IOWA STATE UNIVERSITY

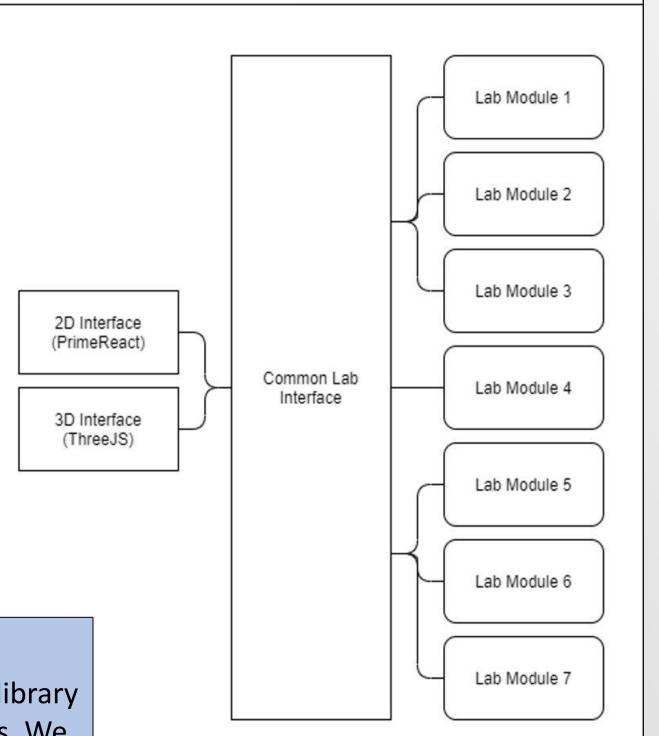
Brody Sunsten [SE], Romain Ndoutoume [SE] Steven Dirth [SE], Jacob Christopherson [SE] Peter Bancks [SE] and Enzo Ciccarelli-Asta [SE] Faculty Advisor: Professor Mitra [COM S] Client: Professor Stone [BBMB]

Department of Electrical and Computer Engineering

Biochemistry Virtual Lab sdmay21-12

Introduction / Motivation

- Virtual Instruction: When Iowa State University transitioned to an online class structure in early 2020, Professor Stone searched for solutions to provide biochemistry students the lab modules of BBMB 102 under new lab capacity regulations
- Webapp Laboratory: An online
 interactive lab allows students to
 complete these lab modules
 remotely, while also reducing wait
 times on equipment and allowing
 for labs to be repeated.



React Application

Design Requirements

- 3D Environment: Users can see and interact with a
 3d virtual lab, including objects, tables, PPE, and a
 notebook
- Must function on all major web browsers
- User can interact with the environment smoothly and intuitively

Design Approach

- React Application split into 7 distinct modules, 1 per lab
- Each lab implements a common interface, which defines the interactions between it and the main application engine
- The main application is further divided into two

Testing

- React Testing Library: The react testing library is a library for testing React components. We use this library to ensure that the lab is working as expected. The react-dom allows us to create tests that resemble the way the lab is used.
- Acceptance Testing: We hold demonstrations
 of our current progress every two weeks to
 ensure the project is advancing in a manner
 acceptable to the client. The team carefully
 reviews and resolves any feedback from the
 client and the faculty advisor.

Design Mockup

BBMB 102 Virtual Laboratory

Welcome, Select an experiment to start.

Module 2: PH and Buffers **Module 1: Protein Concentration Determination** Lorem ipsum dolor sit amet, consectetur adipisicing elit. Inventore sed consequuntur error repudiandae Lorem ipsum dolor sit amet, consectetur adipisicing numquam deserunt guisguam repellat libero elit. Inventore sed consequentur error quisquam asperiores earum nam nobis, culpa ratione quam repellat perferendis esse, cupiditate neque quas! proteins Module 6: Plasmid DNA **Module 4: Enzyme Kinetics** Module 5: Extraction and **Analysis of Carotenoids Purification and Analysis** Lorem ipsum dolor sit amet, consectetur adipisicing ore sed conseguuntur error repudiandae Lorem ipsum dolor sit amet, consectetur adipisicing Lorem ipsum dolor sit amet, consectetur adipisicing elit. Inventore sed consequentur error repudianda

components

- 2D Interface with PrimeReact
- 3D interface with ThreeJS

https://virtuallab.iastate.edu			
⊙ Step A	Step B	🔘 Step C	Help
			 Action A Action B Action C
	Lab 1 Step A X Image: Constraint of the second and the s		Lab1 ^ Lab2 Lab3 Lab4 Lab5 Lab6 Lab7
odule 3: Size Exclusion romatography ermine the molecular weight of an u tein sample through an experiment	Inknown		

Intended users and uses

- This software is intended to assist students taking BBMB 102 by allowing them to complete labs virtually, without physical access to the lab.
- The students will be the primary users of the application, with the professor utilizing it as a teaching aid.

