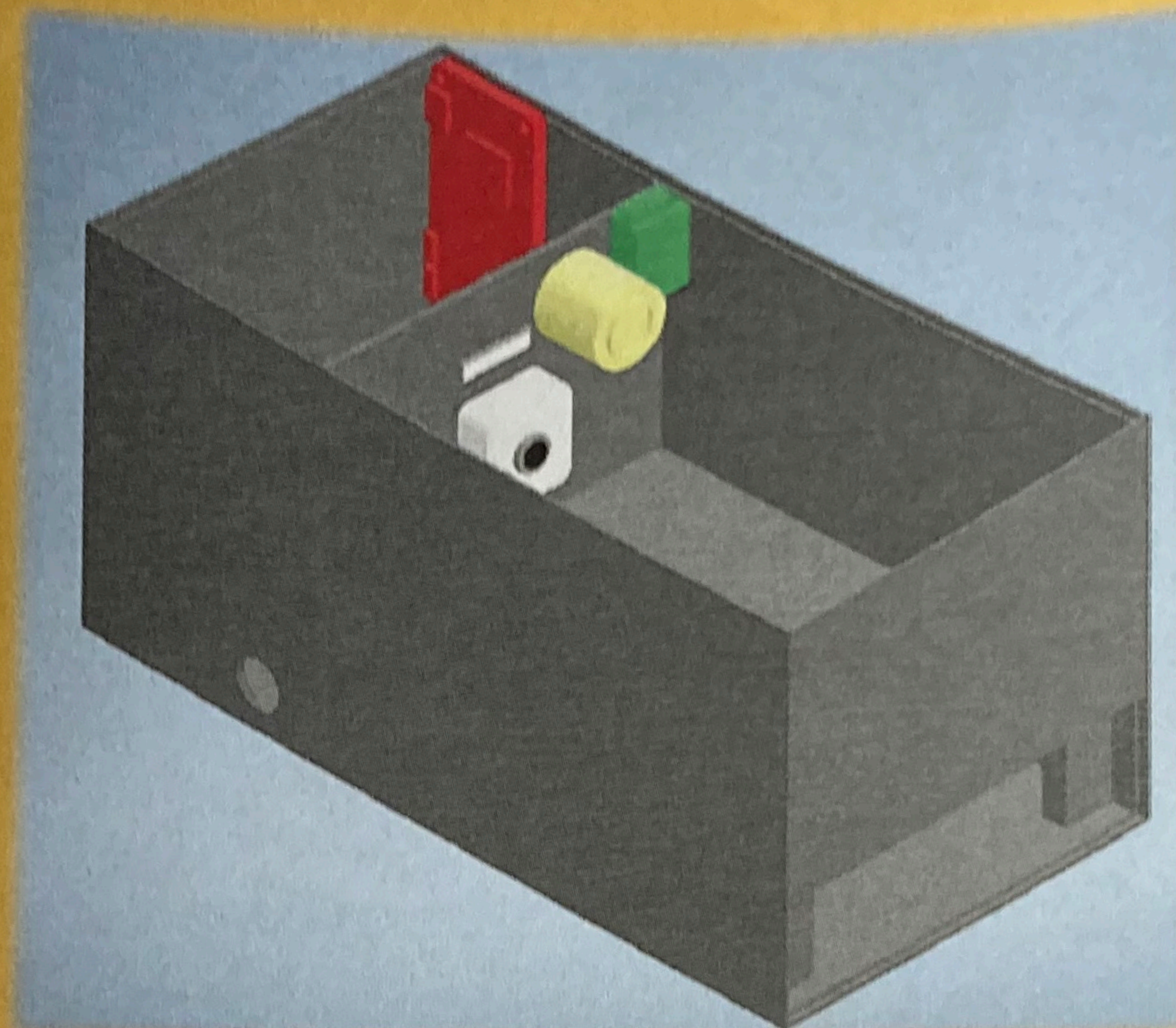
The features of the nano-lab include the ability to control the temperature, humidity, and light levels. The nano-lab also includes a built-in camera that allows students to observe the growth of bacteria in real-time. The nano-lab also includes a built-in camera that allows students to observe the growth of bacteria in real-time.

Justification

The nano-lab is a valuable tool for students to learn about the effects of various factors on the growth of bacteria. The nano-lab is a valuable tool for students to learn about the effects of various factors on the growth of bacteria. The nano-lab is a valuable tool for students to learn about the effects of various factors on the growth of bacteria.



WATER DISTRIBUTION SYSTEM DEMO VIDEO

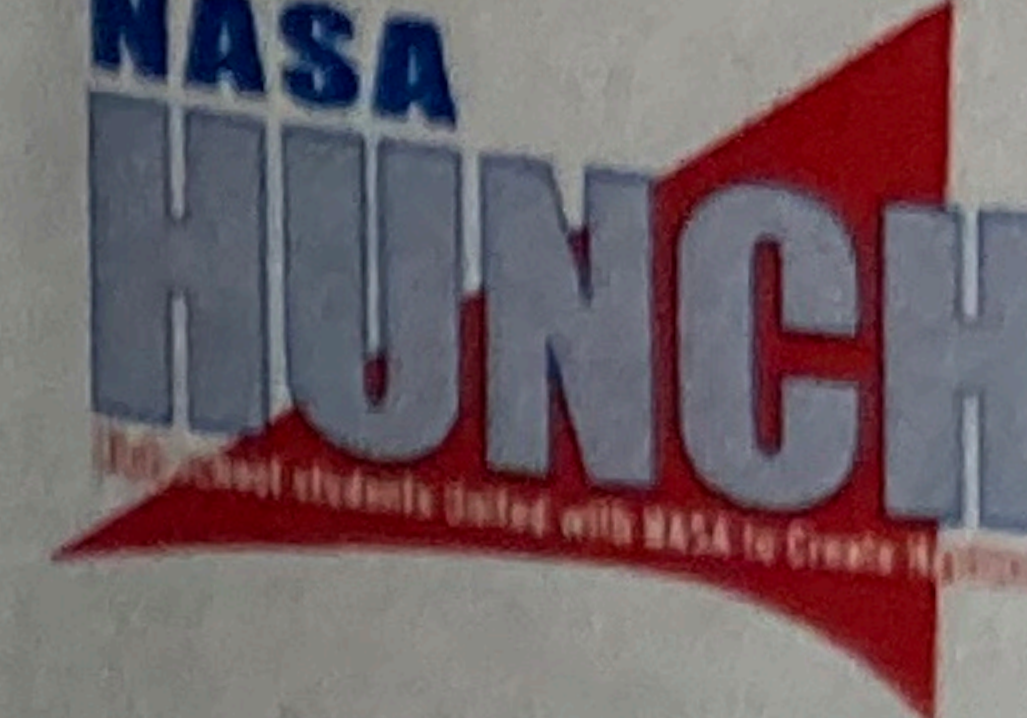


DESIGN:

Our current design has two chambers, and an under area for the insertion of motors.

The chamber on the left holds electronics, as well as our water distribution system.

The chamber on the right is where fermentation happens, and water is distributed into.

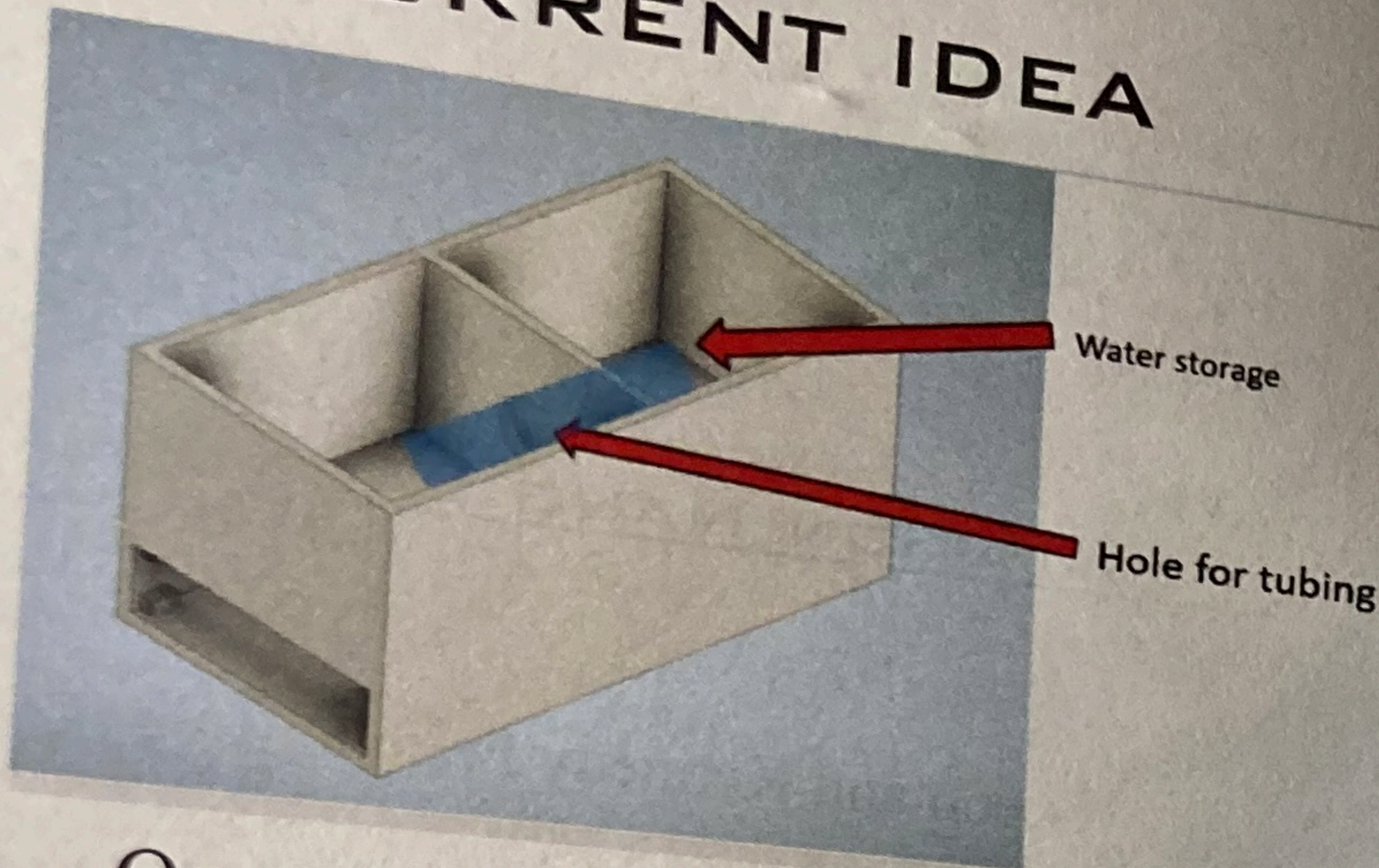


FERMENTATION NANOLAB

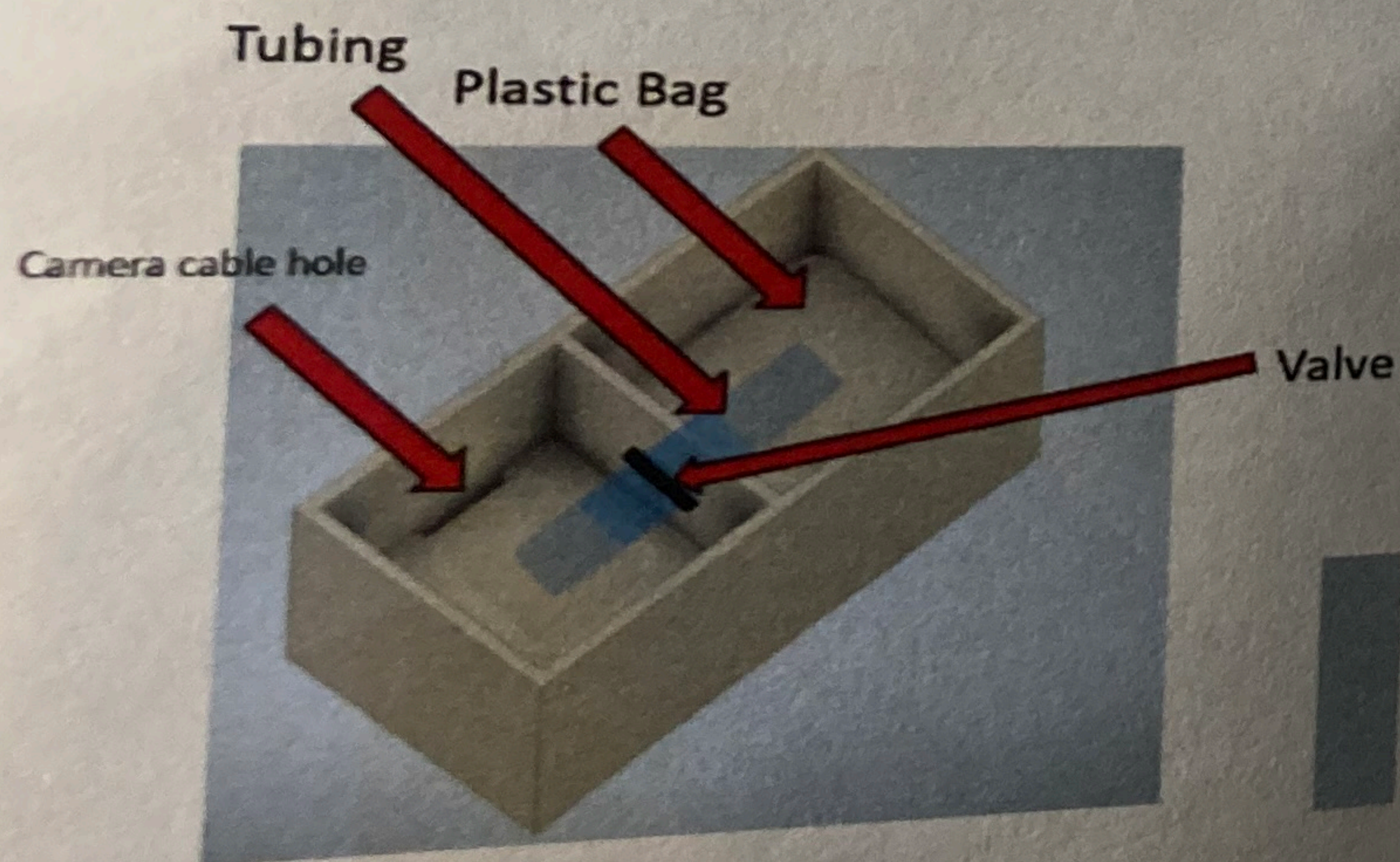
BY:
BRAYDON SCHRAMM &
ELIAS SAAD



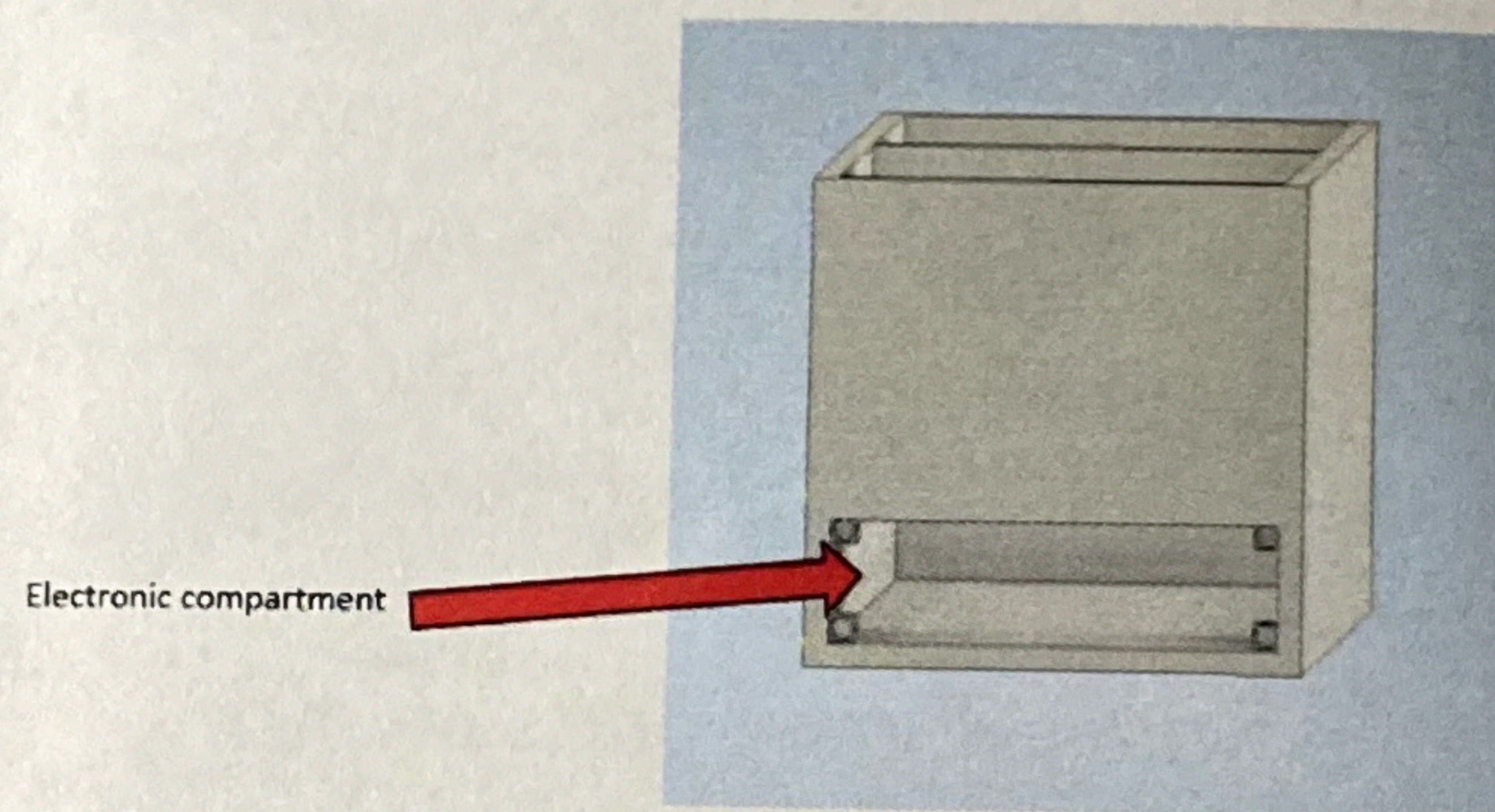
CURRENT IDEA



Our current idea is, we have two compartments up top and one compartment for the electronics under the top compartments. This allows us to have more space for the yeast and liquid to mix and ferment and allows more room for the electronics as they are long but not very tall.



One compartment has a plastic bag with water in it the other compartment has a bag with yeast in it, there is a tube with a valve connected to a servo motor that will control the flow between the two bags. When ready, the valve will open and allow both mixtures to mix and start its fermentation cycle.



Nano Labs must be studied to figure out the correct yeast to liquids what will work in zero gravity situations with different pressure then earth

