



# pH REGULATION MODULE FOR ASTRONAUT USAGE



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## INTRODUCTION

- Crucial for various applications: environmental monitoring, industrial processes, space missions.
- pH control systems use sensors to monitor pH and mechanisms to adjust it.
- On the ISS, these systems ensure potable water quality for astronaut health.
- Prevent risks and support life support systems.
- Automated software and advanced materials enhance reliability and efficiency.
- pH control systems are essential in many environments.

## BACKGROUND

- NASA's IVGEN Mini generates safe, sterile IV fluids on-site, reducing storage needs.
- Purifies ISS water and mixes it with pharmaceuticals to meet USP standards (pH 4.5-7.0).
- Essential for astronaut health as ISS water ranges from pH 4.5 to 8.5.
- Prototype is needed in the ISS and is meant to be used under microgravity.

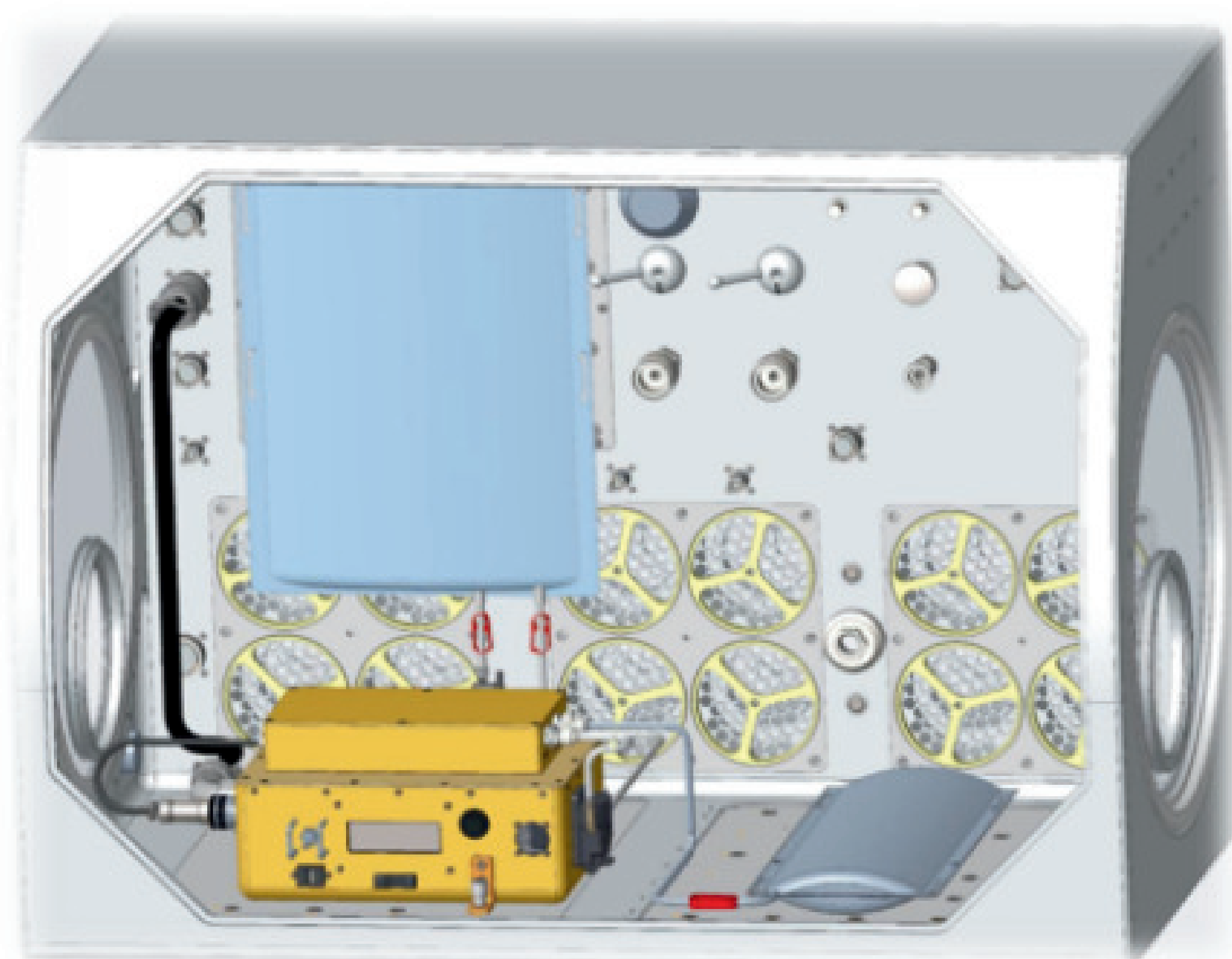


Fig 1. IV Gen System

## CONCEPT STATEMENT

The purpose of this project is to design, build, and test a fluid module that can monitor and regulate the pH levels of potable water for astronaut usage.

## SELECTED DESIGN DETAILS

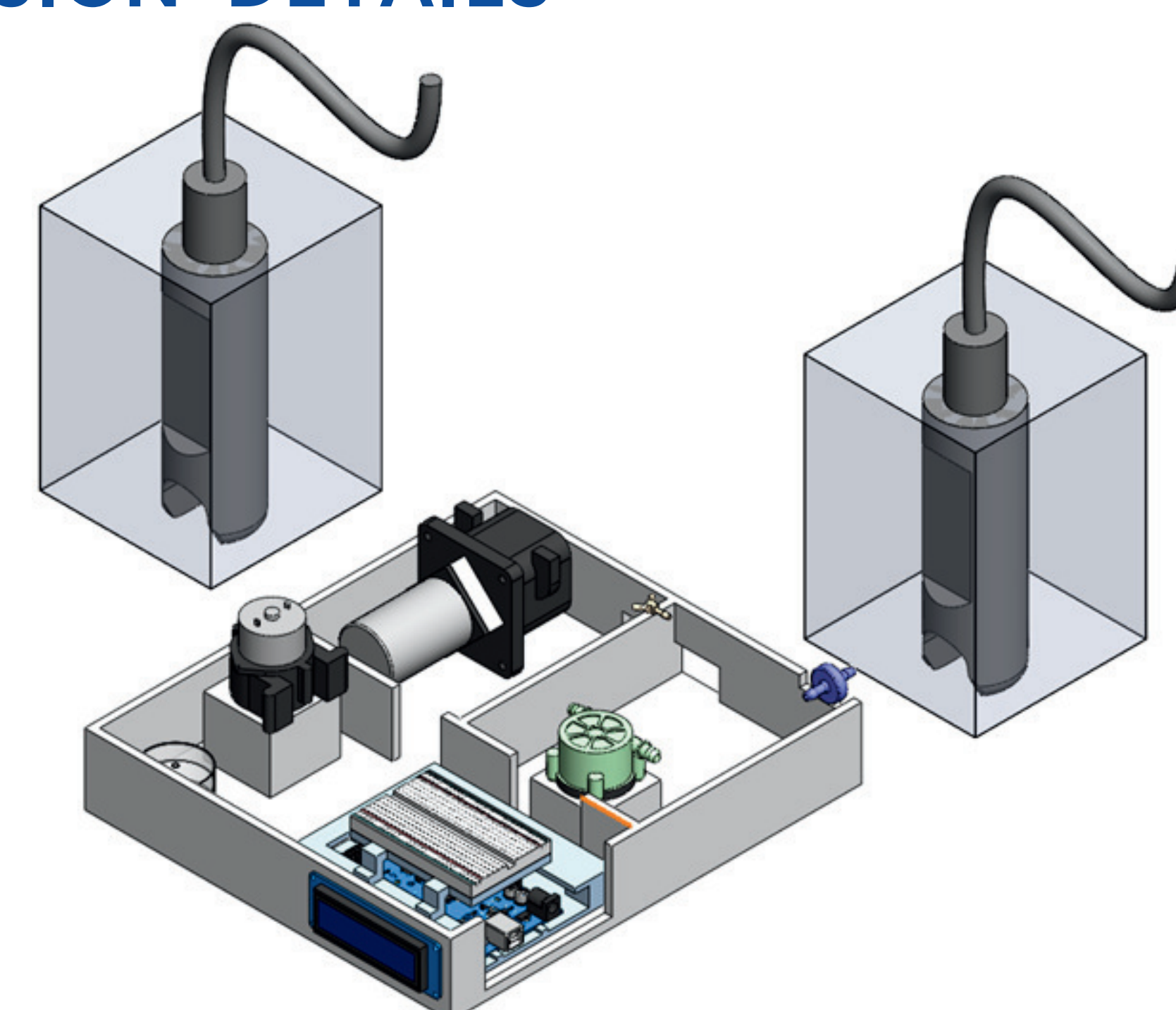


Fig 2. pH Regulation Module

## MAIN COMPONENTS WITH DIMENSIONS IN TEXT

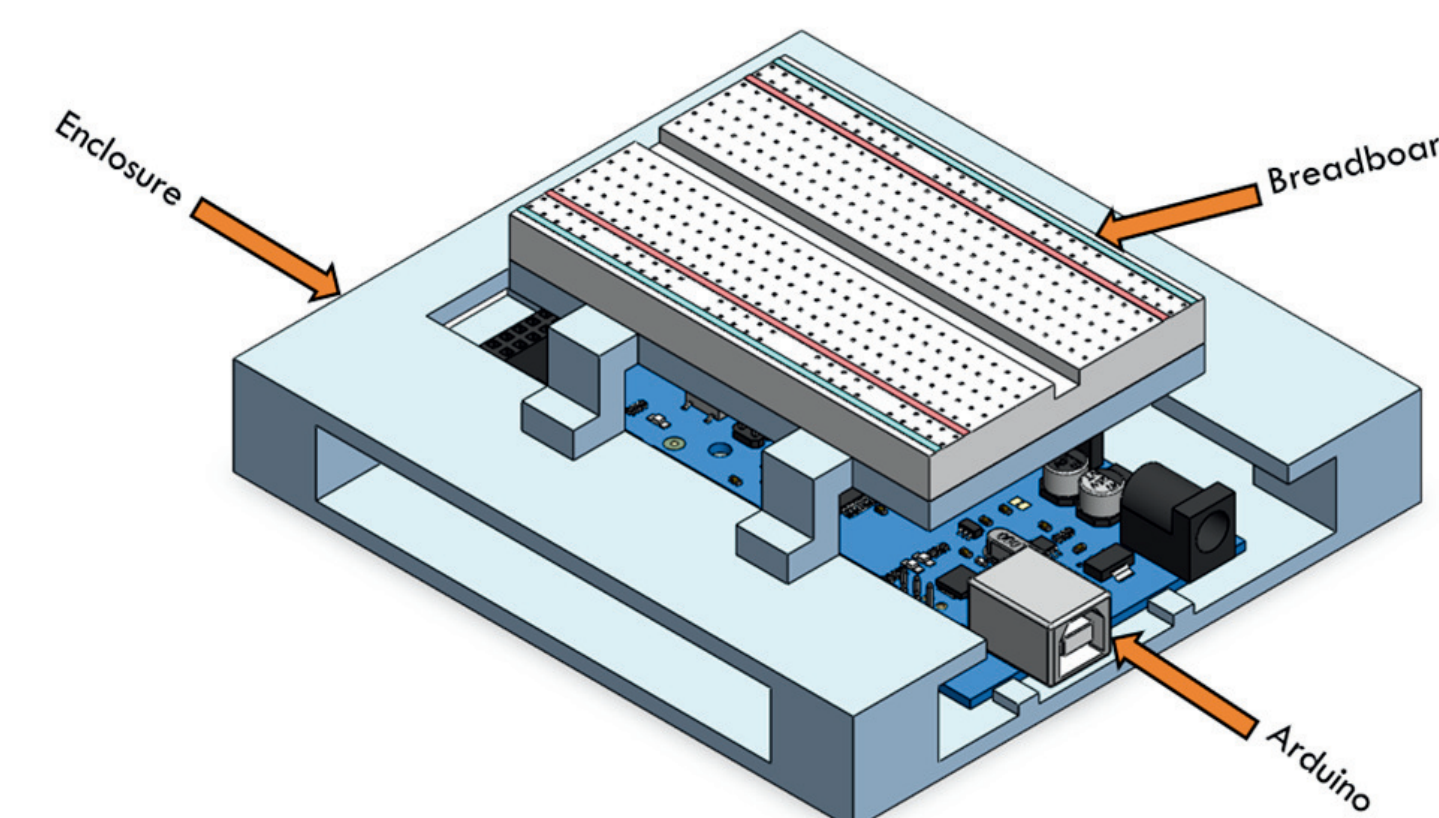


Fig 3. Enclosure Box  
Overall Dimensions (cm):  
12 L x 11 W x 3.4 H

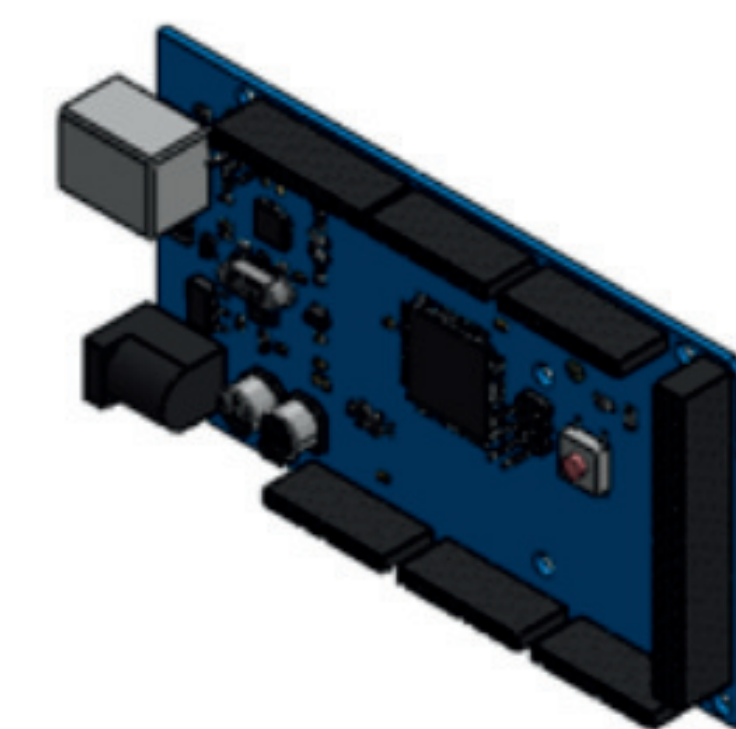


Fig 4. Arduino Mega 2560 R3

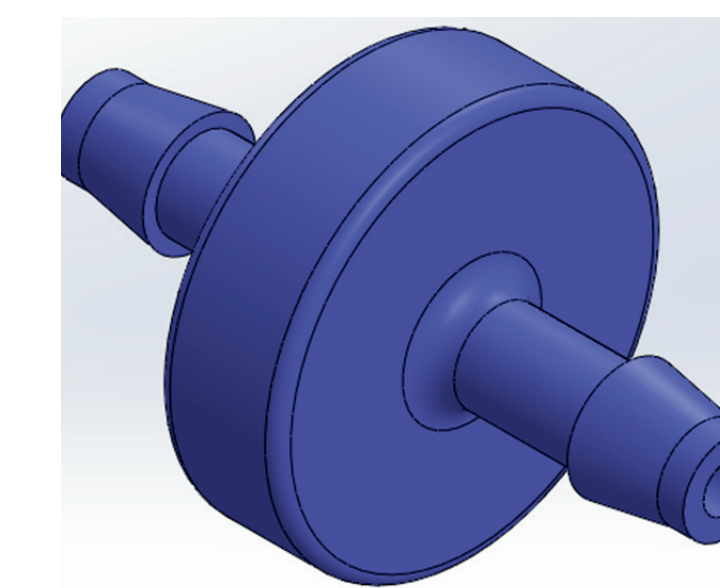


Fig 5. 1/8" Hose barb inline filter

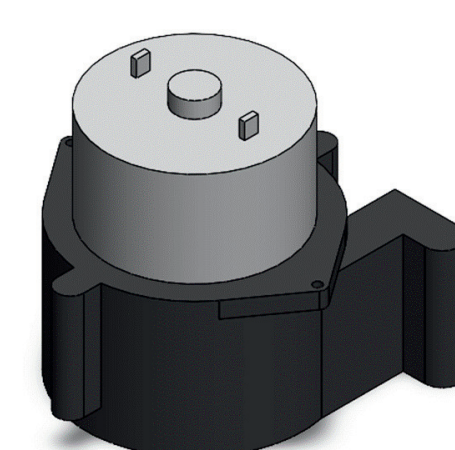


Fig 6. DC6 V Peristaltic Pump  
• flow range: .065 to .15L/min  
• Overall Dimensions (cm): 4.55 L x 4.85 W x 4.56 H

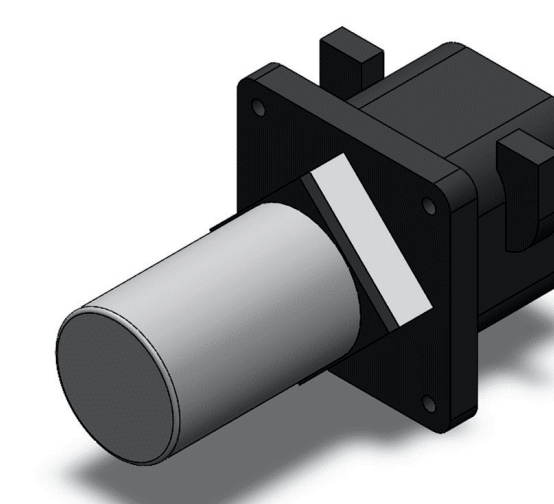


Fig 7. DC 12V Peristaltic Pump  
• flow range: .2 L/min  
• Overall Dimensions (cm): 6.25 L x 6.25 W x 11.58 H

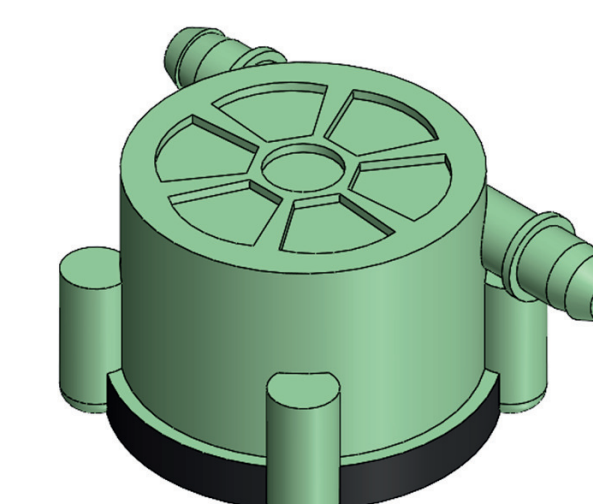
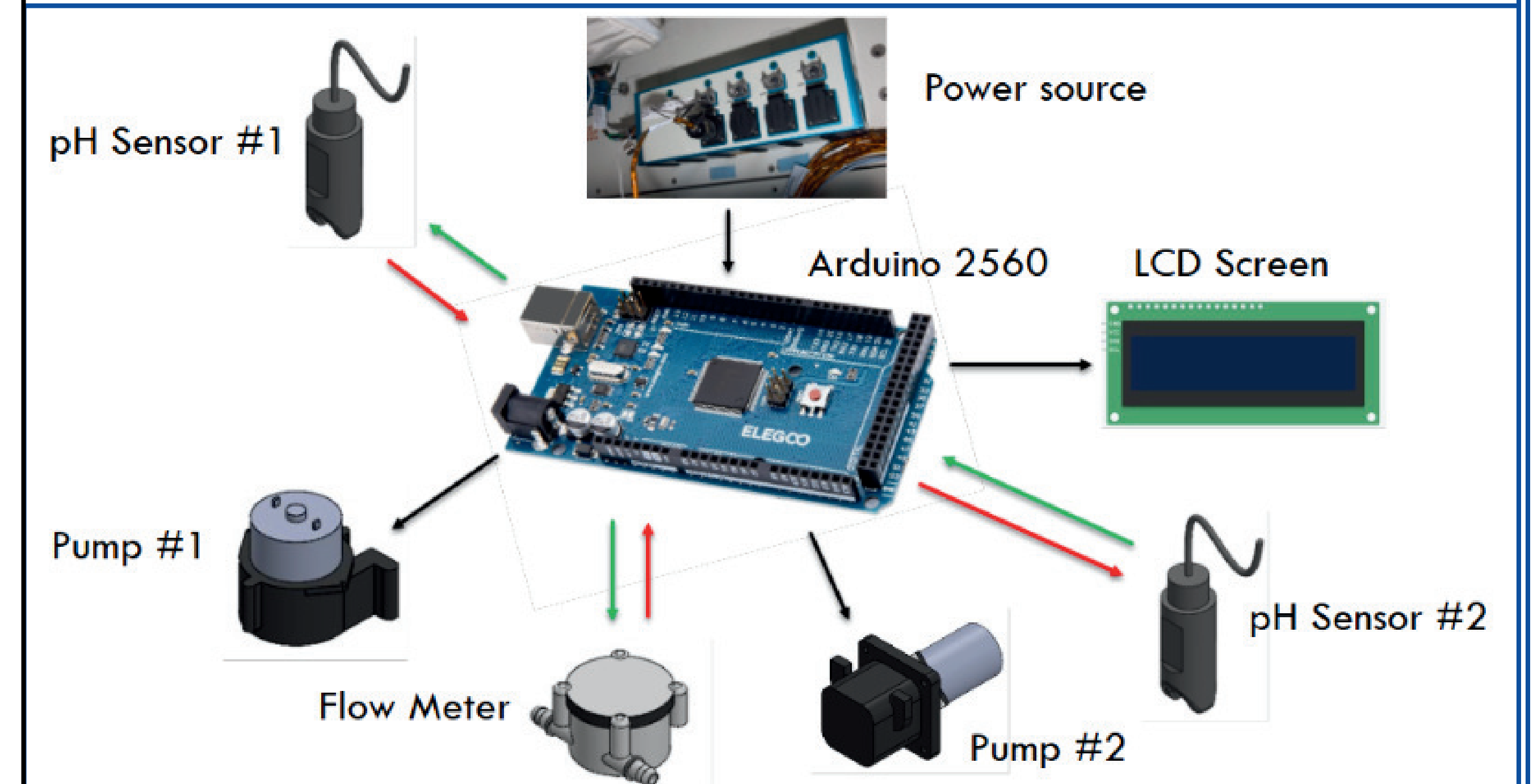


Fig 8. Water Flow meter  
• Overall Dimensions (cm): 5.76 L x 2.8 W x 2.72 H

## FUNCTIONAL DIAGRAM



## DISCUSSION

- Lower ISS potable water pH from 4.5-8.5 to 4.5-7.0.
- Medical-grade materials recommended for safety but not required due to budget constraints.
- Microgravity complicates simulations.
- Cost-efficiency is critical.
- Improve efficiency, cost, weight, dimensions, user-friendliness, and quality.

## CONCLUSION

pH Regulation Module Correction:

- Maintains pH levels between 4.5 to 7 via automated software.
- Designed for the ISS and microgravity
- It supports deep space exploration and astronaut well-being.

## FUTURE WORK

- Work towards full compliance with all relevant standards
- Create comprehensive user manuals
- Analyze lighter and more cost-effective components

## REFERENCES



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