

Indoor Navigation for a Supermarket Using Bluetooth low energy  
(BLE) Beacons and Analysis of Consumer Behavior

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Indoor Navigation for a Supermarket Using Bluetooth low energy  
(BLE) Beacons and Analysis of Consumer Behavior

Mobile application and a Web admin panel

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## **Declaration**

I declare that this thesis is my own work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Signature of Student

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Date:

Supervised by

Mr. B.H Sudantha

Signature of the supervisor

.....

Date:

## **Dedication**

This Dissertation is dedicated to my loving parents for their support and encouragement.

## **Acknowledgements**

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## Abstract

Retailers typically make a variety of strategic level decisions including the type of store, the market to be served, the optimal product assortment, customer service, supporting services and the store's overall market positioning. Once the strategic retail plan is in place, retailers devise the retail mix which includes product, price, place, promotion, personnel and presentation.

In this digital age, there are many ways to analyze buying patterns. Yet retailers would like to understand consumer behavior inside stores so they can organize and place their products based on that and gather more information based on gender, age, profession etc.

Localization and navigation have been important topics in research. There are many impossibilities when trying to perform positioning within indoor environments, with the use of GPS technology. In order to overcome these limitations, we look into Bluetooth Low Energy technology based localization model.

In real time applications such as object tracking and distance estimations, continuous receptions of RSSI measurements are needed in order to estimate accurately the position of the object. In adjacent to those considerations, there are some additional constraints to be inspected such as signal attenuation, signal loss, multipath effects, temperature, reflection, a human body and other communication signals. Hence, this research work has examined the RSSI smoothing approaches in order to obtain preferable results. Although there are so many solutions, no RSSI smoothing method has been recognized as a standard method.

During experiment, we found that the fluctuation of the RSSI values are hard to handle and many techniques were used to overcome this. Kalman filter algorithm was used to smoothing the RSSI values. Many techniques were tried to get the exact position of the user and trilateration algorithms are used to estimate the position of the user.

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