

Project Modeling Report

Thermal Scanning App

Colter Roche, Jose Bastardo

Senior Design 1

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1 Project Background

Corserva is a managed IT service provider that develops and sells custom software and hardware solutions. Corserva's customers include hospitality and other in-person focused related businesses. Official CDC guidelines to businesses encourage taking steps to prevent the spread of Covid-19 among employees and customers, including temperature checks. Corserva has sponsored this project to produce a thermal screening solution capable of processing people quickly and without requiring user interaction to minimize additional contact.

Preliminary development and testing has already been completed by Corserva. The system uses a thermal and a regular camera to recognize users and read the temperature of their face. If the temperature is above a certain threshold, then an alert is shown and the flagged person can be moved aside for further screening. The first iteration of the thermal app has several problems:

- The camera suffers from temperature drift over time and required frequent calibration.
- The facial recognition process is around 5 seconds, limiting the rate people can be processed.
- Onboarding new users requires interaction directly through the app, not practical for large numbers of employees.
- No option to send an alert to the scanned user.

The new application developed as part of this project will address these problems.

2 Scope

2.1 Project Scope

The scope of this project is to produce an application and companion mobile application to measure and report high temperatures of people passing through the system. The thermal camera will use an auto calibration system to increase accuracy of readings. Mobile application to smooth the onboarding process and provide reports to users.

2.2 Business Scope

The business scope is to provide business with a kiosk and mobile app system that will make it easier for them to maintain safety precautions during the current Covid 19 pandemic while also increasing the speed in which staff and customers can enter their place of business.

3 System Overview

3.1 Users

Those who will benefit and be affected by the new solution include:

- Attendant - The new app will no longer require frequent calibration, lessening the need for supervision and technical troubleshooting.
- Corserva - The app will be well structured and extensible, allowing for relative ease when adding new features.
- Customers - The streamlined onboarding system for users will alleviate concerns to do with overcrowding and long wait times to register in person.
- End Users - Users will receive a notification and report in the companion app after they are scanned, increasing their health awareness.

3.2 Location

The system can be installed anywhere with electrical power and space for a calibration object. The companion app will be available for Android and IOS.

3.3 Responsibilities

The primary responsibilities of the new system are:

- Accurately measure the temperature of people passing through the scanner

- Automatically recalibrate the thermal camera to account for possible drift
- Report people with a facial temperature higher than 100 degrees to the attendant
- Recognize users based on facial imaging, and send an alert to them via the companion app
- Provide real-time reporting of scans and locations to the customer
- Provide report history to users through companion app
- Register new users including facial recognition models through companion app

Other desired features include:

- Process multiple people passing through the system at a time
- Cross-platform support for the thermal scanning app

The system will not be responsible for medical screenings or temperature verification.

4 User Requirements

4.1 Interfaces

The thermal scanner system will need to interface with the chosen facial recognition system and the companion app. Corserva included code for facial recognition from another project as one possible solution.

4.2 Outputs

The thermal app will display a UI alert to the operator if a user has a high temperature. The app also sends personal reports to the user's companion app when a new scan is performed, and updates a general database for larger reports.

4.3 Inputs

The mobile app will ask the user for their first name, last name, email, password, and it will use their camera to take photos extract facial recognition data. The app will then send that information to the database. The thermal app will use the thermal camera to scan a user at the kiosk to gather facial recognition data and their temperature. The customer is able to configure settings for their deployment through the thermal scanner app UI.

4.4 Processing

Not applicable to this project. The thermal scanner system is not intended for medical use beyond preliminary screenings.

4.5 Data Storage

All the necessary data will be stored in a database cloud using a MariaDB Relational Database Service from Amazon Web Services. The database will contain users first and last name, email and password, facial recognition data, and a record of past temperature scans.

5 Functional Decomposition Diagrams

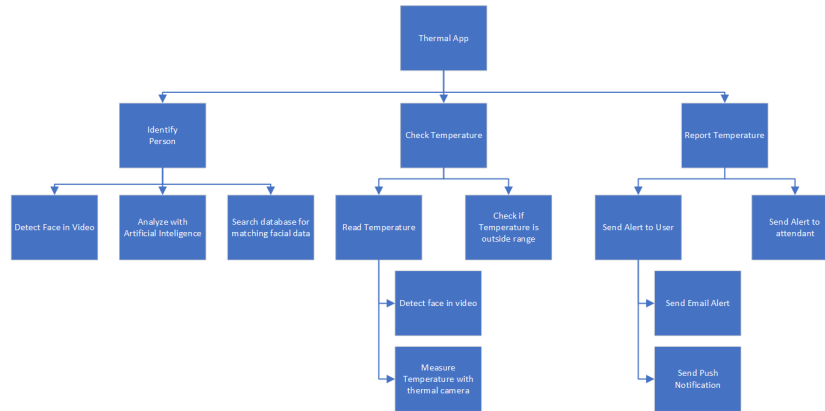


Figure 1: Functional Decomposition Diagram - Thermal scanner

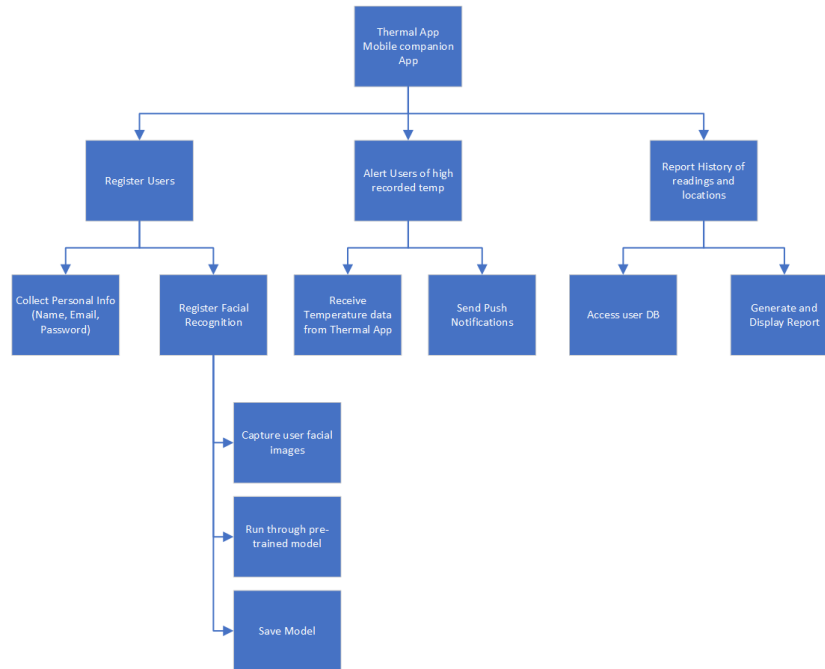


Figure 2: Functional Decomposition Diagram - Comapanion App

6 Data Flow and Application Structure

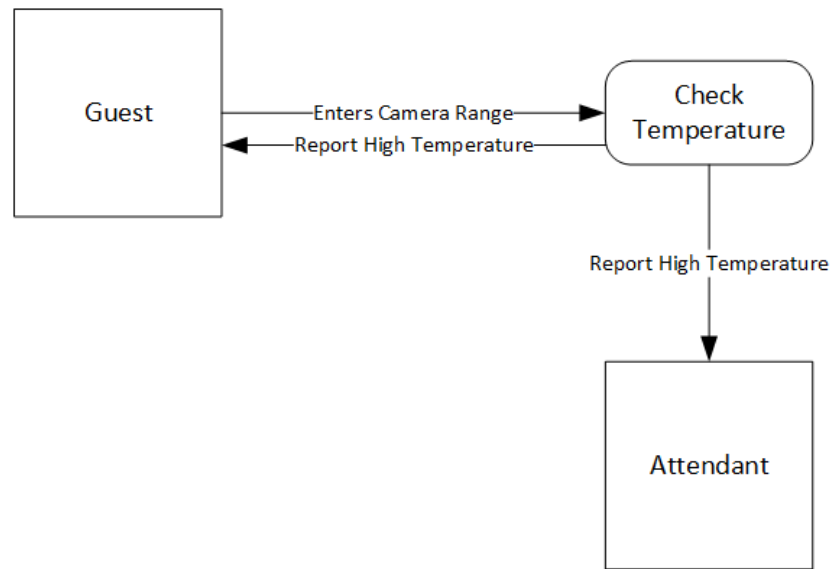


Figure 3: Top Level Data Flow Diagram

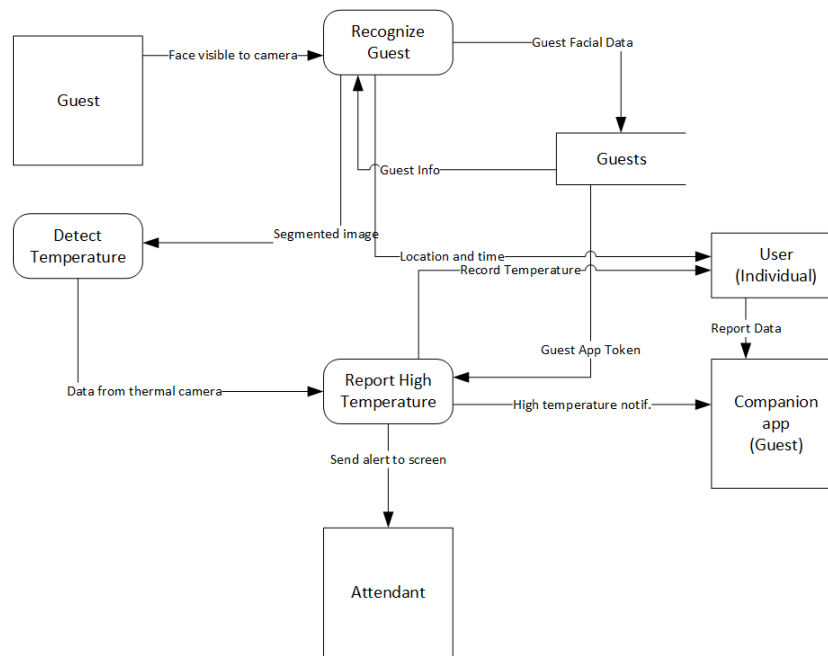


Figure 4: Level 1 Data Flow Diagram

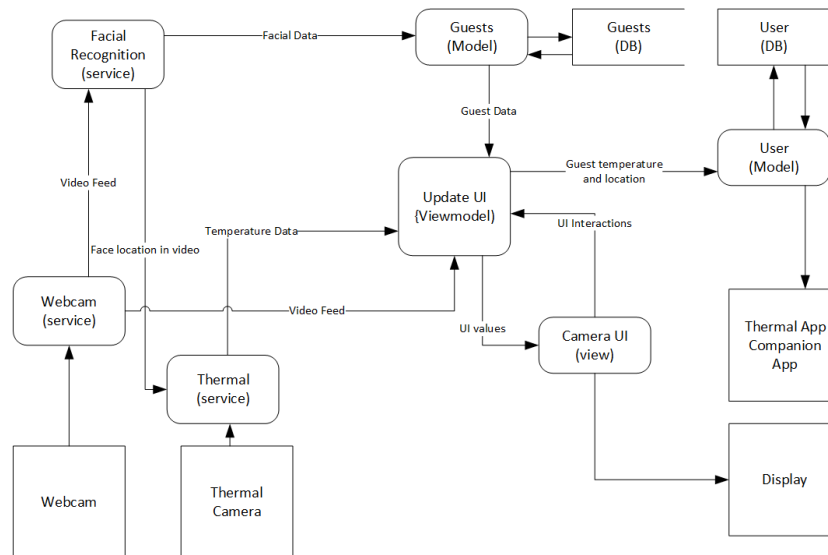


Figure 5: Level 2 Data Flow Diagram

7 Gantt Chart

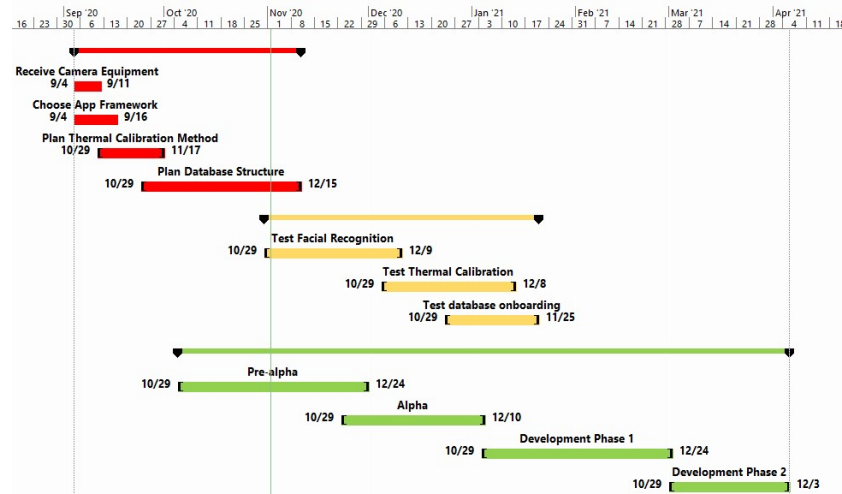


Figure 6: Gantt Chart for Thermal App Development

8 Team Member Participation

Participation was split as follows:

- Colter Roche: 60%
- Jose Bastardo: 40%