The title goes here, cause it looks good, less than 60 characters (preferably)

This will be a good title, about robots and the environment

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Abstract

Robots robots

Environment environment

Acknowledgements

There will be things here, thanks supervisors/labmates/family/other ...

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Declaration of Authorship

I, Benjamin Dyer, declare that this thesis titled, "This will be a good title, about robots and the environment" and the work presented in it are my own. I confirm that:

- Will list each chapter
- and what I did

Chapter 1

Literature Review

1.1 Introduction

1.1.1 Mobile Sensing Systems

Aoki et. al. (Aoki et al. 2008)

- developed wifi-enabled boards to measure carbon monoxide, nitrogen oxide, ozone, temperature, relative humidity, and motion (3D accelerometer)
- Used GPS for localization
- Application for citizen science to detect air quality
- bound to road ways
- not sure yet if data will be usable

Dutta et. al. (Dutta et al. 2009)

- Same vein as (Aoki et al. 2008) but hand held devices
- same sensors as before
- again no data analysis done

North et. al. (North et al. 2008)

- used UV sensor to measure polutants
- deployed on vehicles infrastructure and people
- MESSAGE project
- most of paper on sensor development and calibration

Nitu et. al. (Nitu et al. 2015)

- Mobile sensing using microwave sensors for soil moisture sensing
- multiple platforms mentioned, land based and air based

- Shows mobile monitoring has been used in a variety of applications in the past

Stieglmeier et. al. (Stieglmeier and Tropea 1991)

- develop laser doppler anemometer
- useful for mobile applications
- tested on a train, not super applicable but is a very interesting paper

Zhao et. al. (Zhao et al. 2017)

- created 2D wearable anemometer (hot wire)
- Use accelerometer to determine orientation?

Kato et. al. (Kato et al. 2019)

- developed a anemometer for use on drones
- high noise but decent accuracy on moving average
- probably not much to be gained from this paper

Lee et. al. (Lee et al. 2011)

- localization underwater of mobile robot (path planning stuff)
- paths are still straight using a sweeping motion of the area
- I'm slowly realizing mobile sensors are mostly used for gas detection. Also all the paths seem to either be straight lines to sweet an area, or a path determined in real time in order to move towards a perceived source

1.1.2 Data Analysis

Wang et. al. (Wang et al. 2004)

- handheld sensing devices
- focus on image processing
- use GRID for real time updating of databases
- Could feed this information back in order to update path

Zhao and Yue (Zhao and Yue 2019)

- Spatiotemporal data cube modeling for multi source data
- possible method for real time analysis of data
- can be used with multiple mobile robots or any moving sensors

Sarma et al (Sarma et al. 2014)

- use of mobile phones in a network

- focus on grabbing and developing the data using a multi-tiered hierarchical system.
- more useful for multiple sensors, but same methods can be applied for data collection

La et. al. (La et al. 2015)

- mobile sensing in order to make scalar field mappings
- use a consensus filter to adjust for the temporal change
- obtain decent estimation of scalar field with relatively high confidence
- simulations used to show proposed algorithms
- used with multiple mobile sensors

Xue et. al. (Xue and Zhai 2017)

- methodology for tracking pollutants
- use some interesting probabilities to determine location of pollutants
- sensors follow simple straight paths instead of trying to zone towards the source
- testing done on large scale (travelling along roads, so still straight sources for urban environment
- seems important to fully cover the vector space

Ji-Gong et. al. (Ji-Gong et al. 2015)

- Detection of multiple odor sources
- Idea: Using anemometer data to determine algorithm for source finding. ie. gradient for low Re something else for high Re
- Interesting algorithm for finding multiple source
- Predefined path is always straight lines
- Propose path planning algorithm using collected data, something to look into

Vuka et. al. (Vuka et al. 2017)

- Gaussian Regression Bout Amplitude approach for determining gas source
- use anemometer to determine wind speeds
- robot follows path defined by highest bout amplitude

1.1.3 Directly related

Marques et. al. (Marques et al. 2005) (2 papers)

- used 'car' robot with anemometer (Young 8100) to make measurements

- used for gas detection
- Path was a predefined sweep of the area of interest
- waypoints used measurements taken 10s outdoors, 30s indoors
- max speed 5cm/s (should I be using slower motors?)
- room broken into grid and measurements made at each point in the grid
- Should test multiple real world environments as done in paper

Martinez et. al. (Martínez et al. 2014)

- Differential drive robot with LIDAR, anemometer, and gas sensor
- Used a portable computer (pretty expensive?)
- Used random path about room, all straight lines
- Multiple environmental cases tested all in same room with fans/gas source
- No analysis? nothing on actually using the data, take with grain of salt

Rahardi et. al. (Rahardi et al. 2018)

- Made a hot wire anemometer to assist in gas detection
- robot is differential drive, looks like it must be connected to a computer
- no indication of preferred path
- hot wire anemometer a possibility if Young is to large

Fukazawa & Ishida (Fukazawa and Ishida 2009)

- gas source localization outdoors, using 'car' robot
- Movements are in straight lines scanning the area (think snake)
- used Young 81000
- Turbulent plume model for gas dissipation, look into it

Widyantara et.al. (Widyantara et al. 2018)

- differential drive robot with 3 wind sensors
- path follows gradient
- 90% success rate

Kato et. al. (Kato and Mukai 2005)

- Omniwheel robot used to detect gas source
- No mention of path used

1.1.4 other

Marques et. al. (Marques et al. 2008)

- Interesting hot wire anemometer, very cheap but decent performance

Teng et. al. (Teng et al. 2007)

- Mobile robots move in straight lines between points
- Method for moving robots about environment proposed
- probably more useful for swarms, but the method is semi-interesting

Chapter 2

Platform Overview

2.1 System Breakdown

2.2 Mechanical

2.2.1 Robot Frame

2.2.2 Wheel Drive

2.3 Electrical

2.3.1 Driver Board

2.3.2 12VDC Buck Converter

2.3.3 3.3/5V Buck Converter

Appendix A

Chapter 1 Supplement

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