KMITL ENGINEERING PROJECT DAY 2020

IMSE_Y4_05

Department of Computer Engineering (Music Engineering and Multimedia)

Survey and data collection for the acoustic characteristics of KMITL Engineering Auditorium

Nattaphan Chomkaew[1], Tanakrit Srirathu[2] ,Ashira Wiwattanajit[3] , Rasa Terawatsakul[4] and Kajornsak Kittimathaveenan[5], Phonlasit Thinnakorn na ayuthaya[6]

Abstract

The aim of the project is to examine equipment in order to find suitable values of the hall where important knowledge communication and other activities were held. We cite data analysis according to standard values, ISO 3382-1. Our experiment was prepared at King Mongkut's Institute of Technology Ladkrabang Faculty of Engineering Auditorium. Our research focuses on three of sound quality indexes that are Reverberation time (RT60), Speech Transmission index (STI), and Noise floor. In addition, we use Smaart V8 which is a sound quality indexes analysis program in order to calculate the values as described earlier, bring the results of the experiment to use as a dataset for an advantage application in the future, and correct equipment experimentation.

Introduction

Quality of sound is the important factor which needs to be considered when designing the structure of an architecture. On the other hand, the acoustic systems should concern those infested factors from the outside environment in order to limit the reverb values which cause ineffective communication between speaker and listener. Therefore, the quality of sound is the factor that ensures the better efficiency of the system in both communication and clearly listening aspects.

Conclusion

From our experiment, the results of three parameters (The reverberation time (RT60), Speech Transmission index (STI), and Noise Floor) are as follows. According to the acoustic adjustment in the auditorium such as acoustic boards, absorption pads, canopy, and large number of folding seats, these make the result values have a resemblance. As a result, the average of the reverberation time is 1.824 seconds which is the typical value for reverberation time in concert halls (1.7 to 2.3 seconds). Speech Transmission Index (STI) is the transmission quality factor between the sound source and the listener. In this case, the value is 0.169. Lastly, the average value of Noise Floor or noise from the environment in the auditorium is 32.37 dBA. Our noise floor average value is between 30-35 dBA, so it was in “Large auditoriums, theaters, and churches (>500 seats)”.

References

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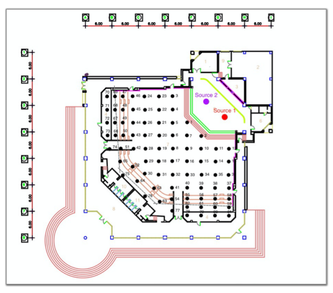
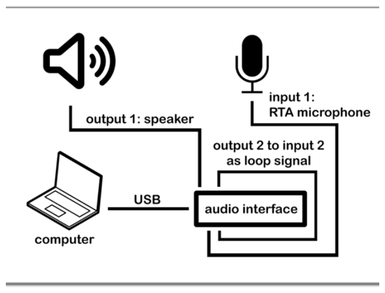
Methodology

We thoroughly divide measurement distance positions in every three meters in order to accurately measure all a total of 81 points over a large area of the auditorium by using an omnidirectional speaker and microphone so that we can collect a sound which travels in all directions with Smaart V8.





First, we began the experiment by determining the sound source position and the measurement position. In our measurement, we used impulse response to measure the reverberation time values by sending out pink noise to make a sound from an omnidirectional speaker, and let it travel all over the hall. Smaart V8 appeared in a period of input sound until it is silent , and we used these periods to determine the reverberation time values.

Results

	1st Source	2nd Source
RT/1	1.782	1.852
STI/1	0.183	0.164
Noise/1	32.586	32.386
RT/2	1.766	1.897
STI/2	0.160	0.169
Noise/2	32.396	32.119

The average of the values

	1st Source	2nd Source
RT/sum	1.774	1.875
STI/sum	0.171	0.167
Noise/sum	32.491	32.253

the average of two source values from 1-81.

Hence, the first measurement at the second position of the loudspeaker, the reverberation time is higher than the first position that is 0.07 seconds. After that, we took the second measurement of the loudspeaker’s first position, In the second measurement at the second position of the loudspeaker, the reverberation time is 0.131 seconds higher than the first position. As a result, the average of the reverberation time is 1.824 seconds, the average of STI (Speech Transmission index) value is 0.169, and the average noise floor of the auditorium is 32.37 dBA.

Acknowledgement

This project was supported by Department of music engineering and multimedia, Faculty of engineering, King Mongkut's Institute of Technology Ladkrabang. We feel very grateful with the support and the assistance from our friends and parents. Finally, we would like to express our sincere gratitude to all those who enable us to accomplish this project.

kajornsak.ki@kmitl.ac.th[1], phonlasit.th@kmitl.ac.th[2]