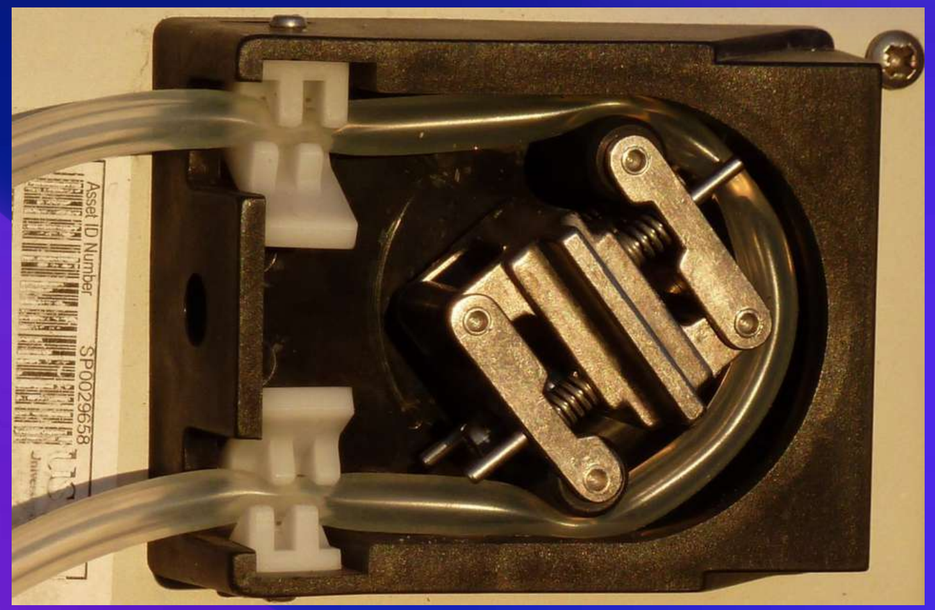
ESW PROJECT

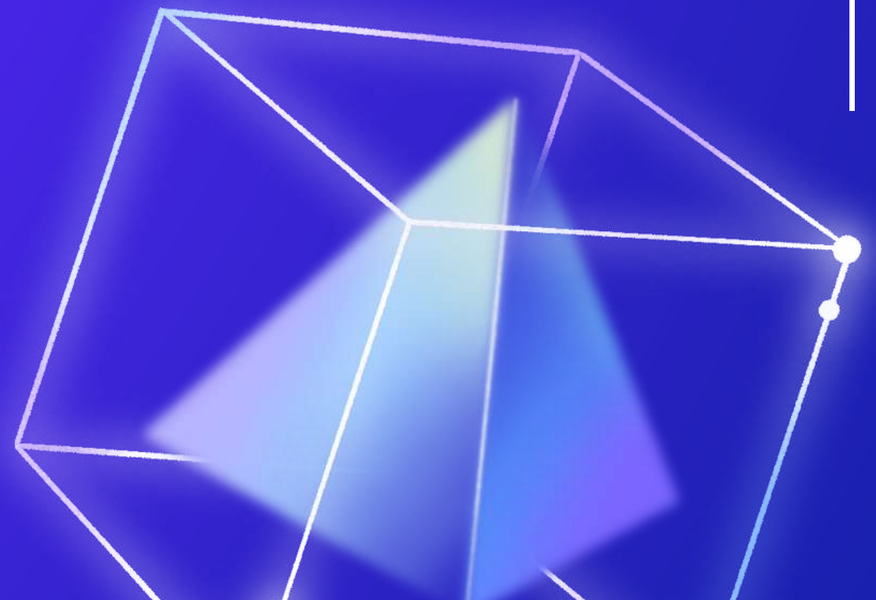
PERISTALTIC PUMP FOR BIOMASS TRANSPORTATION



BY TEAM-3

TABLE OF CONTENTS

- Introduction 01
- Project Objectives 02
- Production Process 03
- Motivation 04
- Our Work 05
- Sensors 06
- Conclusion 07



INTRODUCTION

Peristaltic Pumps move fluids without direct contact. They are used in various fields such as squeezing flexible tubing to create pulsatile flows. This method offers flow control, contamination prevention, etc. In this project, our application title is "Biomass transfer" which covers the critical aspect of optimizing growth conditions for microorganisms, algae or other biological entities.

PROJECT OBJECTIVES

- EVALUATE CONTAMINATION PREVENTION
- FLOW RATE CONTROL AND PRECISION
- QUANTIFYING BIOMASS YIELD ENHANCEMENT
- ENERGY EFFICIENCY ANALYSIS
- DATA COLLECTION AND ANALYSIS
- INTEGRATING THIS TECHNOLOGY INTO BIOMASS PRODUCTION PROCESS, GROWTH CONDITIONS AND SCALABILTY.

PRODUCTION PROCESS

01

Biomass-reactor and Medium Preparation

02

Inoculation and Nutrient Addition, Temperature Control and Oxygen Supply

03

Biomass Monitoring, Harvesting and Processing

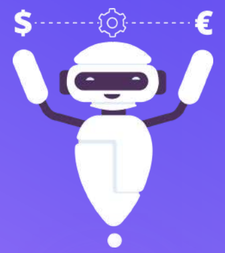
04

Waste Removal, cleaning and sterilization as well as Data Recording and Analysis

MOTIVATION

01

Importance of and Challenges in Biomass Production as well as Fluid Handling



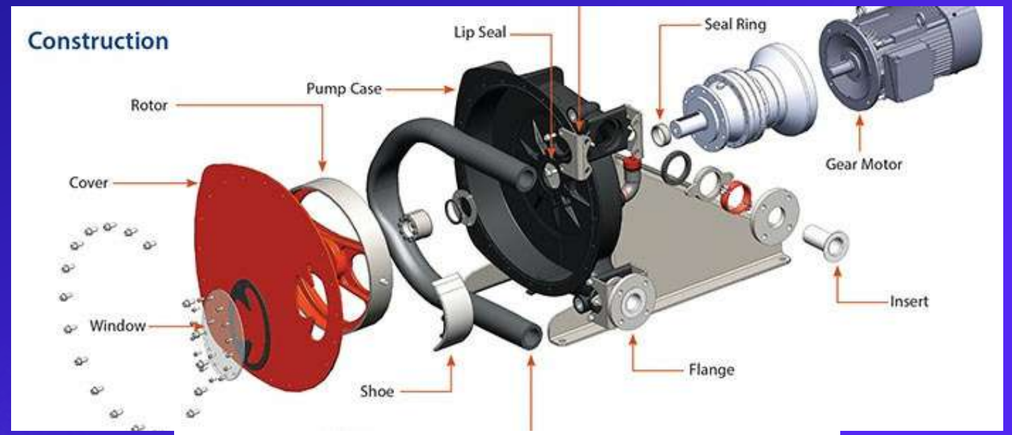
02

Potential Impact as well as Potential Industry Adoption and Alignment With Sustainable Goals

03

Innovation, Technology as well as Peristaltic Pump Advantages

OUR WORK


Construction
Lip Seal
Seal Ring
Pump Case
Rotor
Gear Motor
Cover
Insert
Window
Flange
Shoe

SENSOR INTEGRATION AND TESTING

Sensor integration and testing are crucial for ensuring the smooth operation of a complex system with various sensors, a DC motor, and its driver,ultrasonic,rotary encoder,temperature and flow-rate sensor. Effective communication between sensors and the control unit is vital. This involves configuring interfaces, addressing compatibility issues, and synchronizing data for accurate and real-time information. Thorough testing is necessary to validate reliability and performance. This includes calibration, sensitivity tests, and assessing responses to different conditions. Successful integration and rigorous testing guarantee efficiency, accuracy, and effectiveness in automation, robotics, and industrial processes..

DATA UPLOADING USING THINGSPEAK AND ON WEBSITE

Sensor integration and testing are crucial for ensuring smooth operation of a complex system with various sensors, a DC motor, and its driver. Effective communication between sensors and the control unit is vital. This involves configuring interfaces, addressing compatibility issues, and synchronizing data for accurate and real-time information. Thorough testing is necessary to validate reliability and performance. This includes calibration, sensitivity tests, and assessing responses to different conditions. Successful integration and rigorous testing guarantee efficiency, accuracy, and effectiveness in automation, robotics, and industrial processes.

3-D MODEL MAKING AND PRINTING

In addition to sensor integration, we've used 3D printing to create a customized model for our project. This showcases our commitment to innovation and precision, and helps bring our system to life. With 3D printing, we can design and produce parts that perfectly fit our sensors, motor, and driver components, streamlining the assembly process. This technology reduces costs and allows us to optimize our design quickly, highlighting the potential of additive manufacturing in enhancing functionality and aesthetics.

ULTRASONIC SENSOR

01

- *Ultrasonic sensors consist of a transmitter and a receiver. The transmitter emits a high-frequency sound wave, which then travels through the air until it encounters an object. When the sound wave hits the object, it bounces back towards the sensor and is detected by the receiver.*

02

- *Ultrasonic sensors calculate the distance to an object by measuring the time it takes for the sound wave to travel to the object and return (time of flight). By knowing the speed of sound in the air, the sensor can accurately calculate the distance.*

TEMPERATURE SENSOR

01

- *Temperature sensors are electronic devices designed to measure and provide information about temperature levels in various applications and environments. They play a fundamental role in a wide range of industries and technologies, from HVAC (Heating, Ventilation, and Air Conditioning) systems to automotive engines and weather monitoring.*

02

- *Infrared (IR) temperature sensors detect emitted infrared radiation from objects, and digital temperature sensors, like the DS18B20, employ integrated circuits to provide temperature data digitally. The choice of sensor depends on the specific application's accuracy and precision requirements, temperature range, and environmental conditions.*

ROTARY ENCODER

01

- *Rotary encoders are sensors used to measure the angular position or rotation of an object, typically a shaft or knob. They are widely used in various applications where precise and continuous monitoring of rotational movement is essential.*

02

- *Rotary encoders work on the principle of converting angular motion into an electrical signal. They consist of a rotating shaft and a sensor component that detects changes in the shaft's position.Rotary encoder sensors are versatile and crucial components in various systems, enabling precise control, monitoring, and feedback in applications where rotational position information is vital.*

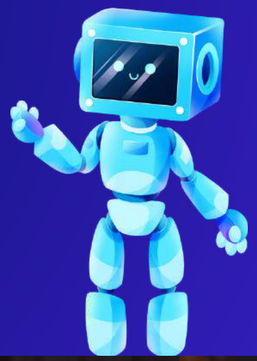
FLOW-RATE SENSOR

01

- *Flow rate sensors, also known as flow meters or flow sensors, are devices designed to measure the rate of fluid (liquid or gas) flow through a pipe, channel, or conduit. They find extensive use in various industries and applications where accurate measurement and control of fluid flow are essential.*

02

- *Flow rate sensors operate based on various principles, and the choice of sensor type depends on the nature of the fluid, the required accuracy, and the specific application such as Differential Pressure , Vortex Shedding, Positive Displacement, etc.*



THE TEAM

HARSH GUPTA

(2022101067)

KEVIN THAKKAR

(2022101064)

SPARSH GOEL

(2022101051)

GOPAL GARG

(2022101079)

THANK YOU!