



## 020320 Why is there a dummy listening to the tulips grow?

One of the classes that I am taking this semester is called Electroacoustic Transducers and Systems. The name is a mouthful, but basically we are currently studying microphone and stereo design which is proving to be quite interesting. Later in the semester we will be working on digital encoding and coding our own MP3 players, which will be neat, but useless since the code will be in MATLAB and not very practical.

One of the goals of the class is to make electrical analogies to the mechanical systems so that they can be easily modeled without having to build the physical system. I have learned a lot about speaker design, enough that I will never buy a pair of speakers again. I can't wait until I have the chance to get at a workshop to start working on my own designs. One thing is for sure, between this class and my architectural acoustics class, one day when I actually have a house where I can build a listening room, I will have an amazing surround sound system.

A project that I have been working on lately is stereo recording. I never would have guessed how much work goes into trying to make an accurate recording of for example a symphony orchestra. As long as you have your speakers properly placed before you, one should perceive the instruments physically located at the center of the orchestra as being reproduced between the two loudspeakers. Instruments on the left side of the orchestra should be reproduced as images to the left of the listener whereas instruments on the right side should be reproduced as images to the right. Basically, the stereo recording should provide a credible illusion that between the loudspeakers there exists another acoustic environment within which the musicians are located and performing. You should not be able to hear each speaker individually, but only the image that speakers create together.

Human hearing localizes sound by two different methods: the difference in sound levels between the ears and the difference in the time of arrival between the ears. I won't go into detail here, but it is fascinating. We did a laboratory experiment last week where we set up a microphone pair and made a recording of a person walking around the microphones. The person stopped at designated positions and said where they were standing. Then we played the recording back to listen to hear if we could perceive where the voice was coming from so that we could compare different microphone pairs. By far the most amazing recording was made using a dummy head. This is basically a head and body made out of plastic with two microphones located in the ears. The results are incredible. I made a recording of myself walking around the dummy. When I played it back over headphones, I had to keep looking around the room to see if one of my lab partners was walking beside me because I certainly heard someone walking there, the recording was that real.

[http://www.bksv.com/bksv/?MIval=bk\\_view\\_SHTML&ID=1650](http://www.bksv.com/bksv/?MIval=bk_view_SHTML&ID=1650)

Prior to this, the speakers of my stereo at home were aimed at the walls to try to make the sound more spacious. Little did I know that by not placing the speakers properly, I was rendering the stereo recording practically useless. Plus, my speaker which I had thought

of as being so good are square in shape which it turns out is the worst shape for a speaker or for a room for that matter. Anyway, if you are interested in learning more, I wrote a paper on stereo recording that goes much more in depth and is available upon request.

## Tulips Tulips Tulips

The spring holiday begins tomorrow and it has not arrived a moment too soon. We have off now until April second since the 28th, 29th, 31st and 1st are national holidays. I am leaving tomorrow (Friday) for the Netherlands where I will meet up with my friends Micah, Michele, my friend who lives in Frankfurt, Germany and Thomas (from Switzerland and also a member of the Norway trip). We are all coming from different directions, but we will meet up in Haarlem where we plan to rent bikes. From there, we will spend days riding along the coast, hopefully past kilometer after kilometer of tulips in bloom. The tulip season starts this week, depending on the weather, but we are hoping that they are out. We are playing everything by ear with just the plan of rolling along the countryside in search of seas of color. We will stop at night in hostels and continue wherever we think best. Holland is all about biking and so they have designated bike routes that you can follow and in some parks free bikes to use.

Micah and Thomas will spend the entire week exploring the country. However, Michele will leave on Monday to head down to Rome for Easter. I will go back to Amsterdam on Monday night to attend a performance in the symphony hall (one of the three best in the world) and catch a flight back to Copenhagen the next morning. I have decided that from now on when I travel, one of the goals will be to check out the concert halls if it is possible.

I am leaving the Netherlands early because my friend Monica from the US is coming to visit during the holiday. Monica and I met years ago in St. Louis and we went to India together as part of the service trip. She is currently living in Atlanta where she is working as a social worker. She will be my second guest in Copenhagen and I am excited to show her the sites, especially the all-you-can-eat pickled herring restaurant (a must for any trip to Scandinavia and from now on all of my visitor's itineraries). Otherwise, we will rent her a bike and check out the castles and sites of Sjælland, the island that I live on. I have been here for over 7 months and I think that I have spent more time exploring other countries than my own backyard, so this will be a lot of fun.

Have a wonderful holiday and I promise to take lots of pictures!

## Danish Humor Note

We were working on a lab for architectural acoustics which involved working with styrofoam. The proctor, Filipe who is from Chile asked how you say styrofoam in Danish. My Danish partner replied that it is pronounced flamingo (I am sure it is not spelled like this, but it is pronounced this way). Filipe and I found this to be humorous and he asked how you say flamingo (the pink bird) in Danish. “Oh wait”, he said, “I know. I’ll bet you call the bird styrofoam” (actually it is also flamingo). My Danish partner found no humor in this.

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