Supporting personnel in warehouses with the inertial measurement unit

ADRIAN ACKVA GABOR FINTA
?????????????? | finta @kth.se

October 10, 2018

Abstract

Your abstract here.

Contents

List of Acronyms and Abbreviations

This document requires readers to be familiar with terms and concepts described in RFC 1235 [1]. For clarity we summarize some of these terms and give a short description of them before presenting them in next sections.

IPv4 Internet Protocol version 4 (RFC 791 [2])

IPv6 Internet Protocol version 6 (RFC 2460 [3])

1 Introduction

It was conjectured in [1] that multicasting could provide gains by ....

See also [4], the paper [5], and the book [6].

1.1 Theoretical framework/literature study

xxxxx xxxx xxxx

1.2 Research questions, hypotheses

We saw that several solutions exist for displacement tracking using ultrasonic sensors. We would like to experiment with an IMU and find out if it is capable of executing similar measurements.

Out hypothesis is that we can correctly decide whether an item had been placed inside the correct container or not. In this scenario we assume that the containers are around the size of 50-100 cm wide and long.

2 Method(s)

We implement our own software for Android operating system[7]. We use Android Studio [8] to implement our application and to deploy it to the mobile device. We decided to use Java programming language [9] for the implementation. Our test device is a Xiaomi Redmi Note 4 mobile phone [10] and its inbuilt measurement units.

We implement an application according for the mentioned system. For this, we use already existing libraries on GitHub to avoid implementing complex algorithms such as a Kalman filter[11]. In our application we use two GitHub projects. After collecting the sensor data, we use FSensor [12] to filter the data. This helps us filter out the noise and keep the useful data. This step is an important step as the raw data is very noisy. ——————————————————————————citation here if we can find something——————————————————————————. Then the acceleration data is integrated twice to get position and at this point another GitHub repository is used. It is the GraphView [13]. This provides a simple way to plot data on the phone screen. Using this method, the X and Y position data is displayed and the results can be seen. After starting the app, the tracking starts and automatically stops after a few seconds, concluding the results. This time is enough to perform the movement of placing the item from one container to another but short enough not to accumulate too much error increasing the accuracy of the final position.

3 Results and Analysis

xxxxx xxxx xxxx

4 Discussion

xxxxx xxxx xxxx

References

[1] J. Ioannidis and G. Q. M. Jr., “Coherent file distribution protocol,” *Internet Request for Comments*, vol. RFC 1235 (Experimental), Jun. 1991. [Online]. Available: http://www.rfc-editor.org/rfc/rfc1235.txt

[2] J. Postel, "Internet protocol," *Internet Request for Comments*, vol. RFC 791 (Standard), Sep. 1981, updated by RFC 1349. [Online]. Available: http://www.rfc-editor.org/rfc/rfc791.txt

[3] S. Deering and R. Hinden, "Internet protocol, version 6 (IPv6) specification," *Internet Request for Comments*, vol. RFC 2460 (Draft Standard), Dec. 1998, updated by RFCs 5095, 5722, 5871. [Online]. Available: http://www.rfc-editor.org/rfc/rfc2460.txt

[4] S. Long, "Database synchronization between devices: A new synchronization protocol for sqlite databases," Master's thesis, KTH, School of Information and Communication (ICT), Stockholm, May 2011, TRITA-ICT-EX-2011:88. [Online]. Available: http://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-46712

[5] Anand Kannan, Gerald Q. Maguire Jr., Ayush Sharma, Volker Fusenig, and Peter Schoo, "N-ary tree based key distribution in a network as a service provisioning model," in *ICACCI '12 Proceedings of the International Conference on Advances in Computing, Communications and Informatics*. ACM Press, 2012. doi: 10.1145/2345396.2345550. ISBN 9781450311960 p. 952. [Online]. Available: http://dl.acm.org/citation.cfm?doid=2345396.2345550

[6] Brent S. Baxter, Lewis E. Hitchner, and Gerald Q. Maguire Jr., *A standard format for digital image exchange*. New York N.Y.: Published for the American Association of Physicists in Medicine by the American Institute of Physics, 1982. ISBN 9780883184080

[7] https://www.android.com/, last accessed on 10-10-2018.

[8] https://developer.android.com/studio/, last accessed on 10-10-2018.

[9] https://docs.oracle.com/javase/8/docs/technotes/guides/language/index.html, last accessed on 10-10-2018.

[10] https://www.mi.com/in/note4/, last accessed on 10-10-2018.

[11] P. Zarchan and H. Musoff, *Fundamentals of Kalman Filtering: A Practical Approach*, ser. Fundamentals of Kalman filtering: a practical approach. American Institute of Aeronautics and Astronautics, Incorporated, 2000. ISBN 978-1-56347-455-2. [Online]. Available: https://books.google.se/books?id=AQxRAAAAMAAJ

[12] https://github.com/KalebKE/FSensor, last accessed on 10-10-2018.

[13] http://www.android-graphview.org/, last accessed on 10-10-2018.

A Insensible Approximation

Note that the Appendix or Appendices are Optional.