Final report

DoorSine / Digital Assistant for Staff Office Door

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University of Essex

CE301 Final Year Capstone Project

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# Acknowledgments

First and foremost, I want to thank my supervisor Doctor Shoaib, Jameel. During my second year at Essex he was one of the supervisors for our team project, and through the year I got to know him as a professional lecturer with an abundance of wisdom and optimism.  
Upon learning about this project, and after a few discussions about the scope and goal of the project, I decided this project was what I wanted to do. This project has really helped me grow as a computer scientist and I want to thank Doctor Shoaib Jameel for giving me the opportunity to do so.

I also want to thank my family, who has supported me every step of the way. These three years of university has not been what I envisioned, but with the guidance and support you have given me I have battled through and come out on top. I am forever grateful for having a family like you.

Lastly, I want to thank my friends who I have also relied on for emotional and sometimes physical help with problems and challenges. You guys are what has made these three strange years of university bearable and most of all enjoyable.

# Abstract

Title: DoorSine / Digital Assistant for Staff Office Door

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The aim of the project was to create a digital assistant for an office door that would allow the owner to communicate and display information to anyone outside their office.  
Several similar products exist on the market, but they are more focused on managing entire  
workspaces.  
What makes this project stand out is that it is aimed at managing offices for individuals, rather than managing workspaces and rooms for corporations.  
It can be utilised by as few as a single office worker, and by as many as an entire corporation.  
The impact the project has is that it shrinks the time it takes to communicate with i.e. a lecturer from a day or two via email, to a quick message or a call.  
It also makes booking meetings and getting up to date information accessible and easy.  
I have learned so much during this project, and have had the opportunity to grow as a data scientist using the newest technology in app development.

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# Project Context

## Description

Below is the description of the project provided by Doctor Shoaib Jameel as the outline for this project on the Project Database.

The idea is to develop software which could run on a mobile device that connects to the network and takes commands remotely.   
The goal is to place this device outside every staff office door so that anyone who wants to visit the staff knows that current status of staff - whether the staff is in the office or out of office, whether the staff is in a meeting, or on leave.   
We could do plenty of cool pieces of stuff with this device such as scheduling a meeting by directly interacting with the device and viewing your marks on this device using facial recognition (I am going too much overboard!).   
The initial goal would be to first build the software that works on a mobile device such as a mobile phone.   
If you are interested, please feel free to drop an e-mail to discuss what exactly you wish to work on including its scope [1].

## Aims and Objectives

**The aims and objectives agreed upon with Shoaib.**

**What problem has been solved, and why is it important?**

After selecting this as my final year project, Doctor Shoaib Jameel and myself discussed and agreed upon exactly what the aims and objectives of the project should be. The initial goal was to develop the groundwork for the application and implement the following features.

* The staff should be able to set their availability so that anyone visiting their office could know if they currently are available or busy.
* A student can check when the staff is available next and book a meeting without disturbing the staff.
* Someone at the door could interact directly with the staff through messaging

Through the report, these features as well as additional ones will be highlighted and explained, showing how the needs of user have been solved.

## Motivation

App development has always intrigued me, but throughout the first two years of university there had been little to no focus on it. So when the chance presented itself to try developing an application from scratch with freedom to do what I wanted with it, there was no doubt in my mind that this was the project I wanted as my final year project.

Statistics from Statista highlight the importance smartphones, and the applications on them have on our life. A survey on the number of smartphone subscriptions worldwide from 2016 to 2027 shows that the amount has been increasing substantially since 2016 and is forecasted to keep increasing in the coming years. At the end of 2021, the number was at 6.259 billion and is forecasted to grow into 6.567 billion in 2022 [2].  
Another survey shows the increase of smartphone usage of age groups 16 to 65 and up from 2012 to 2020. The percentage shows smaller increases in the combined age group 16-44, ranging from 12% at the lowest to 27% at the highest. In the combined age group of 45+ the increase is even larger, ranging from 49% at the lowest to a 62% at the highest [3].  
These two surveys highlight that the usage and reliance of smartphones shows no signs of slowing down, and proves that the need for user friendly and reliable apps are higher than ever.

These surveys also support what I have experienced and continue to experience in my daily life. Born right before the turn of the century, I have experienced smartphones going from something that was non-existent to something that is used and often needed in the daily life of almost everyone.  
This provides the reasons for why I wanted to do this project, and the reason why I believe this is a good time to do it.

## Background Reading

Before looking into languages and environments to create the app in, I wanted to understand what makes an app good in the eyes of the user. I also wanted to look at the challenges app developers face and possibly how to overcome them.

A research paper titled “Real Challenges in Mobile App Development” from 2013 investigates the challenges in mobile app development both using qualitative data from 12 interviews with senior developers and quantitative data from 188 answers to a survey answered by people from the mobile development community.   
One of the main revelations of the study is that one of the biggest challenges in mobile app development is dealing with the various mobile platforms. Since the different platforms vary in build and functionality, the developers often found themselves creating a separate app for every platform and manually checking that the functionalities are preserved across the different versions [4].  
A criticism of the study could be that is older, and that there has been a lot of development in the field of mobile app development. A quick web search shows that this is still the case for most of app development. Articles naming the top 5, top 10, etc. like this Medium article [5] or this SpinxDigital article [6] all mention Java and Kotlin as the most used languages for Android development, and Swift as the most used for IOS development.

“Factors Influencing Quality of Mobile Apps: Role of Mobile App Development Life Cycle” is a paper published in October of 2014 and investigates what makes applications fail, and by proxy then also describes what to do to not make an application that will fail.  
According to the report the were about 6.4 billion applications downloaded in 2009, with the number increasing at an accelerated rate to 76.9 billion by 2014 [7].  
This projected increase is further backed up by numbers from Statista, showing that the number of mobile app downloads in 2016 was at 140.68 billion and in 2021 was at 230 billion [8], showing that the mobile app industry is bigger now than ever.  
The report describes a bad app as having the following flaws:

* Poor design/UI
* Too much clutter on screen
* Poor navigation
* Does not meet the user requirements
* Does not address the specific issue
* Has security issues
* Fails at essential times
* Downloading issues
* Inconsistencies across platforms
* Compatibility issues
* High battery usage
* Slow replication function
* High ad frequency
* Not appropriately priced
* No endeavours made to solve any of the mentioned issues

In short, apps should be fast with a simple and understandable interface and should work as advertised without any issues relating to security, loading or battery consumption.

As previously mentioned, I had little experience with app development. I had no knowledge of what language was the most used languages, compilers or frameworks. The background reading regarding this started by looking at articles like “Top 5 Programming languages for Mobile App Development” [5]  
This article and others like it mention Kotlin and Java as leading languages for Android development, Swift is mentioned as the leading language for IOS development, and JavaScript is mentioned as the leading language for Web development,  
But throughout all of these articles, a language I had never heard about caught my attention, Dart.

“Dart is a client-optimized language for fast apps on any platform” [9]. It is an open-source and object-oriented programming language released by Google in 2011, and has seen continuous improvements and development since its initial release.  
It was created to “offer the most productive programming language for multi-platform development” [10]. Further reading and looking at what other developers have created with Dart and Flutter, I was convinced that this was the language and environment I wanted to create my app in (CAN ON EXPAND THIS).

## Related Technologies

A big part of the background reading also consisted of looking at similar products already publicly available to gain insight into how they function, what their customer base looks like and to look at how they have succeeded. It was also helpful to gain inspiration for design and layout, and to look at what can be improved on.

The major technologies looked at are *Door Tablet* with clients like *Michigan State University* and *Plymouth Marjon University* [11], *Meetio* with clients like *Duchy Homes* and *Three* [12], *Condeco* with clients like *Vodafone, Nestle* and *Comcast* [13], and lastly *Pronestor* with clients like *United Nations* and *Siemens* [14]. These products are all mainly aimed at the office industry sector, but some of them have customers in the school sector as well.

Similarities between these apps and the project include some basic functionality. They all work on both phones and tablets, but this is true for most applications. They all provide the possibility of booking meetings, and they all provide the user with general information they might need.

Differences between the project and the other products are many. The major difference that serves as the basis of most the differences is that this project is aimed at managing one-to-one communication between an office user and a person at their door, while the other products are aimed at managing entire workspaces.   
Their main purpose is to manage the office space by giving the users the ability to book desks, rooms and more. They can plan group meetings, access floor plans and display room information.  
This projects purpose, as mentioned, is one-to-one communication between an office user and a person at their door. The person at the door can see the office users current status, can get some basic information on them and has the option of messaging, calling and booking meetings with the office user.

Looking at the similarities and differences, it is clear that similar products do exist on the market already and the different companies compete for the biggest share on the market. But the amount of differences show that this project is something not available on the market yet and would not struggle to compete with these other companies, but rather fill a gap in the market that is missing.

## Implemented Technologies

Acknowledge technologies used, and why they were chosen.

## Sustainability

The sustainability of the product

## Legal

Any legal problems, as well as the use

## Ethical

Ethical issues and problems that arises from the project

## Intellectual Property

???

## Challenges

Talk abut the challenges I faced working on this project

# Project Implementation

Technical documentation, highlighting what I’ve adopted, modified and created from new.

# Project Testing

Show some evidence of testing, might not be necessary.

# Project Planning

Show use of Jira and GitLab

Talk about overall achievements, performance and what I have learned. Probably better for conclusion.

Was my methodology suitable? What does that mean…?

## Planning

Maintaining momentum, adapting to change

## Operation

## Risk Management

Identifying and dealing with risks

## Jira

<https://cseegit.essex.ac.uk/ce301_21-22/CE301_blakkestad_knut_s_l>

## GitLab

<https://cseegit.essex.ac.uk/ce301_21-22/CE301_blakkestad_knut_s_l>

# Conclusion

Text must have impact, like the abstract but longer.

Summarize the work that has been done.

What the intended goals and what was achieved.

Highlight achievements.

Future scope, what could be worked on if it was to be continued, extension to be added and overall improvements.

## Achievements

The three points mentioned in the “Aims and Objectives” section of the “Project Context” chapter was the original project scope and was supposed to occupy the work for the entire project. By the interim presentation before the end of autumn term, the application had the following features implemented.

* The staff could set their status as available or busy, as well as indicate whether they were in or out of office. This was done using the app on their phone, and changes appeared instantly on the tablet on the door.
* Messaging was implemented and working.
* The staff could change their basic information easily through their app if office hours or related info changed.
* An account creation system was created so anyone who wanted to use the app could create their own account.

Looking at what had been achieved so far, and with the functionality of booking meetings being the only remaining feature to not have been implemented, it was agreed that another feature was needed to fill the hours required for the project. This feature was the ability for someone at the staff door to call the staff using video. With this, the final iteration of the project has the following features in addition to what has been mentioned before.

* A person can book a meeting if they are at the staff door. The app interacts with the staff’s calendar to display when they are busy or available. Meetings cannot be booked if they overlap with other events.
* Calling is implemented and working.
* Every page has a button that give some basic information about the given page of the app, to help users unfamiliar with it.
* Visual improvements to make the app more user friendly.
* Software improvements to make the app run smoother and more efficient.

With all these features, the app has evolved beyond its initial scope of being a digital assistant for a staff office door. It can be used in any environment where offices are abundant, and can be used by as few as a single person to as many as an entire corporation.

# References

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