Team Meeting

9/12/2017 2:13 PM GJ108 Senior Design Suite

Weekly Meeting	Team	Type of meeting: Group Meeting		
Note taker:	Samuel Funk			
Attendees:	Samuel Funk, Lucas Becia, Matthew Jungert, Sage Pratt, Nate Wiedenmeyer			
		Minutes		
Agenda item:	Contract	Presenter: [None]		

Discussion:

We need to go through the mind works page and solidify everything. (Action items are updates that are needed for the contract. Members of the team will review sections pertaining to their roles, and improve/edit them. Matthew is the head editor and will look over the contract before it is submitted.)

- Roles Decided at meetings via unanimous decision. We will have leads for sections of the project.
 - Leads will focus on specific sections of the project as they arise. Members will report information to the relevant lead as information and idea come up with.
 - The purpose of the Lead is to organize information and ideas on a specific subject matter so that it can be concisely presented and discussed at team meetings.
- Budget Run Purchases past Dev, take receipts to office, make sure purchases are tax exempt
- Client Contact Keep the client updated on what is happening and making sure that they are up to date
- Agenda Create meeting agendas and bring them to meetings
- Team Documentation –
- Wiki Page Development Wiki Master will develop the Wikipedia page dedicated to the project

Conclusions:

We began editing the contract at the meeting,

Action items		Person responsible	Deadline
√	Team Name		
√	Roles – Decided at meeting		
√	Budget	Lukas Becia	
\checkmark	Client Contact	Samuel Funk and Matthew Jungert	
~	Team Documentation	Samuel Funk	
\checkmark	Wikipedia Page	Sage Pratt	
\checkmark	Head Builder	Nate Wiedenmeyer	
\checkmark	Agendas	Matthew Jungert	
√	Edit the Contract	Everyone	9/13/2017 at Midnight
√	Read through relevant paper work on Mindworks	Everyone	

2

Action items

Person responsible

Presenter:

Meeting with Client

Discussion:

Agenda item:

Meeting on 9/13/2017 at 12:30 - 1:30, at JML 82

Conclusions:

Everyone needs to get prepared for the meeting with the client and develop a better understanding of the project so that the meeting can run smoothly and cover a large amount of information

Action items		Person responsible	Deadline
✓	Familiarize yourself with the project	Everyone	Time of Meeting
✓	Research the Project	Everyone	Time of Meeting
✓	Develop Questions for Dr. He	Everyone	Time of Meeting

Team Meeting

Meeting called by: Group and Mentor Type of meeting: Group and Mentor Facilitator: **Dev Shrestha** Note taker: Samuel Funk Timekeeper: Samuel Funk Samuel F., Lucas B., Matthew J., Nate W., Sage P. Attendees: **Team Contract** Please read:

Minutes

Review of Meeting with Client Agenda item:

Discussion:

- 1. Dr. Shrestha wanted to hear about what we spoke to the client about.
 - a. Project implementation, expectations
 - b. Meeting time with the client
- 2. Group plans to meet with the client after a design is formulated.
- 3. Spoke about circulating meeting minutes
 - a. Minutes will then be uploaded to OneDrive and the meeting agenda will be derived from the minutes

3:30 JG 108

Time of Meeting

Enter presenter here

[None]

9/14/2017

Presenter:

- 4. Project design:
 - a. Want continuous fluid movement with zero dead space
 - b. Use a check valve
 - i. Sensor to track CO₂ input
 - c. Implementation of a catalytic converter?
- 5. Dev would like us to focus specifically on the requirements that the client has requested
 - a. After the group meets the requirements, additional ideas can then be addressed
- 6. Light
 - a. Light bands for growth is going to mostly be within the solar spectrum
 - b. Focused on the GREEN, RED, and BROWN algae types
 - i. Can ask whoever the algae is attained from the correct frequencies of light we should use
 - ii. Use Arduino to create a program that allows for a programmed light intensity to be used

Action items		Person responsible	Deadline
√	Formulate Design	Team	
✓	Gant Chart	Team	9/28/2017
✓	Transcript of Client interview with target specs sent to client		9/28/2017
\checkmark	Research "Bubble Lifters"	Team	
\checkmark	Research literature on PBR	Team	9/18/2017
\checkmark	Log book #1 (w/review form)	Team	10/3/2017
\checkmark	Certifications needed	Nate W., Sage W.	9/25/2017

Action items were decided as a team, and individual jobs were given out. It is important at this stage that everyone is conducting research so that we can begin formulating a better understanding of the project and how we can best design a PBR.

Other Information

Special notes:

None.

Team Meeting 4

9/19/2017 2:00 GJ 108

Meeting called by:	Group	Type of meeting:	Group	
Facilitator:	None	Note taker:	Samuel Funk	
Timekeeper:	Samuel Funk			
Attendees:	Samuel Funk, Lucas Becia, Nate	e Wiedenmeyer, N	latthew Jungert, Sage Pratt	
Minutes				

Agenda item:	Client Interview Transcript and Project	Presenter:	Enter presenter here
J	Specifications		

Discussion:

- The transcript is a compilation of the notes and pictures from the client interview process
 - Meant to be sent between the group, faculty mentor and grad student mentor, and with the client
- Itemize the client requests into categories and create a matrix against the requirements shortening to essentials when possible
 - Want a measurable thing for every requirement (i.e. 10-15 gallon system)
 - \circ \quad Go through the file that was sent to us and edit it to include the above items

Conclusions:

Team will convert the client meeting minutes to an online form and begin forming a matrix outlining the specifications and requirements of the project.

Action items		Person responsible	Deadline
🗸 Туре	e up notes from the Client Meeting	Team	9/28/2017
	a digital of the Senior Capstone Design Project from nt and post on OneDrive	Matthew	9/21/2017
a ma	vert the project specifications and requirements into atrix on excel, that illustrates how things will be omplished.	Team	9/28/2017
Agenda it	_{tem:} Gant Chart	Presenter:	Enter presenter here

Discussion:

Decided on a time to do the Gant Chart.

Conclusions:

Gant Chart will start being made in upon the completion of the matrix outlining the project specifications and requirements.

Action items		Person responsible	Deadline
✓	Gant chart will be made after the project specifications are determined.	Team	9/28/2017

Agenda item: Specifications and Requirements of the Project Presenter: Enter presenter here

9/21/2017

3:30 GJ 108

Discussion:

- Working Bioreactor to grow algae
- Light fixture for the system that we can program the specific frequencies.
- CO₂ injector for the system

Team Meeting 5

Meeting called by:	Team	Type of meeting:	Mentor	and Team
Facilitator:	None	Note taker:	Samuel I	Funk
Timekeeper:	Samuel Funk			
Attendees:	Dev Shrestha, Samuel Funk, N Pratt	latthew Jungert,	Lucas Becia	a, Nate Weidemeyer, Sage
	Mi	nutes		
Agenda item:	Mentor Update and Advice	Ρ	resenter:	Enter presenter here
Discussion:				
	ks that this is the time to do as much proceed on the second s			
Research	c	than a large hamse	or puges	
0	Currently looking mostly at the existing	structures of PBR's		
0	Nate has been looking at mainly at vario • A turbine pump will likely be en			
0	Nate suggests using a panel like setup sh	nifting from a tubula	r system	
 Dev wants at least three design ideas to present to the client 				
 Nutrient control for the algae CO₂ for the carbon source Nitrogen source needs to be figured out 				

Conclusions:

Enter conclusions here.

Action items		Person responsible	Deadline
√	Prepare three design ideas to present to the client	Team	
✓	Research on nutrient requirements of the algae	Samuel, Matthew, Lucas	
\checkmark	Refine Nate's design idea, Draft up a representation	Nate	9/26/2017
✓	Finish the documentation on OneDrive – Client meeting transcript	Team	9/28/2016

Action items		Person responsible	Deadline
√	Continue work on the Excel matrix of project specifications	Team	9/28/2017
√	Complete the Class Survey	Team	9/31/2017

Team Meeting 6

9/26/2017 2:00 PM

GJ 108

Meeting called by:	Team	Type of meeting:	Design		
		Note taker:	Samuel Fui	nk	
Timekeeper:	Samuel Funk				
Attendees:	Samuel Funk, Nate Weidenmey	er, Matthew Jung	ert, Sage P	ratt, Lucas Becia	
	Minutes				
Agenda item:	Design Ideas	Pres	senter:	Enter presenter here	
Discussion:					
Nate Prepared tw	vo Solid works designs:				
○ H ● Square: ○ T	: arge settling tank diameter ligh propensity for dead spots in flow wo panels that come together with stain vetachable top	less steel frame			

- Inserts to control fluid circulation to limit dead spots
- Insert lights or integrate them into frame
- Front panel/ door latches closed for easy removal
- Top latches down for seal and cleanup
- Swivel stand for cleanup and transportation
- o Easily alterable dimensions
- Possibility of an external filtration/ pump module/ cultivation chamber
- Nutrients
 - o Peristaltic pump or a solenoid valve for nutrient implementation
 - Sensors needed
 - o Ph
 - Thermometer
 - \circ Conductivity
 - Ammonia (MONEY MONEY MONEY)
 - O₂ Sensor (MONEY MONEY MONEY)

• Nitrate Sensor?

Conclusions: Enter conclusions here. Action items Person responsible ✓ Specification Sheet Team Other Information Observers: Enter observers here. Resources:

Deadline

9/28/2017

9/28/2017

3:30 GJ 108

Enter resources here.

Special notes:

Enter any special notes here.

Team Meeting 7

Meeting called by:	Team	Type of meeting:	Team and Mentor Meeting
Facilitator:	None	Note taker:	Samuel Funk
Timekeeper:	Samuel Funk		
Attendees:	Samuel Funk, Nate Wiedenmeyer, Matthew Jungert, Lucas Becia		

	Minutes		
Agenda item:	Design Specification and ideas	Presenter:	Enter presenter here

Discussion:

- Need to get approval of if we want to veer from a cylindrical shape
 - Dev suggests that we should further design our rectangular idea more completely and then present our rectangular idea along with our other design ideas
 - Nate adds that moving from the cylindrical design to the rectangular would help in reducing the number of needed connection points one would have with the tubing in a cylindrical design. Which would also have leakage

Conclusions:

Enter conclusions here.

Act	ion items	Person responsible	Deadline
\checkmark	3-D print a preliminary design	Nate and Lucas	10/5/2017
✓	Calculate the pore size for most efficient CO_2 bubbling to have enough lift for flow.	Team	10/5/2017
✓	Get the book: Airlift Bioreactors	Sage	10/5/2017
✓	Figure out the concentration of $\ensuremath{\text{CO}_2}$ needed in the system	n Team	10/5/2017
✓	Determine the necessary flow rate for algae circulation	Team	
\checkmark	Research materials used in photo bioreactors	Sam, Lucas, Matthew	
✓	Investigate Algae	Sam, Lucas, Matthew	

Team Meeting 8			
Meeting called by:	Team	Type of meeting:	Design
Facilitator:	Dev Shrestha	Note taker:	Samuel Funk
Timekeeper:	Samuel Funk		
Attendees:	Samuel Funk, Nate Wiedenme	eyer, Matthew Jun	gert, Lucas Becia, Sage Pratt
Minutes			

IVIIIIL	nes	
Modeling	Presenter:	Enter presenter here
ants us to model the fluid flow in our device		
ch		
In an article they used a temp of 27°C, a pH feedback via a pH sensor.	of 7.3 ± 1, which was contro	lled by through active
Dev suggest a pipe diameter of 3-4 in		
nts us to put more time into the design		
ons here.		
	Person responsible	Deadline
	Modeling ants us to model the fluid flow in our device ch In an article they used a temp of 27°C, a pH feedback via a pH sensor.	ants us to model the fluid flow in our device ch In an article they used a temp of 27°C, a pH of 7.3 ± 1, which was contro feedback via a pH sensor. Dev suggest a pipe diameter of 3-4 in ints us to put more time into the design ons here.

 ✓ Research on Nutrient Requirements, look into viscosity of Sam PBR fluid
 ✓ Scan chapter 5 and upload it
 Lucas
 10/13/2017

Action items		Person responsible	Deadline
✓	Read chapter 5	Team	
✓	Come up with design ideas	Team	10/17/2017
√	Enter action items here	Enter person responsible here	Enter deadline here

11/2/2017

3:30 GJ

Team Meeting 10

Meeting called by:	Tea,	Type of meeting:	Mentor
Facilitator:	Dev	Note taker:	Samuel Funk
Timekeeper:	Samuel Funk		
Attendees:	Samuel Funk, Nate Wiedenme Advisors	yer, Lucas Becia, N	1atthew Jungert, Sage Pratt, Grad

Minutes

Agenda item: Design

Discussion:

- Showed Dev that we wanted to use a concentric tube design
 - o Dev was concerned about the water tight seal of the base and how we would accomplish it
 - May want to use a twisting and locking type of mechanism
 - Materials for base: 66-1 Aluminum? HDPE
 - Lights
 - Explained lights on the outside and then lights on the inside of the concentric light
 - Want to include in the program the capabilities of controlling lights being on and off ger
 - Sparger
 - Have it set within the bowel so it is flush, to reduce the dead space
 - Sage suggested a circular sparger
 - Don't want to use an air stone so that the
 - Top of the PBR
 - Still deciding on if we want a cap on the PBR
 - Considering on if we want to recirculate the gas that we input
 - Need to consider how to release excess O2
 - May want to check out the JML Water Filtration device called New Tech, moving bed sand filter
 - Martin Bakker
 - \circ \quad Want to have an understanding of how everything will be fit together
 - Hardware
 - Prices
 - How things go together
 - Have the building of the device going before Christmas break
 - Design Review is Due November 17
 - Need to arrange a client meeting (Should be between Nov 13-17th)

- Need to send Dev the time and Date of meeting as other teams will be present
- Required to attend two other design reviews
- Log Book Due November 7th

Enter conclusions here.

Action items		Person responsible	Deadline
√	Prices for Base Materials	Lucas	11/6/2017
√ √	Wiki Page Iterations	Sage Lucas, Sam, Matthew	11/6/2017 11/6/2017
√ √	CFD Research Book	Nate Sam, Matthew, Lukas	11/6/2017 11/6/2017
,	Nescaren book	Jully Matthew, Eukas	11/0/2017

Team Meeting 12

11/2/2017

3:30

GJ

Meeting called by:	Tea,	Type of meeting:	Mentor
Facilitator:	Dev	Note taker:	Samuel Funk
Timekeeper:	Samuel Funk		
Attendees:	Samuel Funk, Nate Wiedenmey Advisors	er, Lucas Becia, Ma	atthew Jungert, Sage Pratt, Grad

Minutes

Agenda item: Design

Discussion:

- Showed Dev that we wanted to use a concentric tube design
 - o Dev was concerned about the water tight seal of the base and how we would accomplish it
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 - Explained lights on the outside and then lights on the inside of the concentric light
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 Martin Bakker
- Want to have an understanding of how everything will be fit together
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Enter conclusions here.

Action items		Person responsible	Deadline
✓	Prices for Base Materials	Lucas	11/6/2017
\checkmark	Wiki Page	Sage	11/6/2017
\checkmark	Iterations	Lucas, Sam, Matthew	11/6/2017
\checkmark	CFD	Nate	11/6/2017
\checkmark	Research Book	Sam, Matthew, Lukas	11/6/2017

Team Meeting 12

11/28/2017

2:	00
	GJ

Meeting called by:	Team	Type of meeting:	Mentor
Facilitator:	Dev	Note taker:	Samuel Funk
Timekeeper:	Samuel Funk		
Attendees:	Samuel Funk, Nate Wiedenme Advisors	yer, Lucas Becia, N	latthew Jungert, Sage Pratt, Grad
	Mir	nutes	
Agenda item: Do	esign		
Discussion:			

- o Portfolio
 - Will be brought to the Thursday meeting
- o Residence time:

- Residence time = $\frac{Total Volume}{Out flow}$, concentration of the algae will change
- Prototype: What we want to be able to gain from this
 - Bubble rise time
 - Sparger type differences and optimal uses
 - Algae rate of falling
- Dev Suggestions:
 - Implementing the baffles will cause the boundary layer to be low which will provide more surface area for the algae to stick to
 - It should be more self-cleaning in type, a low velocity area (possible from too many baffles) will cause the algae to start sticking.
- Luke: Got the credit card and is ready to begin purchases
 - Poster for the snapshot day:
 - Will be done like the last snapshot Dev

Enter conclusions here.

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Action items		Person responsible	Deadline
√	Assemble Prototype	Team	12/1/2017
✓	Necessary Data From prototype	Team	Before semester end
✓	Credit Card	Lucas	11/28/2017
\checkmark	Snapshot Presentation – Think about what you'll say	Team	11/30/2017

Team Meeting 13

1/11/2018

3	:30
	GJ

Meeting called by:	Team	Type of meeting:	Mentor		
Facilitator:	Dev	Note taker:	Samuel Funk		
Timekeeper:	Samuel Funk				
Attendees:	Samuel Funk, Nate Wiedenmeyer, Lucas Becia, Matthew Jungert, Sage Pratt, Grad Advisors				
Minutes					

Discussion:

- o <u>URGENT:</u>
 - Need to send the client an email with the prototype (pictures and videos would be good)
 - Need to begin the building process within the three weeks
 - Need to figure out the placement of LED lights
 - Establish a time where we can view the prototype the client has already made
- o Design

- Sparger:
 - Considering air stones and centered bronze to use for the sprager as we cannot produce a sparger with holes the size enough to have even bubble distribution.
- Baffles:
- Lighting: This is a possible hazard area as the lights could cause electrocution, as they need to be submerged in water.
 - Thinking about LED or Fiber Optics
 - May want to also used bubbled acrylic to improve light distribution
 - Water proof LED lights should be considered.
 - Wrap LED lights on the entire tube. Then wrap a plastic sheet/shrink tube around and vacuum suck it short
 - Have extra tubes in the reactor that have LED lights on the inside of them that allow for light distribution currently this is a favored possibility
- Lid
 - We should support everything from the top as we will be milling it out the bottom of the reactor so that the base plate has a parabola shape
- Ordering

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- We are ordering a 10 inch tube as the outside tube and a 2 inch tube as the interior tube. Portfolio
 - Website: Need team member photos, more design aspects, more finished appearance
 - Website also currently has a bad gateway needs correcting
 - Project summary: Seems to have a disconnect
 - Project Learning: This section is the space where we display the understanding of the project. Should we do research and decide to change specifications because of the research, we need to indicate that in this section. Section also needs specifications on what is needed for the project design, and we need to document how the project has evolved as the client's needs change
 - The project learning should have a table including things such as: required deliverables, desired deliverables, and so forth
 - Organization of the binder and the set-up is fine.
 - Technical Data sheet: We need to develop this area
 - Billing section
 - <u>Take Away</u>: We need to have more detailed information and descriptions of what we are doing and how the project changes.

Conclusions:

Enter conclusions here.

Action items		Person responsible	Deadline
√	Correct the Time Schedule and send to Dev and Client	Team	1/16/2018
√	Bill of Materials	Team	1/16/2018
✓	Create a schedule of times for us to meet and work together	Sam	1/12/2018
✓	Send Sam your weekly schedules	Team	1/11/2018