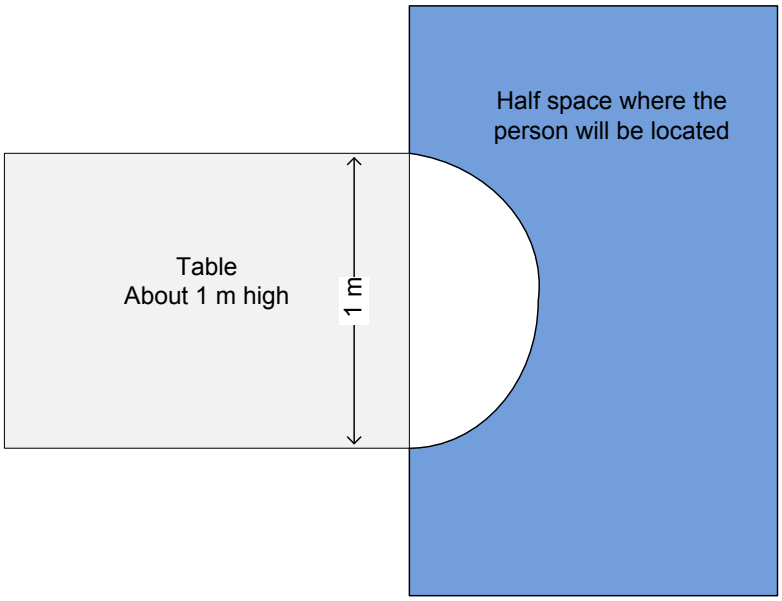
EEC10 **Final Project**

Due: Tuesday June 10th, 6:00 – 8:00pm

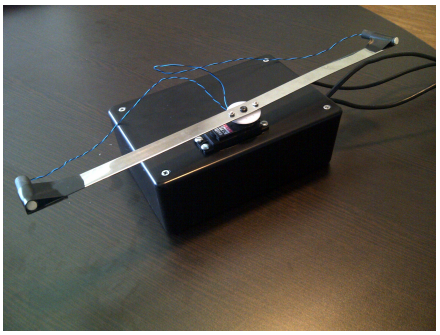
Implement an electronic system to locate the direction of a person who is clapping hands in a room. The clapping sound will be the only sound in the room.

Your task is to implement an electronic system to locate the direction of the claps as rapidly as possible, using a servomotor to point in the direction of the person. Make use of your microphone circuits, the servo, Stellaris/TIVA microcontroller, MyDAQ and LabView to implement a device to point to the person clapping hands. The servo controller could be controlled by either the microcontroller or MyDAQ. The only real restriction is that you must base your system on the components that you have already developed in the labs.

You will be given 10 minutes to deploy and calibrate your system. You will be given a table (1 meter wide and 1 meter tall) and access to an electrical outlet. The successive claps will not occur at a well-defined period. The time between claps will be no less that 1 second. The claps will occur in a radius larger than 0.5 meter and at a distance no more than 3 meters. Your system must completely fit on the table and be able to locate the person within a 0 to 180 degree region corresponding to the blue region shown below.



There are multiple ways to implement the system and it will be your task to implement one that works best. One such implementation to keep the microphones stationary on the table, and the servo only points in the direction of the person clapping. Another option is use the servo to rotate a beam onto which the microphones are mounted such as shown below:



The location of the sound could be determined by either measuring the difference in the time of flight of the sound received, or by the difference in the energy of the sound signal received by at least two microphones or by some other approach of your choosing. You need to decide what approach is the most practical. The final grade will not solely be based on if the unit is working. If it does not work, the success of the project will be based on analysis of why the approach should be able to work, and the design choices that you have made.

On the day before the demonstration, you will be required to submit electronically a brief well-written report of your approach and the resources that you have used. The report must be less than 5 pages (12 point and double spaced). The sections of the report will be:

i) Abstract (< 1 page)
ii) Introduction (approximately 1 page)
iii) Description (approximately 2.5 pages)
iv) Resources and Acknowledgements (approximately 0.5 pages)

The report must be written in active voice. You do not have to repeat material that has been covered in the labs or the course (e.g. the circuit diagram of the amplifier is not needed). Only emphasize the essential aspects of the project to explain your approach. Critical measurements should be included. All figures should have self-contained captions (i.e. reading the caption makes it clear what the figure is about). The report will be graded accounting for grammar and clarity. There will be no requests for make-up or late demonstrations or late submission of reports allowed.

Collaborative Policy: You can consult any student in the class. You may not consult people outside of the class. You are responsible to implement and demonstrate your own solution. If you make use of someone else's idea, you are obliged to give that person credit. If you provide advice to another student, and your idea is adopted, you can insist that you should be given credit. You can also in general discuss your approach with the teaching assistants or the instructor, however they will only provide you with general advice and suggestions to the extent that they judge is appropriate and fair to all in the class. As appropriate, the teaching assistants will distribute information of general use to everyone on the class.

Evaluation Rubric – EEC 10

STUDENT LEARNING OUTCOMES	Skillful	Emergent	Not Demonstrated
1. **Presentation overview: [total 10 points]** • Address the concept and themes of the demonstration. **[4pts]** • Identify drawbacks of current implementation. **[3pts]** • Suggestions for improvement. **[3pts]**			
2. **Collecting and measuring relevant information: [total 10 points]** • Has data collection/calibration occurred? **[4pts]** • How thoroughly was the system modeled before it was implemented? **[2pts]** • How was ambient noise filtered out? **[2pts]** • Any innovative LABVIEW techniques utilized to analyze data? **[2pts]**			
3**. System implementation: [total 60 points]** • Distinguish between what is working and what is not working. **[10pts]** • Draw conclusions or create solutions that may challenge existing thinking (current implementation). **[10pts]** • Each component of the system will be graded on a scale of [1-10]: **1.** Microphone Pre-Amplifier **[10pts]** **2.** Servo Motor + Control **[10pts]** 3. Labview Glue-Logic **[10pts]** 4. Does the implemented detection algorithm make sense? **[10pts]**			
4. **Considering robustness of buzzer/clapping detection: [total 10 points]** • Identify examples of point of view or bias in sources (duty cycle detection). **[4pts]** • Examine the source to determine if it is reliable (make detection algorithm reliable). **[3pts]** • The ability to distinguish between noise and chirp. **[3pts]**			
5. **Communicating effectively with others**: **[total 10 points]** • Present findings in a clear, coherent fashion. **[4pts]** • Base the results of the investigation or solution of the problem on sound reasoning. **[3pts]** • How well can the student explain the problem statement and how he/she tackled it. **[3pts]**			

Total 100 points possible: Section 1, 2, 4, 5 are each 10 points. Section 3 is worth 60 points.

Version 1.0