BRADLEY University

Project Notebook

Multi-Robot Localization for Area Coverage

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Friday, March 13, 2018

1 Notation

Throughout this document, the vectors (matrices) will be denoted by lowercase (uppercase) bold letters while the lowercase non-bold letters will denote scalar quantities. Sets will be denoted by calligraphic letters. For positive integers $m, n > 0$, $\mathbb{R}^n (\mathbb{R}^{m\times n})$ denotes n–dimensional column vector ($m \times n$–dimensional matrix) with entries taken from a set of real numbers $\mathbb{R}$. $(\cdot)^T$ denotes the transposition of quantity $(\cdot)$. The standard Euclidean norm of the vector $\mathbf{x} \in \mathbb{R}^n$ and the matrix $\mathbf{A}$ are given by $\|x\| = \left(\sum_{i=1}^n |x_i|^2\right)^{1/2}$ and $\|\mathbf{A}\| = \left(\sum_{i=1}^m \sum_{j=1}^n |a_{ij}|^2\right)^{1/2}$ with x_i, a_{ij} being the entries of $\mathbf{x}$ and $\mathbf{A}$, respectively. The scalar products of quantities $\mathbf{x}, \mathbf{y} \in \mathbb{R}^n$ and $\mathbf{A}, \mathbf{B} \in \mathbb{R}^{m\times n}$, are given by

$$\mathbf{x}^T\mathbf{y} = \sum_{i=1}^n x_i y_i \quad \text{and} \quad \mathbf{A} \cdot \mathbf{B} = \mathrm{Tr}\left(\mathbf{A}^T\mathbf{B}\right) = \mathrm{Tr}\left(\mathbf{A}\mathbf{B}^T\right),$$

respectively, where $\mathrm{Tr}(\cdot)$ is the trace of matrix $(\cdot)$. Clearly, $\mathrm{Tr}(\mathbf{A}^T\mathbf{A}) = \|\mathbf{A}\|^2$.
Example of citing a paper. "Authors in [1] ..."

Friday, April 26, 2019

Dr. Miah will write a research grant proposal under BEMOSS and is due May 3.

All documentation will be maintained in a github repository for this project. I need to create a Github account and send my username to Dr. Miah. A Google Drive with the same name as the Github repository will be created name DocsBEMOSS.

I need to talk to Mr. Mattus about getting a laptop for research. It must be installed with Ubuntu administrative privileges.

Send him an email:

Hello Mr. Mattus, I will be working on a project with Dr. Miah. For that we would like to request a laptop available in the department if possible so that we can install Ubuntu operating system.

Try to go see him in the afternoon.

I need to learn the following Github Bash terminal commands:

```
Git add
Git commit -m "message"
Git remote add origin 'url'
```

To get a better undestanding of what is going on I need to go through Github tutorials.

Thursday, May 02, 2019

I met with Reece Bachman, Jordan Ingram, and Robert O'Malley in the lab with the intention of filming a video of the BEMOSS installation from start to finish. However, I misinterpreted Dr. Miah's email and thought we were going to install on the current laptop they have in the lab. Instead, I was expected to have received one from Mr. Mattus with Ubuntu installed. Robert showed me the motor setup with the Zigbee module, L298N dual H bridge module, and buck-boost converter. Later, Jordan demonstrated his work with the HVAC controller.

Friday, May 03, 2019

I still am in need of a laptop, so I must email Mr. Mattus once again on Monday, May 6.

Dr. Miah showed me some of the Github commands to upload tex and pdf files to the Github repo. We added the meeting minutes files `meeting.tex` and `meeting.pdf`.

Friday, May 10, 2019

Today, I met with Bob and Jordan to film the installation of BEMOSS on my borrowed laptop. After Bob attempted to install BEMOSS twice, he came to the conclusion that I installed the wrong version of Ubuntu on my machine. BEMOSS requires 16.04.5 not 16.04.6 that I had installed before the first installation. After another attempt at installing the software on Ubuntu 16.04.5, the same issue persisted involving three python modules not installing.

Bibliography

[1] F. Martinelli. A robot localization system combining rssi and phase shift in uhf-rfid signals. *IEEE Transactions on Control Systems Technology*, 23(5):1782–1796, Sept 2015. 7