

University of Bamberg



**Internship Report
Mobile Software Frameworks and Object
Oriented Programming
at Favendo GmbH
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by

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Contents

1	Acknowledgment	2
2	Introduction	2
2.1	Description	5
2.2	Key Concepts and Activities	6
3	Reflection	6
4	Conclusion	6
5	References	6

List of Figures

1	Way Finding sample application from Favendo Official [1] . . .	3
2	Asset Tracking concept from Favendo Official [1]	3
3	Proximity Marketing concept from Favendo Official [1]	4
4	Analytics concept from Favendo Official [1]	5

List of Tables

1 Acknowledgment

I would like to thank Mr. Christian Motz, the Director Legal/HR at Favendo GmbH, for giving me the opportunity to do an internship within the organization.

2 Introduction

I have participated in an internship program offered by Favendo GmbH [1] in Bamberg for four months starting from April 2018 and concluding on July 2018. Favendo is a software company established on 2014 with development sites mainly in Bamberg and Jena in Germany, provides cutting edge Location Based Services to its internationally spread customer base. Favendo is also part of Fewclicks corporate group [2] which closely deals with Web Application Services and Internet of Things based solutions. Favendo has provided location based services and solutions to customers from various demographics. Some of the prominent examples are Audi AG, SAP and Mediterranean Shipping Company cruise ships. This internship is part of my ongoing masters program at University of Bamberg in Germany.

Core services offered by Favendo can be divided into several categories as referred from the Favendo Official references [1]:

- **WayFinding**

Way finding and indoor navigation is one of the key services that is offered with the help of hardware components such as beacons and the Commander software framework, in conjunction with a highly available backend server component. This service helps the users in finding their navigation path from a given source to destination at the indoor venues such as airport, shopping malls or large cruise ships with hand-held smart devices. A high degree of accuracy helps in precisely locating a point of interest in large complex venues. Normally, a combination of several technologies such as low energy consuming crypto-beacons along with core development framework of popular software ecosystems are used to bring the solution to the customer.



Figure 1: Way Finding sample application from Favendo Official [1]

WayFinding carries value both for external visitors as well as the authority using the Favendo provided solution. On one hand visitors can find their way to desired destination in a large building or complex. On the other hand, respective authorities can use visitors data through analytics and use the same for proximity marketing and many other thoughtful purposes in order to boost the business.

- **Asset Tracking**

Asset Tracking was always been a challenge worth considering for large industries especially in sectors like construction, hospital management or large recreational venues like cruise ships. It is crucial to search items of interest in the hour of need and ensure security for them. Asset Tracking system developed by Favendo can be helpful in tracking the positions/potential utilizations of equipments or in certain cases even human beings. It is far more than just keeping track of matters. It could also be helpful in routing and smart arrival/availability predictions.



Figure 2: Asset Tracking concept from Favendo Official [1]

Favendo offers hardware/asset tags based on crypto-beacons and RFID

technology as well as software framework that goes hand in hand in order to create an Internet of Things based real time implementation of Asset Tracking. Use of bluloc [3] crypto-beacons makes a durable installation of signal radiators which are intercepted by beacon controllers and analyzed by the software systems to generate useful knowledge.

- **Proximity Marketing**

Proximity Marketing has introduced a new paradigm of customer engagement for the businesses in order to improve sales. The key idea of the proximity marketing often relies upon the accurate positioning systems in place and it exposes unprecedented opportunities to improve business as a whole. Proximity marketing can be utilized to reach customers with making venue-specific products or offers information available.

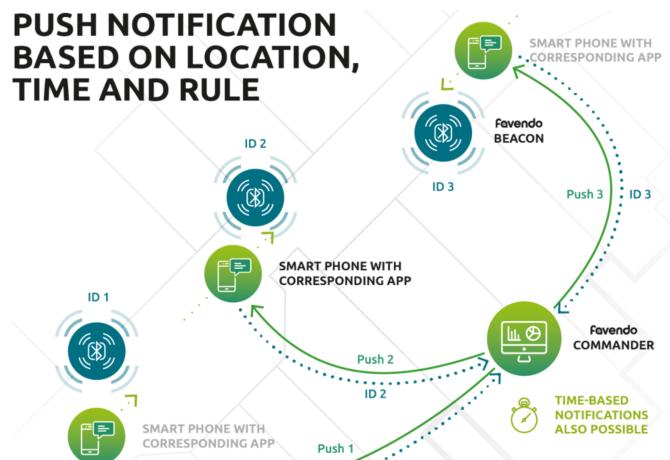


Figure 3: Proximity Marketing concept from Favendo Official [1]

We can assume a very simple use case of making the content or commercial offers available in mobile device of potential customers when they enter a specific zone or in close vicinity with the point of interest. The solution offered by Favendo is implemented with beacons making it independent of the network connectivity.

- **Analytics**

Analytics utility is built in within the web based dashboard application that Favendo offers to customers. This datasets covers a wide range such as the purchasing trends, navigation patterns or interactions with tracked objects or assets.



Figure 4: Analytics concept from Favendo Official [1]

This invaluable dataset could help customers with determining the possible optimization scopes in their product lines or services offered as well taking rational decisions improving the customer engagement. The image 4 shows a concept study made for an indoor shopping center to have an overall idea of visitors movement over a course of time.

2.1 Description

Efficient framework system plays a key role in the services that Favendo offers to its customers and works as the enabler and customization point for consuming location based service. It consists of several related subsystems and goes by the project name Commander [4]. Commander is executed with a highly available backend server side module that often securely hosts the classified information and a highly customizable mobile application SDK that is used to integrate location based services offered by Favendo to the mobile application developed for popular mobile software ecosystems such as iOS and Android. In order to provide the indoor navigation/positioning utility this framework comes with a map implementation customizable as per specific customer needs.

During my internship I was engaged with various enhancements and bug-fixes for this framework especially applicable for the iOS mobile platform. I have participated in the research and development efforts targeted towards the next major release of the commander mobile framework.

2.2 Key Concepts and Activities

This subsection will describe the key concepts developed during the internship and the activities performed.

- Object Oriented Design Patterns
- Delegate Pattern
- iBeacon Standard and Ranging/Positioning
- Object Oriented Programming with Swift, Objective C
- Cross platform research with C++

3 Reflection

This section will describe the reflection on the internship.

4 Conclusion

This section will have the conclusion.

5 References

- ### **References**
- [1] Favendo gmbh official. [Online]. Available: <https://www.favendo.com>
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 - [4] Favendo commander. [Online]. Available: <https://www.favendo.com/commander/>