***Team Agreement***

**EC463/EC464 - Senior Design**

**Fall 2018 – Spring 2019**

We, the members of team number \_\_4\_\_\_, called \_\_\_\_\_\_\_OverEar\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, have entered into a project titled \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_OverEar\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for the customer, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Professor Alan Pisano\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ as part of Senior Design Project, ENG EC463/EC464.

The general objective of our project is:

The objective of our project is to create a portable sound localization device which can take in audio and stream out filtered sound with near real-time speed. The device will make sure that noises from various orientations are filtered out unless the sound is oriented directly in front of you (the 0th azimuth). The algorithm uses is called a Biological Sound Segregation Algorithm (BOSSA).

We expect that our major project deliverables will include the following:

Pre and post processing code, written in MATLAB, that prepares audio for input to the original BOSSA code and output to the speakers.

An embedded device that can perform sound segregation in real time, ideally on a custom PCB

Hardware that allows the device to be worn by a user.

GENERAL CRITERIA FOR SUCCESS

We understand that evaluation of our work in Senior Design will depend on several factors. First is our team's success at meeting our proposed objectives, as described by our specifications, and providing our deliverables in working fashion, with the required documentation, by the course deadlines. Second is our demonstration of individual proficiency at design and at keeping adequate engineering records of our work. Third is our individual and collective team skill in listening, helping others to reach their goals, and negotiating technical and team problems. Finally, we understand the department policy for reimbursement of expenditures made in executing our project and agree that anything spent about the amount reimbursed by the department will be equally shared among all team members.

INDIVIDUAL LEADERSHIP

We understand that Senior Design teams shall be organized to give each member clear responsibility for one or more design areas. Several people may collaborate on a problem, but only one person should be the designated 'leader' for a design area. Each of us should be the leader of at least one design area so that we can clearly demonstrate our individual proficiency in design and in keeping professional engineering records (in our logbooks).

RESOLVING TEAM CONFLICTS

We understand that we need to work to resolve interpersonal and technical disputes within our team, in a professional and respectful manner. This will sometimes involve compromise, and we agree to be open to reasoned technical arguments about our individual areas and the team's collective efforts. We will seek faculty or mentor help when problems appear serious and are not resolved quickly by our efforts.

NON-PERFORMANCE OF DUTIES BY A TEAM MEMBER

We understand that each of us must pursue our design and team tasks in a professional and timely fashion to ensure our team's success. Should a team member fail to show diligence and concern for the team, a meeting of the team and the course faculty will be held to assess the situation and recommend specific short-term performance goals for the team member, and possibly the whole team. If these goals are not met, the course faculty may decide to remove the offending team member from the team. The student will then have to complete the course reporting directly to the faculty as a team of one. This is a serious step and suggests a significant failure on the part of the individual, and possibly the whole team. It should not be considered except as a last resort.

QUESTIONS

We understand that students and teams are welcome to approach the course faculty about this agreement at any time.

INDIVIDUAL TEAM MEMBER RESPONSIBILITIES

The remaining pages list our team members and our individual 'leader' responsibilities.

TEAM MEMBER ADDENDUM (submit one for each team member):

Team Member Name: (printed) Guillermo Ao

Team Number \_4 Team Name: OverEar

I have read this entire document, including my teammates’ descriptions of their 'leader' roles. I understand the document and agree with the descriptions of roles.

Team Member Signature Guillermo Ao

Date: 11/23/2021

The following paragraph(s) describes the technical problem(s) for which I hold leader responsibility. (Please give technical details if possible. Broad topical claims will be difficult to assess.)

Input/Output processing

Make sure that the input signals are processed correctly through the microphones with the right functions and scripts (MATLAB programming). Same for the output and possibly add some noise filter to the processed input to have the output sound heard more clearly. For our project it is very important to have the input and output working properly since we are making an audio device. I will work together with Ben since he is handling the hardware choices and I have to ensure that the devices are connected correctly to the computer that runs the main algorithm. also, to make our project better it is important to have it running fast so I will look for ways to make the input recollection more efficient.

TEAM MEMBER ADDENDUM (submit one for each team member):

Team Member Name: Jonathan Ngo

Team Number \_\_4\_\_\_\_ Team Name: OverEar

I have read this entire document, including my teammates’ descriptions of their 'leader' roles. I understand the document and agree with the descriptions of roles.

Team Member Signature JONATHAN NGO

Date: 11/23/2021

The following paragraph(s) describes the technical problem(s) for which I hold leader responsibility.

* Develop a structure to run BOSSA on multiple cores in parallel as a way to optimize processing time. One approach could be to focus on running the algorithm on each of our available cores. Another could be to parallelize data collection and data processing. The structure could also include using FIFOs as the buffers between collection and processing rather than the file system currently implemented. Optimally implementing parallel cores would involve research into best practices of storing input information and running parfor loops.
* Work on hardware integration such as PCB design if we reach the point of a real time system. This would also include minimizing the form factor of our final product to be more user friendly and portable. Our current prototype has a wired power supply as well as many unused parts of the LattePanda

TEAM MEMBER ADDENDUM (submit one for each team member):

Team Member Name: (printed) Benjamin Li

Team Number 4 Team Name: OverEar

I have read this entire document, including my teammates’ descriptions of their 'leader' roles. I understand the document and agree with the descriptions of roles.

Team Member Signature Benjamin Li

Date: 2021/11/23

The following paragraph(s) describes the technical problem(s) for which I hold leader responsibility. (Please give technical details if possible. Broad topical claims will be difficult to assess.)

Integration of software and hardware

* Choosing what hardware specs are necessary for our device to operate successfully
  + Prototype: Single Board Computer, storage, microphones, etc.
  + Final System: daughterboard, PCB vendor, microphones, battery, etc.
* CAD design for product
  + Enclosure, clips, microphone holder, etc.

Additionally, I will be responsible for making sure the hardware we choose is compatible, and is correctly calibrated. This will include some integration with the BOSSA software and code that other team members write. Because our team overall has less experience with hardware, a large portion of my job will be to do extensive research and testing of the hardware that we select.

TEAM MEMBER ADDENDUM (submit one for each team member):

Team Member Name: (printed) Hannah Gold

Team Number \_\_\_4\_\_\_ Team Name: OverEar

I have read this entire document, including my teammates’ descriptions of their 'leader' roles. I understand the document and agree with the descriptions of roles.

Team Member Signature Hannah Gold

Date: 11/23/2021

The following paragraph(s) describes the technical problem(s) for which I hold leader responsibility. (Please give technical details if possible. Broad topical claims will be difficult to assess.)

I will be responsible for optimizing the algorithm by looking for options to make the functions within it more efficient. I will be working hand in hand with Jon to integrate his parallelizations with my own optimizations to try to achieve a more real-time sounding output.This can be done through:

* Matrix multiplication quicker: getting rid of floating point multiplications, multiplying constants outside of the for loop, and looking for opportunities to multiply multiples of two through bit shifts.
* I can also make the algorithm more efficient by making it more modular than it is. According to Matlab documentation, more modular code is quicker to run.
* Profiling the code for time taken to run each function will help me to identify bottlenecks and allow me to give me an ideal plan for which functions to start work on first.

Professor Osama Alshaykh has agreed to meet with me to discuss some solutions to these problems, and of course this will be helpful to making the algorithm work more efficiently.