Technische Universität München
TUM Department of Electrical and Computer Engineering

Professorship of Environmental Sensing and Modeling
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Master's Thesis

TITLE OF THESIS

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Abstract

text text text text

I confirm that this Master's Thesis is my own work and I have documented all sources and material used.

Munich, September 14, 2018

Place, Date

Signature

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Chapter 1

Introduction

As the world population increases by millions every year, the environmental damage we cause increases dramatically. In densely populated areas -and especially in larger cities- air pollution is a major problem, which does not only have financial consequences but also affects the quality of our lives in many ways. Since air pollution today constitutes a significant problem, there are more than many researches and studies regarding this issue: " . . . the total damage costs of air pollution [is estimated] to be US$ 3.0 trillion in 2010, or 5.6% of Gross World Product (GWP). These losses are equivalent to US$ 430 for every person on the planet."[1] is from just one of the numerous studies made on financial damage caused by air pollution.

To be able to assess this problem correctly and take suitable measures to minimize the harm of air pollution, one should first be capable of finding out the cause accurately. Only after an accurate diagnosis can there be a suitable solution and thus a significant outcome. When it comes to air pollution, the best way to detect the cause is to make density measurements of air pollutants with electrochemical sensors sensitive to specific gases in various locations. However there are some requirements that must be fulfilled: "To adequately characterize air quality (AQ), measurements must be fast (real-time), scalable, and reliable (with known accuracy, precision, and stability over time)."[2] The more accurate and fast the sensors get, the more expensive the gas measurement station will be. Since it is important to make measurements in multiple locations to create a pool of air pollutant density data and thus getting a better understanding of the environmental damage, a collective of stations are needed, which increases the total cost dramatically.

Chapter 2

Challenges

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2.1 Mechanical and optical challenges

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2.1.1 Critical parameters

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Chapter 3

Outlook

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APPENDIX

Appendix A

Some Appendix

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Appendix B

Source Code

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Bibliography

[1] Guy Hutton. Air pollution. *Global Damage Costs of Air Pollution from 1900 to 2050*, 2011.

[2] Eben S. Cross. Use of electrochemical sensors for measurement of air pollution: correcting interference response and validating measurements. Technical report, Massachusetts Institute of Technology, Cambridge, MA 02139, USA, 2017.