

Visiting Student Report for 3rd Quarter

Texas Tech University

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Thank you, CSC, FJUT and TTU. This is my third report for 2020. The report will cover my summer course, academic activities, and future planning.

I selected one course for the summer semester. The course was ME3215 Numerical Methods. I learned root finding, solving systems of equations, numerical integration, and numerical differentiation. I was expecting the course to be at least 80% based on coding on MatLab. But the professor just asked us to use our calculators and not much content about MatLab was delivered. This is somehow quite disappointing. I got an A+ for this course and that was no surprise. As the pandemic is still spreading all around the US, the course was online. My next semester will begin on August 24, hope for the best to come.

As an HVAC&R/ME major student, I am cultivating my interest in this industry and research. I joined the ASHRAE (American Society of Heating Refrigerating and Air Conditioning Engineers) as a student member and since then I kept receiving news updates and other information about the industry. I have been learning from the newsletters and that has given me a better insight into the industry. For example, the main research areas of the industry are now about the energy efficiency of buildings, human comfort and health inside residential and industrial buildings, and net-zero buildings. I registered and attended several seminars including the ASHRAE 2020 annual conference.

The conference this year was held virtually for the first time because of the current situation. It contained recorded seminars, live debate sections, and live academic reports with Q&A sections. A lot of the sections this year discussed COVID-19 from the perspective of our industry. For instance, how the virus travels in a closed space with the HVAC system, what our industry can do to help stop the spread of the virus and how to upgrade the building facilities to deal with future pandemics. Those topics were highly related to fluid mechanics, aerodynamics and CFD (Computational Fluid Dynamics). The reason is that the virus is to some degree airborne and we can deal with that airflow to ultimately minimize the spread. Knowing all of this, we can then

apply what we specialize in and provide solutions. All in all, it was great fun and I learned a lot from those experienced engineers and researchers.

I have only gone through the live sections and did not have time for the pre-recorded seminars. I will go through those recorded parts in the coming months. Another academic activity I have been doing is reading published academic papers. Texas Tech University Library bought many academic databases. As their student, I can access these databases and download the papers. Although my home institution has purchased some database access, the amount cannot match what Texas Tech achieved. I hope to access the Texas Tech database even after I leave.

My life abroad has not come the way I expected. I was looking forward to the NCAA basketball and volleyball games, but this is not likely to happen in 2020. My fall semester courses will still be online and that is good news. I will not need to interact with students who might be wandering around high-risk places of COVID-19. For now, I will keep on reading papers and newsletters from the HVAC industry and prepare for my TOEFL test in late November. I hope the pandemic will end as soon as possible.

07/19/2020

Lubbock, Texas, United States of America

1. Summer course transcript

Official Transcript

Term: Summer 2020 TTU

Major: TTU Exchange Fee-Paying

Academic Standing:

Subject	Course	Level	Title	Grade	Credit Hours	Quality Points	Start and End Dates	R
ME	3215	UG	Numerical Methods	A+	2.000	8.000		

Term Totals (Undergraduate - TTU)

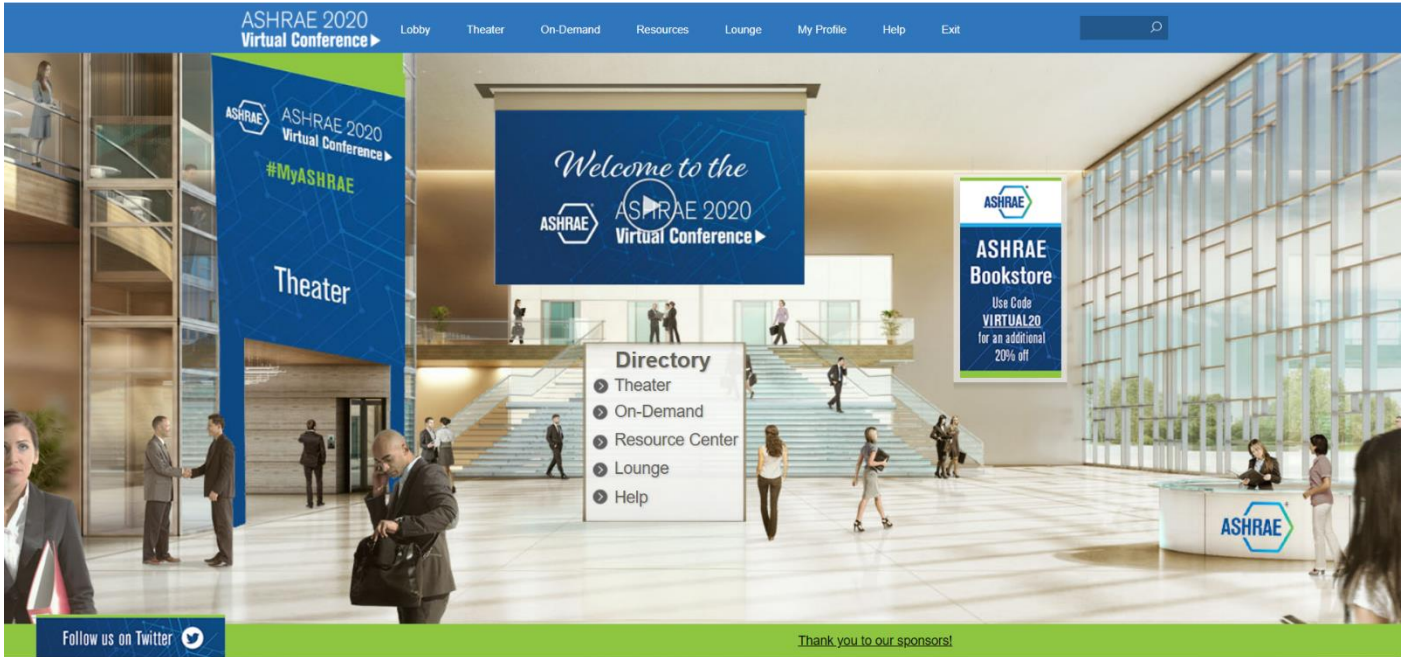
	Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points	GPA
Current Term:	2.000	2.000	2.000	2.000	8.000	4.000
Cumulative:	14.000	14.000	14.000	14.000	56.000	4.000

Unofficial Transcript

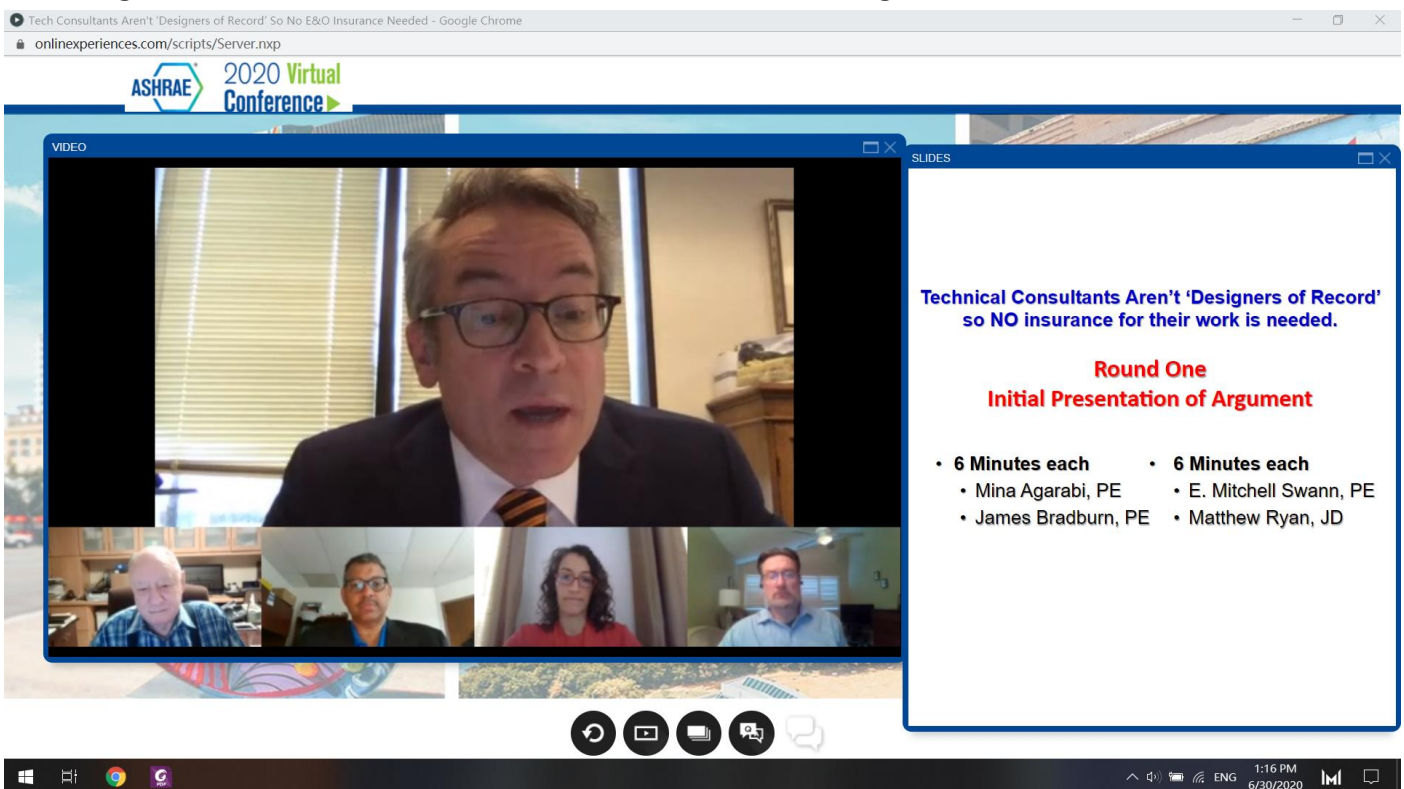
TRANSCRIPT TOTALS (UNDERGRADUATE - TTU) -Top-

	Attempt Hours	Passed Hours	Earned Hours	GPA Hours	Quality Points	GPA
Total Institution:	14.000	14.000	14.000	14.000	56.000	4.000
Total Transfer:	0.000	0.000	0.000	0.000	0.000	0.000

2. The ASHRAE 2020 virtual annual conference



Virtual conference web page. I can still access the conference videos after the meeting time since it is all recorded. This is an advantage of online conferences.



Debate section



Webinar: Managing COVID-19 and HVAC in Buildings for Emerging Economies

SARS, MERS, Ebola, COVID-19: How to Prepare for the Next Epidemic - Google Chrome

onlinexperiences.com/scripts/Server.nxp

ASHRAE 2020 Virtual Conference

VIDEO

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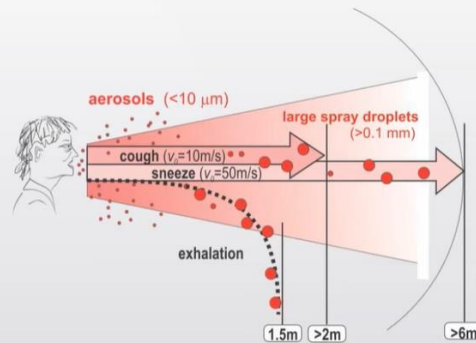
Humidification to 50% RH reduces the viable Coronavirus to less than 1% in 2 days, significantly decreasing the infection risk (blue line).

Days	RH 20% (log10 %)	RH 80% (log10 %)	RH 50% (log10 %)
1	100	100	100
2	~80	~60	~0.1
3	~70	~40	~0.02
4	~60	~30	~0.01
5	~50	~20	~0.005
6	~40	~15	~0.002
7	~30	~10	~0.001
8	~25	~8	~0.0005
9	~20	~6	~0.0002
10	~18	~5	~0.0001
11	~16	~4	~0.00005
12	~14	~3	~0.00002
13	~12	~2	~0.00001
14	~10	~1.5	~0.000005

11:54 AM 6/30/2020

Respiratory Aerosol Dynamics

- "Large" droplets settle before travelling long distances
- "Small" droplets/aerosols remain airborne longer, may travel significant distances
- Various definitions of boundary between small and large $\sim 60 \mu\text{m}$ initial diameter, $10 \mu\text{m}$ final diameter

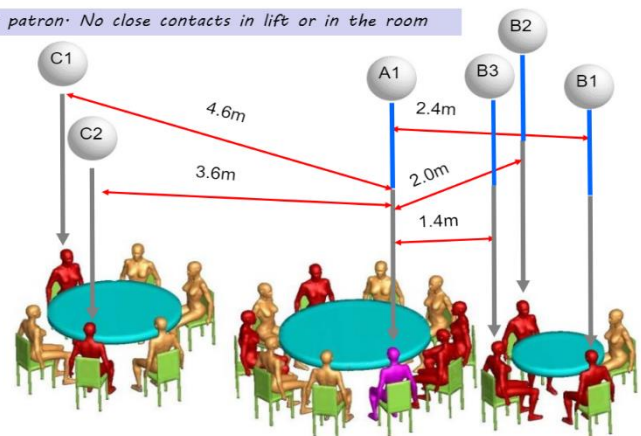


ASHRAE's guidance for building services are to increase supplying fresh air, increase the air change rate and maintaining the indoor RH (relative humidity) at around 40%-60%. They also recommend upgrading the HVAC filters to MERV-13 level or higher, installation of UVC equipment into return air grills.



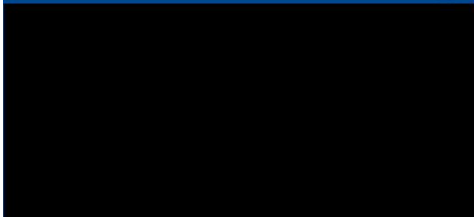
Poor ventilation at only 1 L/s per patron. No close contacts in lift or in the room

Field measurement: March 19–20



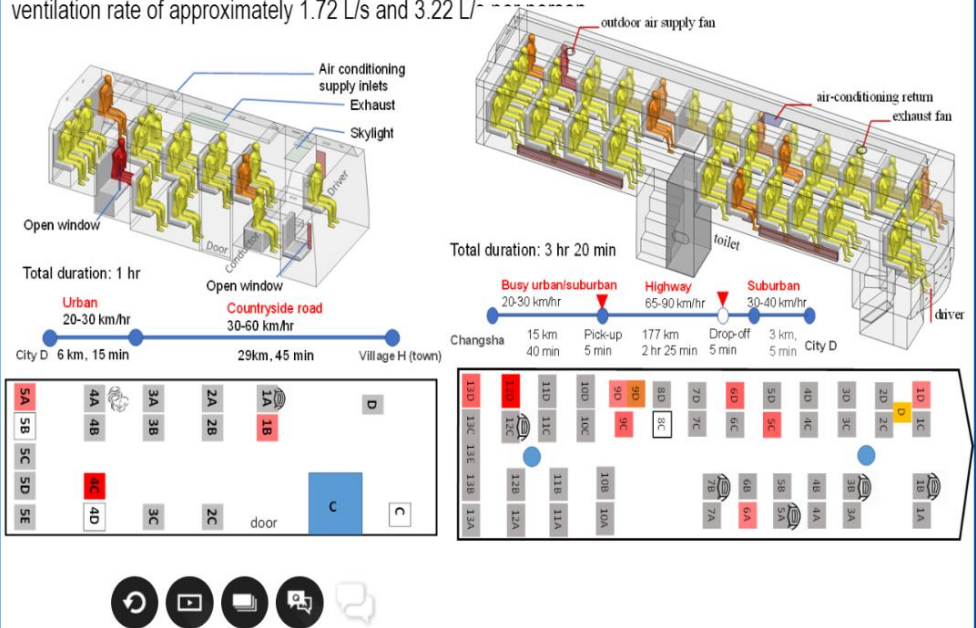
Li Y., et al. Evidence for probable aerosol transmission of SARS-CoV-2 in a poorly ventilated restaurant. <https://www.medrxiv.org/content/10.1101/2020.04.16.20067728v1>

VIDEO



SLIDES

Poor ventilation: Hunan bus outbreaks: a young man went home on 22 Jan on two buses and infected 10. ventilation rate of approximately 1.72 L/s and 3.22 L/s



Dr. Yuguo Li from Hong Kong University shared his research into transmission patterns of infectious aerosols. Dr. Li began studying respiratory droplets after the outbreak of SARS in 2003. He is very experienced in such field. He covered two typical cases (Guangzhou restaurant case and Hunan Bus case) of COVID-19 spread. Which revealed the relationship between airflow patterns and the spread of COVID-19. This contributes to publishing healthcare and re-opening guidance.