Part (a): Create a brief summary of your team characteristics along the lines stated below. This will go into an early section of your design document. [10 points]

I. Team Members:

- Justin Pioquinto (Computer Engineering), pioqujus@iastate.edu
- Denise Orege (Electrical Engineering), daorege@iastate.edu
- Trent Moritz (Electrical Engineering), tdmoritz@iastate.edu
- Si Yuan Sim (Electrical Engineering), simsy@iastate.edu
- Joseph Paffrath (Electrical Engineering), paffrath@iastate.edu
- Karthik Vempati (Electrical Engineering), vempati@iastate.edu
- Hunter Carradus (Electrical Engineering), hdc@iastate.edu
- Josh Montgomery (Electrical Engineering), jmonty@iastate.edu

II. Required Skill Sets for Your Project: (if feasible – tie them to the requirements)

- radio frequency (RF) circuitry
- resonant antenna design for imaging array
- signal detection
- CST studio (a high-performance 3D EM analysis software package for designing, analyzing and optimizing electromagnetic (EM) components and systems)
- HFFS (a 3D electromagnetic (EM) simulation software for designing and simulating high-frequency electronic products such as antennas, antenna arrays, RF or microwave components, high-speed interconnects, filters, connectors, IC packages and printed circuit boards)
- antenna construction and measurement for optimization
- design and construction of printed circuit board (PCB) for generating and routing signals to the antenna array
- construction of signal conditioning and acquisition circuit (including amplifiers, buffers, and ADCs)
- programming a microcontroller (e.g., FPGA, raspberry pi, other)
- writing software to transmit, process, and display the data
- technical writing for design documents
- organizational skills and professional discipline

III. Skill Sets Covered by the Team: (for each skill, state which team member(s) cover it)

- *Justin Pioquinto* – Justin will serve as the primary software and programming lead on the team. He will contribute primarily to programming a microcontroller and writing software to transmit, process, and display the data. Furthermore, he will provide supplemental assistance with all hardware related design aspects of the projects. He will also maintain a focus on organizational skills and professional discipline.
- *Denise Orege* – Denise will serve as one of three co-primary contacts with our professor/client. Denise will also aid with many of the hardware applications for the project: radio frequency circuitry, resonant antenna design, signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. She will also maintain a focus on organizational skills and professional discipline.

- ***Trent Moritz*** – Trent will serve as the second of three co-primary contacts with our professor/client. Trent will also aid with many of the hardware applications for the project: radio frequency circuitry, resonant antenna design, signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. He will also maintain a focus on organizational skills and professional discipline.
- ***Si Yuan Sim*** – Si Yuan will serve as the third of three co-primary contacts with our professor/client. Si Yuan will also aid with many of the hardware applications for the project: radio frequency circuitry, resonant antenna design, signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. He will also maintain a focus on organizational skills and professional discipline.
- ***Joseph Paffrath*** – Joe will aid with many of the hardware applications for the project: signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. He will also maintain a focus on organizational skills and professional discipline.
- ***Karthik Vempati*** – Karthik will aid with many of both the hardware and software applications for the project. Regarding hardware, Karthik will assist with the following: radio frequency circuitry, resonant antenna design, signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. Regarding software, Karthik will assist with the following: programming a microcontroller and writing software to transmit, process, and display the data. He will also maintain a focus on organizational skills and professional discipline.
- ***Hunter Carradus*** – Hunter will aid with many of the hardware applications for the project: signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. He will also maintain a focus on organizational skills and professional discipline.
- ***Josh Montgomery*** – Josh will serve as the primary technical writer for the project and will compose the first draft of all design documents. He will also provide supplemental assistance on both the hardware and software aspects of project design. Furthermore, he will coordinate with the leads for both hardware and software design elements while synthesizing the progress from each. He will also maintain a focus on organizational skills and professional discipline.

IV.   <u>Project Management Style Adopted by the Team:</u>

We are likely to utilize a hybrid structure of both the Agile and Waterfall project management styles. Our project will require completion of certain stages of the project before beginning other stages—this lends itself towards the Waterfall project management style. For example, we must complete the printed circuit board design before we can begin programming it. However, we will also work in parallel on many design stages—this lends itself to the Agile project management style. For example, we will design and measure the RF antenna while simultaneously designing the printed circuit board it will work in conjunction with.
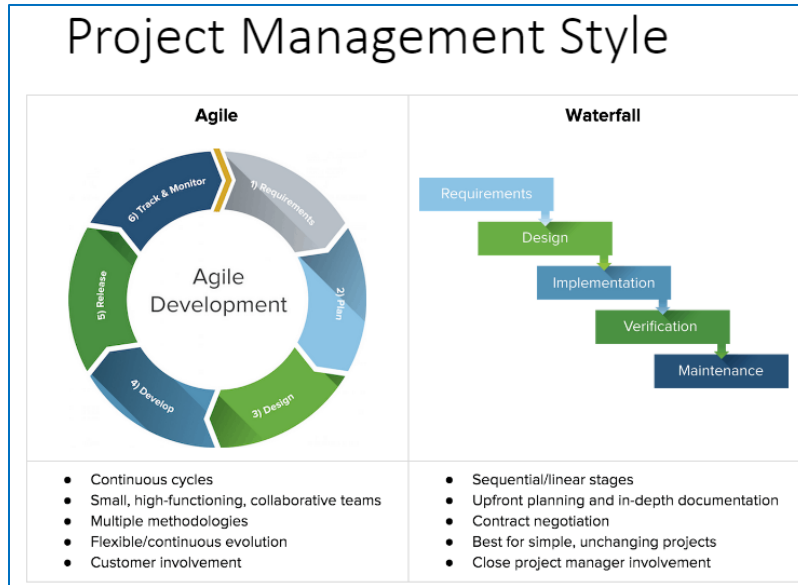
V.   **Initial Project Management Roles: (enumerate which team member plays what role)**

- **Professor/Client Liaisons** – Trent, Denise, Si Yuan
- **Technical Writing** – Josh, Hunter, Justin, Karthik
- **Primary Group Coordinators** – Trent, Karthik, Josh
- **RF Antenna Hardware Experts** – Trent, Denise, Si Yuan
- **PCB Hardware Experts** – Joe, Hunter, Karthik, Josh
- **Programming Leads** – Justin, Karthik, Joe
- **Simulation Software Leads** – Trent, Joe, Si Yuan, Denise, Hunter, Justin

Tentative Team Member Assignments
1. *CST Modeling and antenna design*
    a. Trent
    b. Denise
2. *Antenna Tuning*
    a. Trent
    b. Denise
    c. Also anyone who wants to, this will be once we have it in hand
3. *RF PCB Design (PLL & Switches)*
    a. Sim
    b. Karthik
4. *ADC PCB Design*
    a. Joe
5. *Low level programming (data gathering)*
    a. Justin
6. *Data Processing and Display*
    a. Hunter
    b. Josh

Part (b): Create a team contract along the lines of this **Team Contract Template.** ↓
(https://canvas.iastate.edu/courses/85384/files/16368887/download?download_frd=1)

This will go into an appendix in your design document eventually. **[90 points]**

Team Name: SD22-23

Team Members:
1) Justin Pioquinto (Computer Engineering), pioqujus@iastate.edu
2) Denise Orege (Electrical Engineering), daorege@iastate.edu
3) Trent Moritz (Electrical Engineering), tdmoritz@iastate.edu
4) Si Yuan Sim (Electrical Engineering), simsy@iastate.edu
5) Joseph Paffrath (Electrical Engineering), paffrath@iastate.edu
6) Karthik Vempati (Electrical Engineering), vempati@iastate.edu
7) Hunter Carradus (Electrical Engineering), hdc@iastate.edu
8) Josh Montgomery (Electrical Engineering), jmonty@iastate.edu

Team Procedures

1. **Day, time, and location (face-to-face or virtual) for regular team meetings:**

- **Mondays @ 10 a.m. on Google Meets** – weekly virtual (Google Meets) progress meetings with Professor/Client Tayeb Al Qaseer
- **Wednesdays @ 9 a.m. on Discord** – weekly virtual (Discord) progress meetings with TA Jacob Betsworth
- **Fridays, Weekends, and As Needed @ Applied Science II Lab** – in-person project design and construction work

2. **Preferred method of communication updates, reminders, issues, and scheduling (e.g., e-mail, phone, app, face-to-face):**

Our team will meet through three primary mediums: Google Meet (virtual), Discord (virtual), and Face-to-Face. Progress will be reported through virtual meetings while project design and construction will occur in-person at the Applied Sciences II complex. Once the RF antenna and PCB are constructed the remainder of the design and construction will occur remotely and involve programming and testing.

3. **Decision-making policy (e.g., consensus, majority vote):**

Our team will make decisions by majority vote if disagreements do arise. All team member opinions will be considered fairly and with equal weight—and all team members will be given equal time to speak—prior to votes contested issues.

4. **Procedures for record keeping (i.e., who will keep meeting minutes, how will minutes be shared/archived):**

As the primary technical writers, Josh and Karthik will keep records of team meeting minutes. These records will be available to all team members through a shared document drive (Discord).

Participation Expectations

1. **Expected individual attendance, punctuality, and participation at all team meetings:**

   Attendance is expected at all team meetings, but team members will be provided significant leniency if conflicting obligations arise. Our team mantra is essentially "all for one, and one for all," and we will do everything we can to ensure that team member schedules are considered. We will prioritize making the necessary accommodations to fully participate. We will operate on a "good faith effort" standard of contribution, attendance, punctuality, and participation.

2. **Expected level of responsibility for fulfilling team assignments, timelines, and deadlines:**

   Team members are expected to meet or exceed the responsibilities delegated to them in a timely manner. Team members are to notify the entire team via Discord message if it is not possible to complete their expected tasks in accord with internal deadlines.

3. **Expected level of communication with other team members:**

   Team communication will occur primarily through Discord, and team members are expected to communicate with one another "multiple" times throughout the week. "Multiple" in this context means a combination of commenting on Discord and attending team meetings. Three communications per week per team member is the desired team standard.

4. **Expected level of commitment to team decisions and tasks:**

   Team members are expected to remain aware of consensus team expectations. All team members are encouraged to weigh in on team decisions. All team members will be assigned to or volunteer for tasks proportional to their availability and skills. Team members are expected to commit as much as they are reasonably able to offer in completing their tasks in a timely fashion while maintaining a healthy work-life balance.

Leadership

1. **Leadership roles for each team member (e.g., team organization, client interaction, individual component design, testing, etc.):**

   - **Professor/Client Liaisons** – Trent, Denise, Si Yuan
   - **Technical Writing** – Josh, Hunter, Justin, Karthik
   - **Primary Group Coordinators** – Trent, Karthik, Josh
   - **RF Antenna Hardware Experts** – Trent, Denise, Si Yuan

- **PCB Hardware Experts** – Joe, Hunter, Karthik, Josh
- **Programming Leads** – Justin, Karthik, Joe
- **Simulation Software Leads** – Trent, Joe, Si Yuan, Denise, Hunter, Justin

2. **Strategies for supporting and guiding the work of all team members:**

No team member will be solely responsible for a single essential responsibility. "Essential" in this context means a necessary requirement for completion of the project. This dual or multi-assignment responsibility structure will ensure all team members are supported and guided in completing internal tasks.

3. **Strategies for recognizing the contributions of all team members:**

The team will not prioritize delineating precisely who contributed to precise design aspects. However, the team's design documents will clarify which team members contributed on broader design stages like RF antenna design, measurement and testing, PCB design, simulations, and programming.

Collaboration and Inclusion

1. **Describe the skills, expertise, and unique perspectives each team member brings to the team.**

- *Justin Pioquinto* – Justin is a talented and accomplished computer engineering student. Justin will serve as the primary software and programming lead on the team. He will contribute primarily to programming a microcontroller and writing software to transmit, process, and display the data. Furthermore, he will provide supplemental assistance with all hardware related design aspects of the projects. He will also maintain a focus on organizational skills and professional discipline.
- *Denise Orege* – Denise has unique work experience related to non-destructive testing and evaluation. She also has an existing relationship with the Professor/Client Tayeb Al Qaseer. Denise will serve as one of three co-primary contacts with our professor/client. Denise will also aid with many of the hardware applications for the project: radio frequency circuitry, resonant antenna design, signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. She will also maintain a focus on organizational skills and professional discipline.
- *Trent Moritz* – Trent is a gifted student with a relentless work ethic. He is passionate about RF antenna software. He also has an existing relationship with the Professor/Client Tayeb Al Qaseer. Trent will serve as the second of three co-primary contacts with our professor/client. Trent will also aid with many of the hardware applications for the project: radio frequency circuitry, resonant antenna design, signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. He will also maintain a focus on organizational skills and professional discipline.
- *Si Yuan Sim* – Si Yuan is a gifted student with a relentless work ethic. He is passionate about RF antenna software. He also has an existing relationship with the Professor/Client Tayeb Al Qaseer. Si Yuan will serve as the third of three co-primary contacts with our professor/client. Si Yuan

will also aid with many of the hardware applications for the project: radio frequency circuitry, resonant antenna design, signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. He will also maintain a focus on organizational skills and professional discipline.

- *Joseph Paffrath* – Joe possesses a creative mind and the ability to solve abstract, complex problems. Joe is a capable student and a pleasant teammate. Joe will aid with many of the hardware applications for the project: signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. He will also maintain a focus on organizational skills and professional discipline.
- *Karthik Vempati* – Karthik possesses world-class attention to detail and infectious ambition. Karthik also has invaluable industry experience at multiple engineering employers. Karthik will aid with many of both the hardware and software applications for the project. Regarding hardware, Karthik will assist with the following: radio frequency circuitry, resonant antenna design, signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. Regarding software, Karthik will assist with the following: programming a microcontroller and writing software to transmit, process, and display the data. He will also maintain a focus on organizational skills and professional discipline.
- *Hunter Carradus* – Hunter's calm demeanor provides a measured balance with some of the other personalities in the group. He is perpetually curious and will pick up on the technologies that other group members are struggling with. Hunter will aid with many of the hardware applications for the project: signal detection, EM analysis software utilization, antenna construction and measurement, design and construction of the PCB, and construction of signal conditioning and acquisition circuitry. He will also maintain a focus on organizational skills and professional discipline.
- *Josh Montgomery* – Josh is an experienced technical writer and engineering student. Josh will serve as the primary technical writer for the project and will compose the first draft of all design documents. He will also provide supplemental assistance on both the hardware and software aspects of project design. Furthermore, he will coordinate with the leads for both hardware and software design elements while synthesizing the progress from each. He will also maintain a focus on organizational skills and professional discipline.

2. **Strategies for encouraging and support contributions and ideas from all team members:**

   Team members will ensure they are always supportive of one another and the group. When certain members have been less vocal than others for extended periods of time, those members will be politely encouraged to speak up and contribute to decision making and task completion. Differences in personalities will be accepted, accounted for, and embraced.

3. **Procedures for identifying and resolving collaboration or inclusion issues (e.g., how will a team member inform the team that the team environment is obstructing their opportunity or ability to contribute?)**

   Team members will advocate for one another, and concerns about inclusivity and consideration will be treated with paramount importance. Any concerns are always

welcome to be voiced, shared, discussed, and resolved. If a team member is uncomfortable bringing a concern to the group at large, they will reach out to their closest team contact who can bring the concern to the group.

Goal-Setting, Planning, and Execution

1. **Team goals for this semester:**

- Design and build an incredible device
- Obtain an "A" grade for every team member
- Learn a considerable amount about the exciting multi-faceted project technologies
- Get ahead on the project to reduce the workload next semester
- Collaborate in a friendly and efficient manner

2. **Strategies for planning and assigning individual and team work:**

   The team will discuss planning and individual assignments during the weekly client, TA, and team meetings. Tasks will be open for voluntarily contribution first—if tasks are not claimed they will be assigned by majority vote in accordance with scheduling accommodations and individual skills. All members will take a proactive role in task delegation and volunteering.

3. **Strategies for keeping on task:**

   Team members appreciate that project progress is co-dependent. As such, certain members reliant on others to complete tasks will help the members remain focused until an essential task is completed. Individually, all team members will strive to complete tasks as soon as it is convenient in the spirit of accomplishing the team goals.

Consequences for Not Adhering to Team Contract

1. **How will you handle infractions of any of the obligations of this team contract?**

   The nature of this team is not punitive. Members will not be publicly shamed or outwardly punished. Members will be supportively encouraged to continue to strive to do their best while any members who are struggling to accomplish tasks will be granted a partner member who will help complete the tasks in a mutually beneficial capacity.

2. **What will your team do if the infractions continue?**

   The team will press onwards regardless of adversity, and no team member will be left behind. However, team member contributions will be highlighted during internal team meetings and in internal team discussions. It is expected that no team member will be blackballed in peer reviews and that all team members will be given equal weight for the value they contributed at the end of the project.

****

a) *I participated in formulating the standards, roles, and procedures as stated in this contract.*
b) *I understand that I am obligated to abide by these terms and conditions.*
c) *I understand that if I do not abide by these terms and conditions, I will suffer the consequences as stated in this contract.*

#	Signature	Date
1	/s/ Justin Pioquinto	9/13/2021
2	/s/ Denise Orege	9/13/2021
3	/s/ Karthik Vempati	9/13/2021
4	/s/ Hunter Carradus	9/13/2021
5	/s/ Josh Montgomery	9/13/2021
6	/s/ Si Yuan Sim	9/13/2021
7	/s/ Joseph Paffrath	9/13/2021
8	/s/ Trent Moritz	9/13/2021