



Trine University
ECE Department

Smart Mirror

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Introduction:

Hello! We are the Smart Mirror Senior Design Team. We decided for our project that we would build a Smart Mirror that incorporated several Smart home technologies. This includes the mirror itself, as well as a companion application, facial recognition, and speech recognition technology. This is all brought together by an online database that stores all required information. We wanted to make an application for smartphones that allows users to easily set up and customize their mirror from their smartphone. After users register their faces with their mirror's database, they can simply walk up to the mirror and it will bring up their custom profile. To ensure that the mirror is completely hands free, the user can use voice commands to wake the mirror, choose from one of their custom configurations, update the mirror, and even put the mirror to sleep. Our mirror will have eight default widgets, but the user can select more widgets from our selection in the smartphone app.

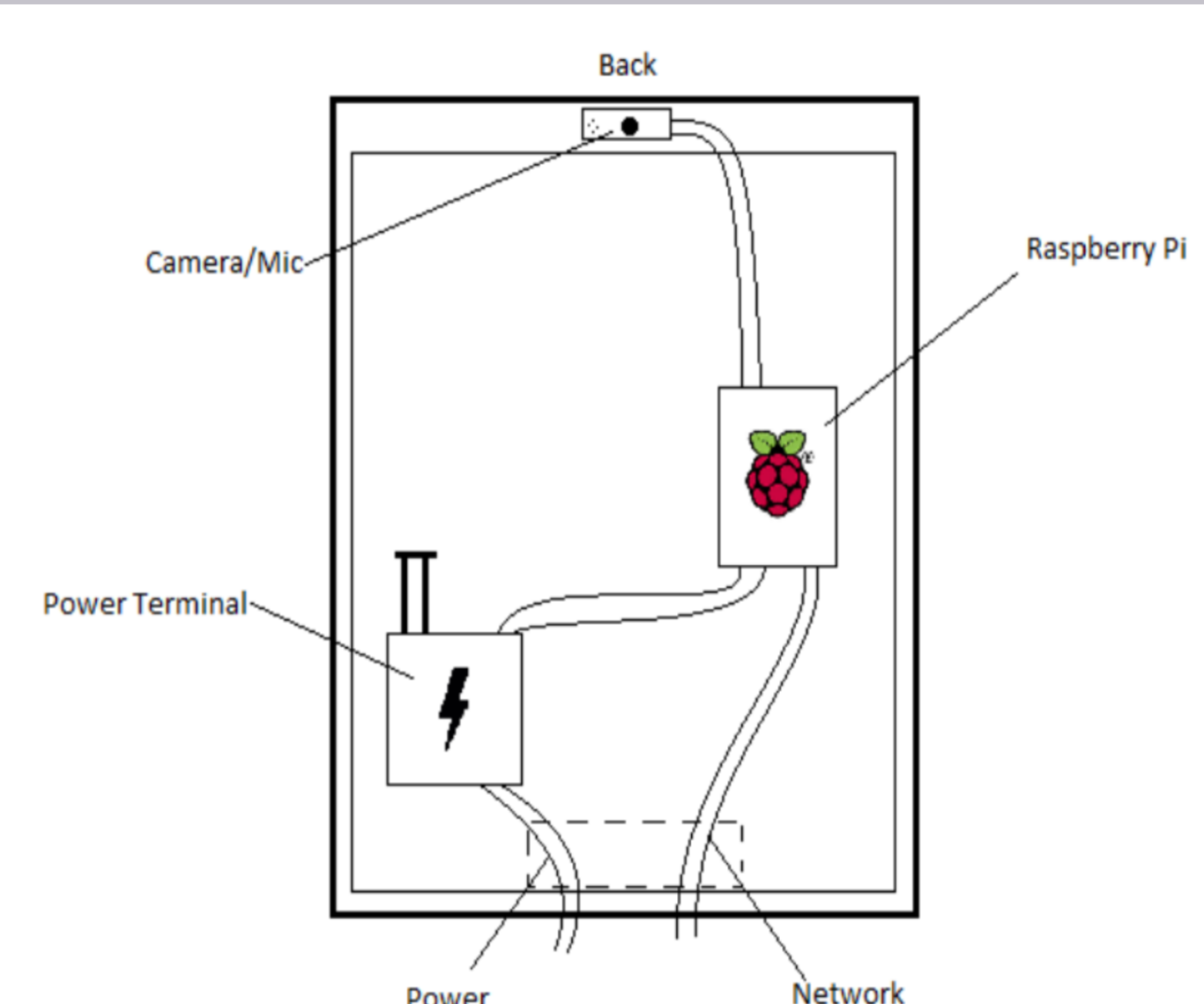
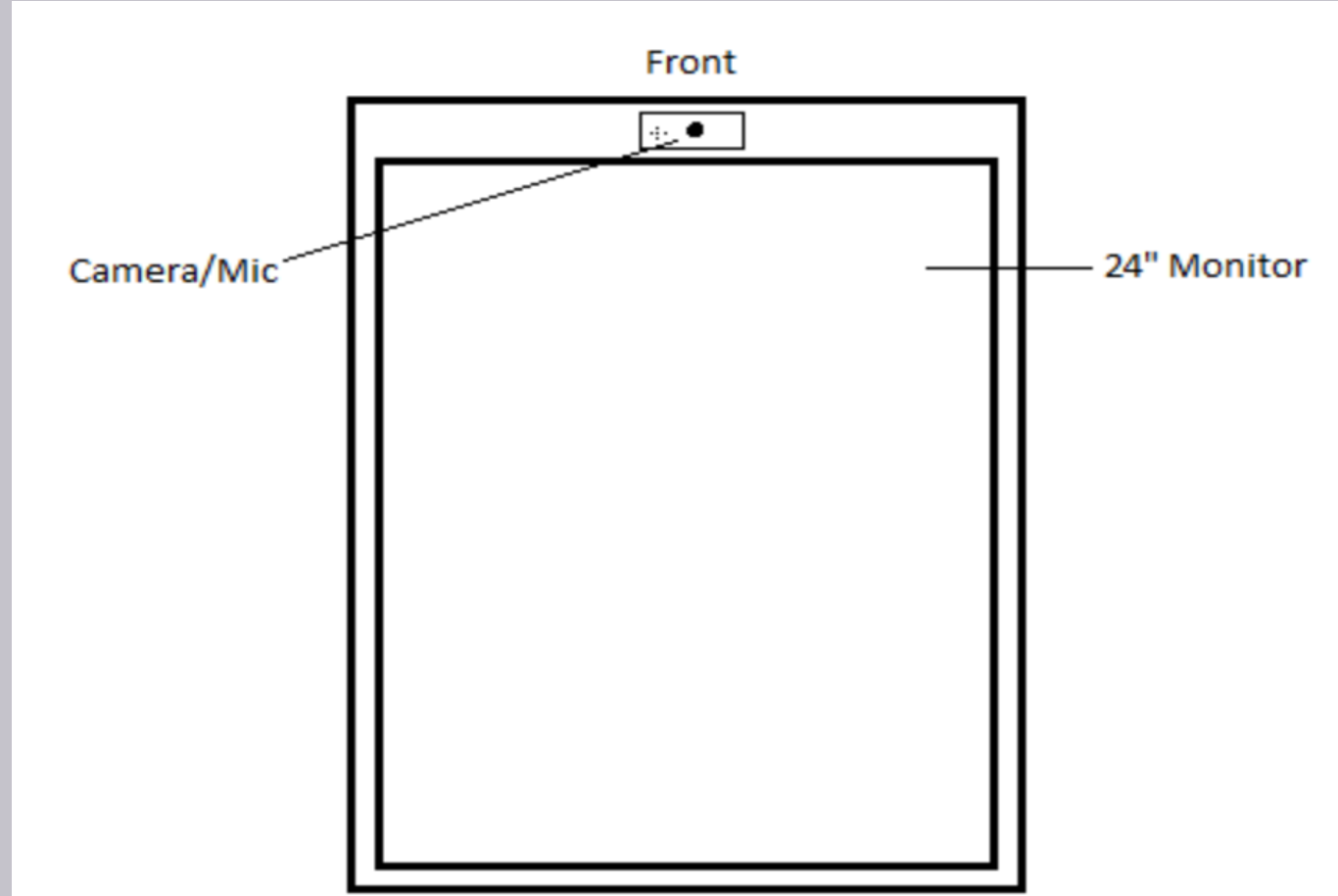
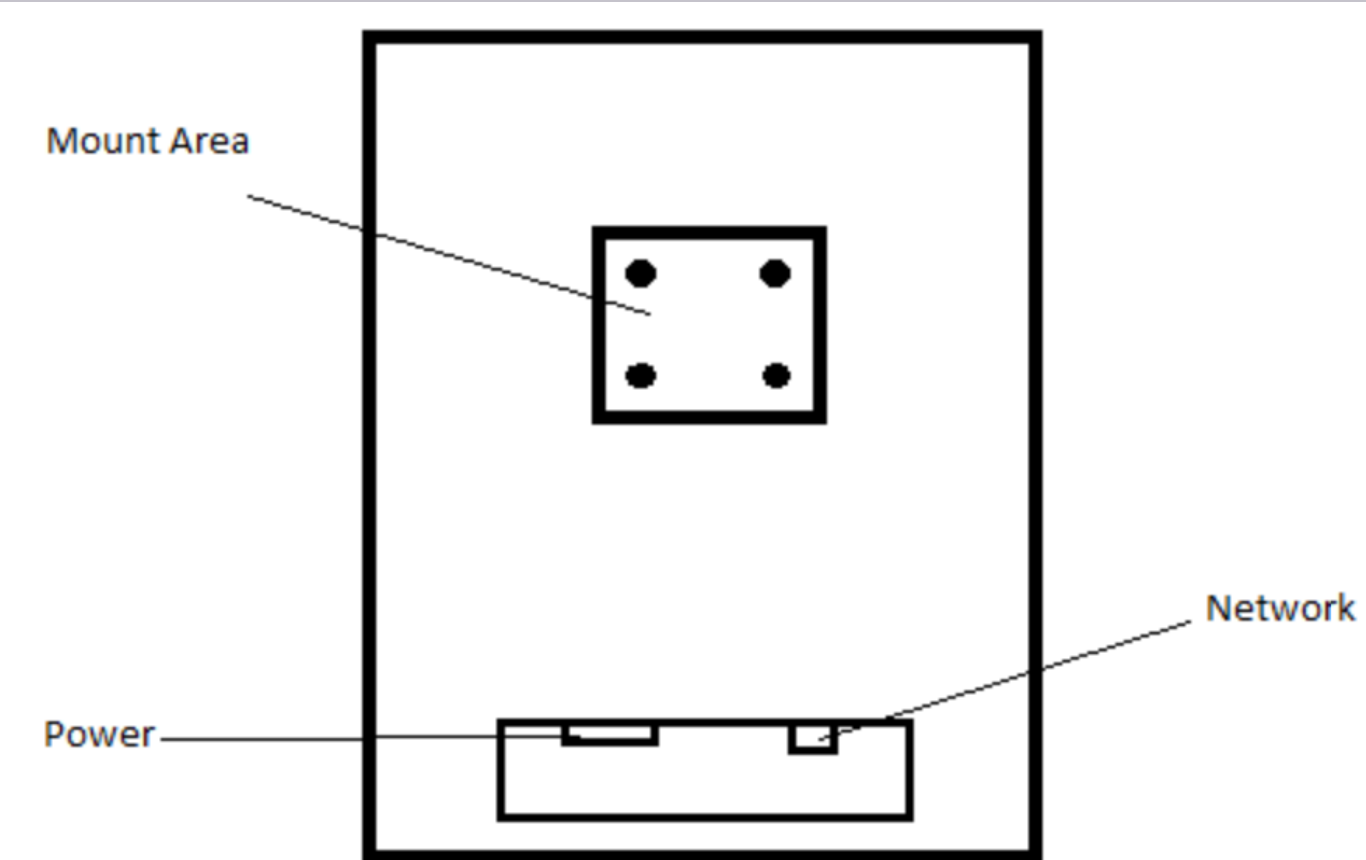


Figure 1: External Back Design Diagram (Top left)
Figure 2: Internal Front Design Diagram (Top right)
Figure 3: Internal Back Design Diagram (Bottom Left)

Our Development Process:

1. We configured the Magic Mirror v2 API to fit our purpose.
2. We created the companion application which feeds all of our users' information to our online database.
3. We configured the API to receive information from the database to ensure that the Smart Display matched the selected user configuration from the phone application.
4. We wrote and configured the facial recognition and speech recognition software to allow for hands-free control of the mirror.



Figure 4: The mirror's final assembly

Features and Operation:

- Our mirror features a default display of widgets for non-registered users and the ability to customize the display for registered users.
- The default widgets will include things such as: weather, news/sports updates, date and time, compliments, etc.
- Registered users can log into their user account with their Google credentials and customize what widgets they would like on the screen and where they would like them.
- The app will also allow new users to register their face with the mirror by using the mirror's camera to take pictures of them.
- Once a user is registered, the facial recognition software will automatically log them in to their account and pull up their custom display.
- To ensure a hands-free, day-to-day experience, the mirror will accept vocal commands to select between a user's saved configurations and, to wake or sleep the mirror.
- In our design process, we made sure that what we ended with would feel like a project not a program. The combined functionality of our mirror does just that.

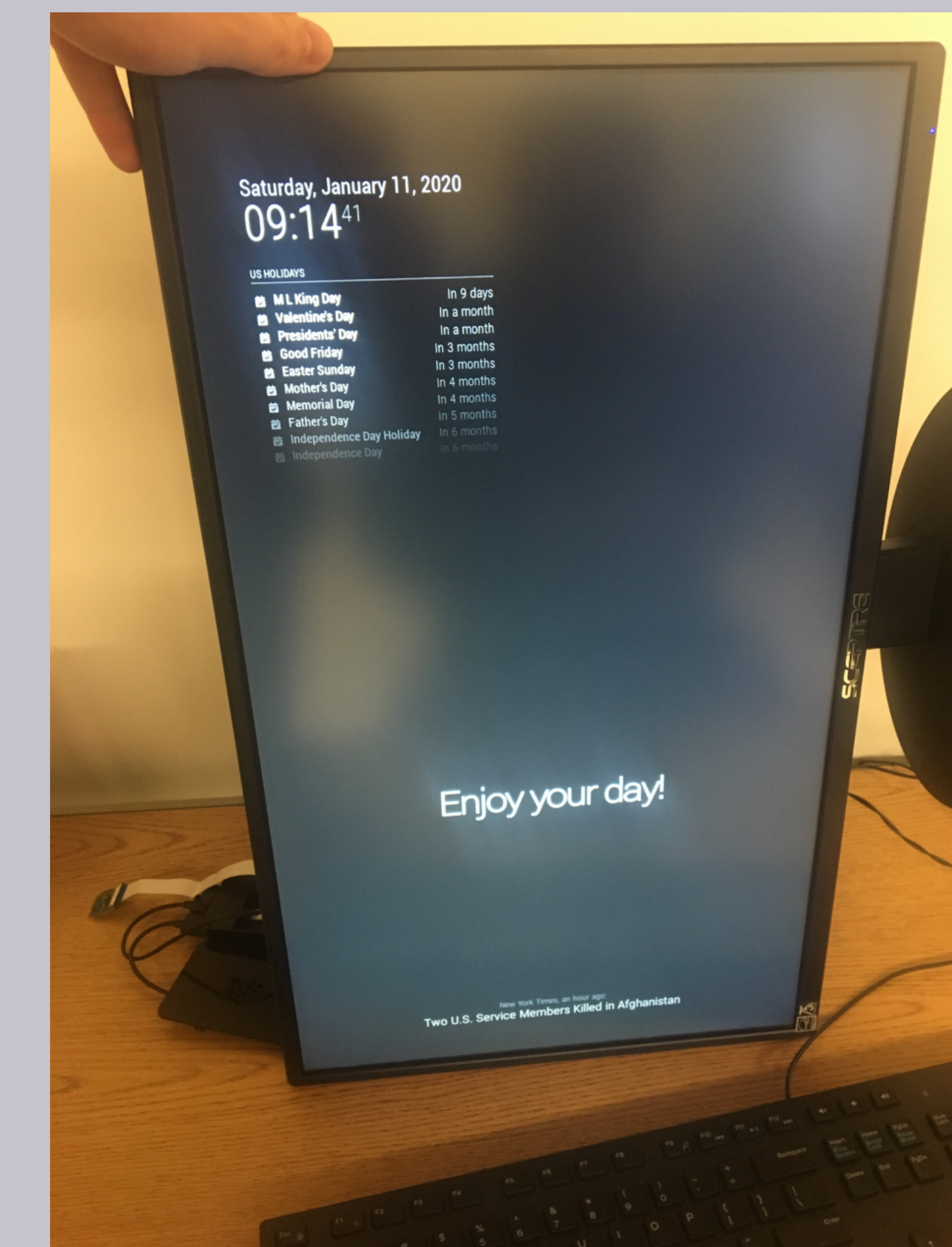


Figure 5: This shows the default configuration of the Smart Mirror Display.

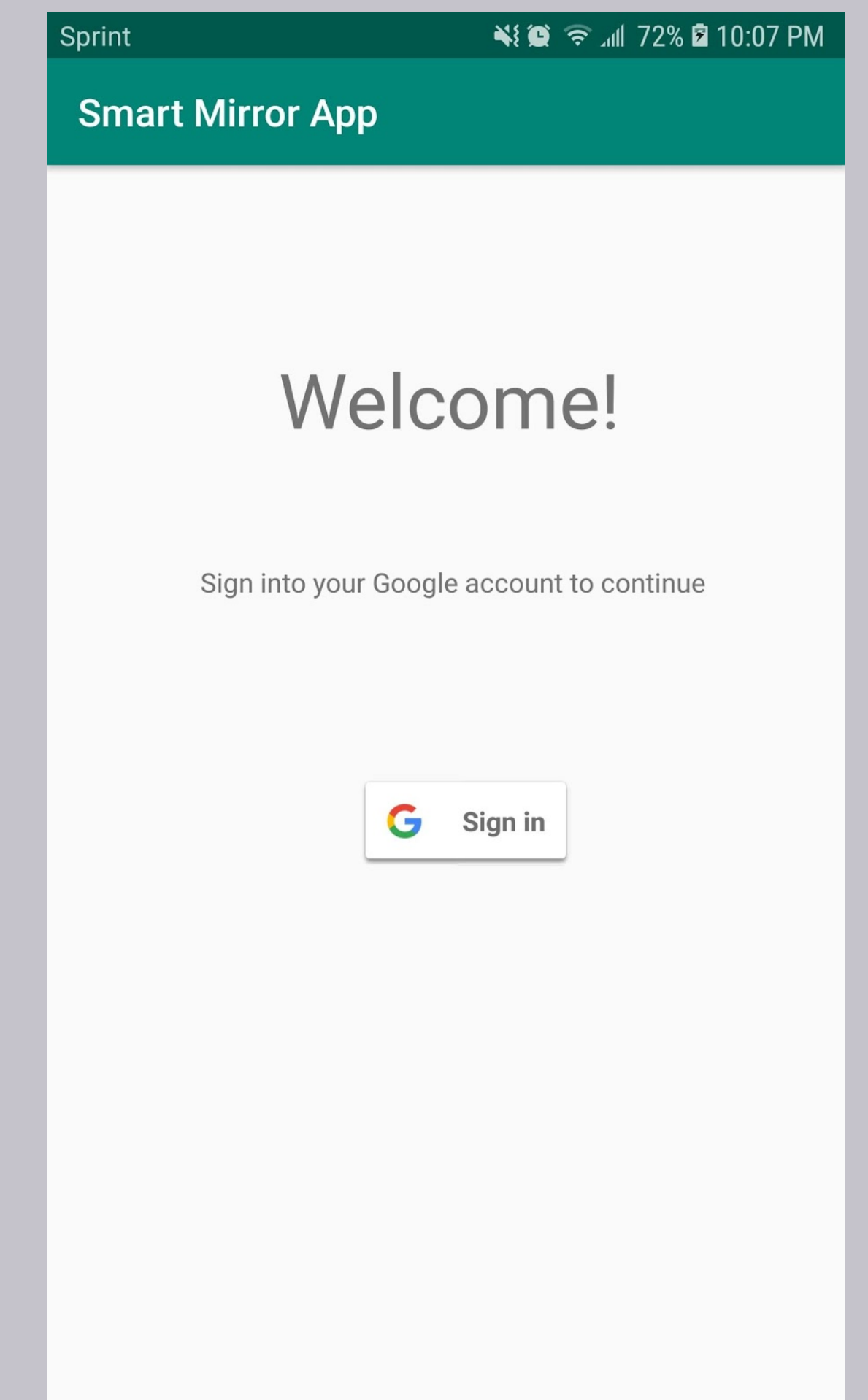


Figure 6: The welcome screen for our companion app.

Conclusion:

Our team was set back by the sudden suspension to our project, but we were able to get all our individual subsystems done and begin some integration. We were able to detect certain key phrases as well as identify people based on their face. In terms of the mirror's display, we were able to not only display what we wanted but also connect it to our database so it would display the chosen profile based of our app. Overall, we are very proud of the progress we made and while it was not a finished project it did showcase quite a varying bit of technology.

Completing the Project:

The following are steps to complete the Smart Mirror Project:

- Put hardware components together
- Mount completed mirror on the wall
- Integrate the speech recognition and face recognition with the other subsystems