# Contactless Clock-In Application for Workplaces

**Ryan Higgins**

**Daniel Gallagher**

**Shane McCormack**

**Jack McNamee**

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Advised by: Joseph Corr

Department of Computer Science and Applied Physics
Galway-Mayo Institute of Technology (GMIT)

# Contents

# Abstract

Covid-19 has brought the world to a standstill for the past year and many workplaces have been forced to close down for fear of transmitting and contracting the virus. This virus can be spread easily by surface contact, which can be near impossible to avoid at many workplaces that are unable to work remotely.
A particular area that is regularly accessed by all the members of a workplace, usually at the same time on a daily basis, is the clock-in system. This can result in the transmission of Covid-19 between employees and managers, leading to them not being able to work, the business losing money and also possible deaths.
We are developing an app that will remove the need for employees to clock in to work at the same place and instead clock in and out using their own smartphone. The user of our app can only clock in when they enter the workplace, via their GPS location.
They will also have to confirm they are an employee of the workplace using a facial recognition system, via their front-facing camera. Employee clock-in times will be recorded for the manager to view, thus replacing the need for a physical clock in system. For employees that may not have access to a smartphone, a camera will be set up by reception to allow them to clock in safely.

**Authors** The authors of this project are Ryan Higgins, Daniel Gallagher, Jack McNamee and Shane McCormack who are three fourth year students studying for a Bachelors of Science Honours Degree in Computing in Software Development in the GMIT Dublin Road campus

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**Important Project Documentation**

1. https://github.com/ryanhiggins11/FINAL-YEAR-PROJECT/blob/master/Paperwork/Dis
2. https://github.com/ryanhiggins11/FINAL-YEAR-PROJECT/tree/master/kotlin-app
3. https://github.com/ryanhiggins11/FINAL-YEAR-PROJECT/blob/master/README.md
4. (LINK TO SCREENCAST)

# Chapter 1

# Introduction

For our project, we wanted to make an application that allows employees to clock in via their smartphone to help prevent the transmission of Covid-19 in the workplace. The employee will only be able to clock in when they are in the workplace and will have to use their front-facing camera to confirm they are an employee. The clock in times will be recorded for the manager to view, thus removing the need for a physical clock-in system

## 1.1 Idea

At the beginning of 4th,the last year in software development we were given the task of coming up with an idea worthy and suitable for a level 8 final year project. We knew that whatever we needed to come up with must have certain requirements, use multiple different technologies, languages and it had to challenge our knowledge and skills that we had learned in previous years.
With this year being all remote learning it meant that we couldn't meet in person so we were advised at the start of the year to either work by ourselves or to form a team. To start off this project we decided to form a team which consists of four of us. When we decided our team we then had to start thinking of ideas and we done so much brainstorming of different ideas but we wanted to keep our idea topical to what is going on in the world. This is where the breakthrough happened early into our college year.
It was during a team meeting that we had came up with the idea of designing an application for workplaces that would stop big queues of people all using the same clock in machine especially with Covid 19. After many long discussions, research and teams calls we decided that we were going to pursue this idea.

We needed to find the right environment for this application. We had used angular and ionic in previous modules but we had never really delved into the environment in much detail and thus we were very intrigued in the environment and learning about the inner workings and its plugins. At the start of the project different ideas where talked about one was that we would use BLE beacon technology and an android application which employees would download and use to login.When the employee would pass the front door it would then clock them in or if they were leaving work it would clock them out. Although we liked this idea we felt that there wasn't enough to it and we felt by using facial recognition it would be better. When we then knew we could incorporate facial recognition into our app this was when we decided that this was the project we would be doing.
For the application we wanted to store everything in a database which includes user account information,clock in times and clock out times. We decided to use MongoDB which is a document-oriented database which stores data in a JSON-like format with dynamic schema. We learned about databases in previous years in our course but for the login we wanted to experiment with some technology that we hadn't previously used, therefore, the decision to connect an online database to the project came about.

### 1.1.1 Technologies we used

- Kotlin
- Android Studio
- Realm DB
- Mongo DB‘
- Facial Recognition with ML kit
- Google Maps Location

## 1.2 The Application

The application we are developing is going to be able to use on mobile phones. The user will download this application onto there phone and then create an account using an email and password. When this account is created the user can then login to the application. The applications functionality is going to be clocking in or out for work, clocking in or out for breaks and also we decided to include a sickness feature in our application so if an employee

is feeling ill the manager will be notified of this. When the User either Clocks In or Out or takes a break this time will be sent to our database where it is stored. The managers will then have access to a website where we will then be displaying the names and all the times of each employee.

## 1.3 Objectives

The objectives of this project are:

- Deploy a working application on the Android Store.
- Design a user friendly application that will be easy to understand and use by any given person.
- Make an Application that will allow users to Clock in using there phone and prevent the spread of Covid 19 in the workplace.
- To work as a developing team, work as professionally as possible, set objectives and complete them. Meet weekly with our Supervisor and team members discussing Project development updates and discussions about the applications.
- Connect an application and display the information from a self developed server with our own database.
- For the application have a valid login and sign up connected to a database that stores the information and then displays it to a website.
- Allocate the work evenly and fairly between the four of us and set goals for each one of us.
- Constantly test the application which allows for error and bug detection as well as advance the development of this application. The application should be tested every time it is updated and documented on the results.

## 1.4 Chapter Summaries

### 1.4.1 Introduction

This chapter contains the context of the entire project what we set out to do our objectives for the future, the idea and where it came from technologies

we plan to use and the location of different elements of our GitHub Repository

### 1.4.2 Research

This is a chapter where we show all the research that we had carried out on all the different parts of the project from the beginning of clock in machines to different technology we would use in our project.

### 1.4.3 Methodology

This chapter describes the way the project was approached and managed. It also gives an outline of how the project was tested and the layout of the project development.

### 1.4.4 System Design

This chapter gives an insight into how the entire design of system architecture how it all works in conjunction and diagrams are provided for the explanation of each element of the system.

### 1.4.5 Conclusion

The conclusion is a section where we give a summary of our findings, results and our experiences while creating the development and deployment of this project.

# Chapter 2

# Research

## 2.1 Covid-19

## 2.2 Clock-In Methods

## 2.3 Spread of covid

## 2.4 Workplace Covid

## 2.5 Privacy

## 2.6 Facial Recognition

# Chapter 3

# Frameworks

## 3.1 Kotlin

## 3.2 MongoDB

## 3.3 Firebase

## 3.4 MYSQL

## 3.5 Android

# Chapter 4

# Phones

## 4.1 Front Cameras

## 4.2 Facial Recognition

# Chapter 5

# Survey

## 5.1 Survey Questions

## 5.2 Survey Results

## 5.3 Reflections on survey

# Chapter 6

# Methodology

## 6.1 Overview

### 6.1.1 Using Agile

## 6.2 Sprint 1

### 6.2.1 Work allocation

### 6.2.2 Frameworks, Technologies and Languages

### 6.2.3 GitHub Repository

## 6.3 Sprint 2

### 6.3.1 Scope

### 6.3.2 Researching Application

### 6.3.3 Designing Application

## 6.4 Sprint 3

### 6.4.1 Testing and Debugging

### 6.4.2 ..

### 6.4.3 ..

## 6.5 Sprint 4

### 6.5.1 Deploying

### 6.5.2 ..

### 6.5.3 ..

# Chapter 7

# System Design

## 7.1 Project Design

## 7.2 Application Design

## 7.3 Log In and Sign Up

## 7.4 Facial Recognition

## 7.5 Database

## 7.6 Manager Access

# Chapter 8

# Conclusion

## 8.1 Objectives and Goals

## 8.2 Retrospective of this project

## 8.3 Improvements

# Chapter 9

# System Evaluation

## 9.1 Testing

## 9.2 Application Performance

## 9.3 Limitation Issues

# Chapter 10

# Appendices

## 10.1 Installation Guide

## 10.2 Plugins

## 10.3 Platforms

## 10.4 Running the application

## 10.5 Application Images

# Bibliography