

ECE1778 Creative Applications for Mobile Devices

# PublicProtector

Final Report

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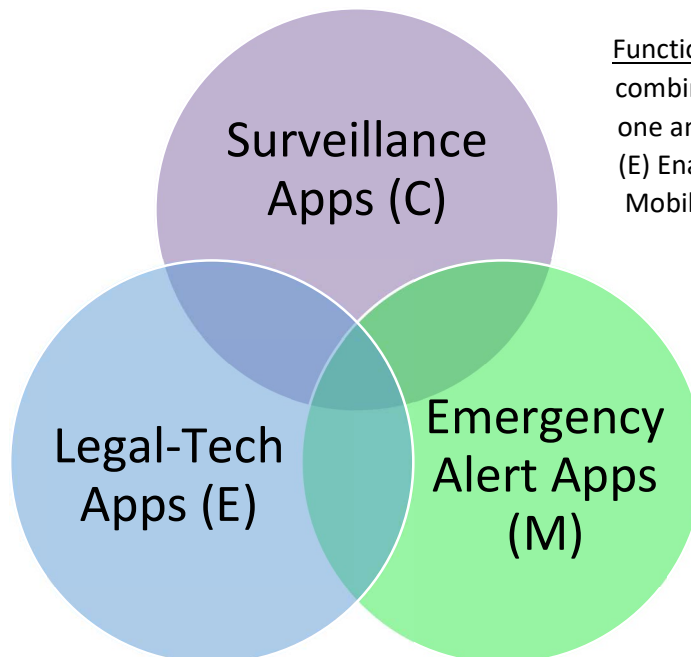
# Introduction

The goal of the 'PublicProtector' App is the prevention of police brutality in the context of an inspection, detention, and arrest of a user. In the longer term of the systemic use of the App by vulnerable groups, the intent is to reduce the discrimination, racial profiling, and biased use of unnecessary force by police, as the consequential effect from a thorough civil oversight of every instance of misconduct of the law enforcement agency.

We have identified three emergency alert apps (My SOS Family, SOS Alert, Emergency Alert) which focus on the alert function primarily for seeking help in emergency situations, and four "personal lawyer" apps (Lawyer, My Lawyer, Personal Lawyer, Ask Lawyer), on the other hand, which focused mainly on the client-lawyer communication in a form of request/response with apparently significant delay and no clear timelines for response; none of those legal-tech apps had a function of the emergency alert in the moment of interaction with the police.

So we came to the conclusion about a possible gap for a specific 'PublicProtector' app that will focus on protecting the citizen's rights in the moment of their interaction with the police and thereafter (Diagram 1 below).

Diagram 1. 'Emergency Mode' gap in the Legal-Tech Apps



Functional Gap: None of these Apps combine the necessary elements of one another: (C) Capture evidence, (E) Enable immediate legal aid, (M) Mobilize resources to support the suffering party

It is remarkable that the Emergency Alert Apps do not seem to purport to utilize many of the measuring and constant monitoring capabilities of the modern mobile devices (microphone, accelerometer, gyroscope, the other internal and external sensors). In

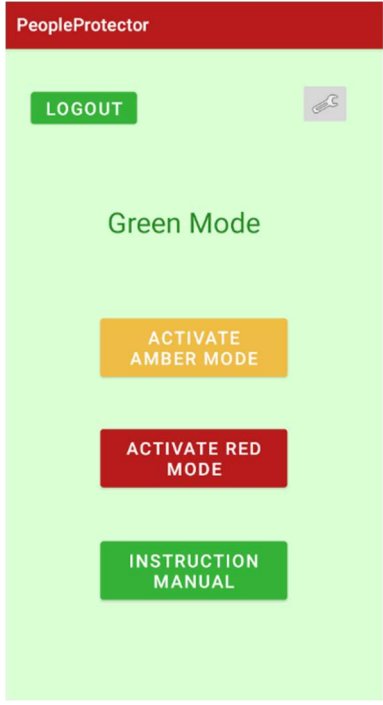
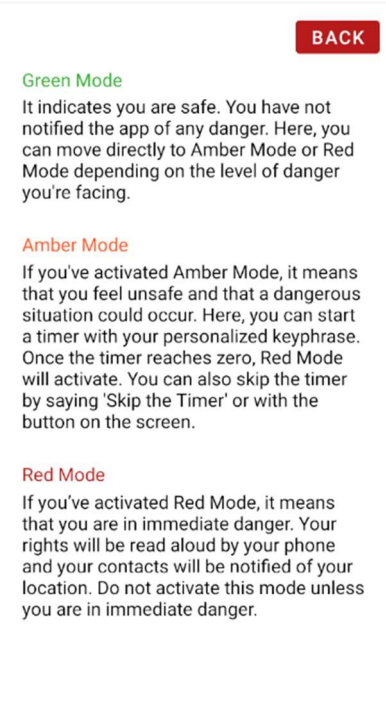
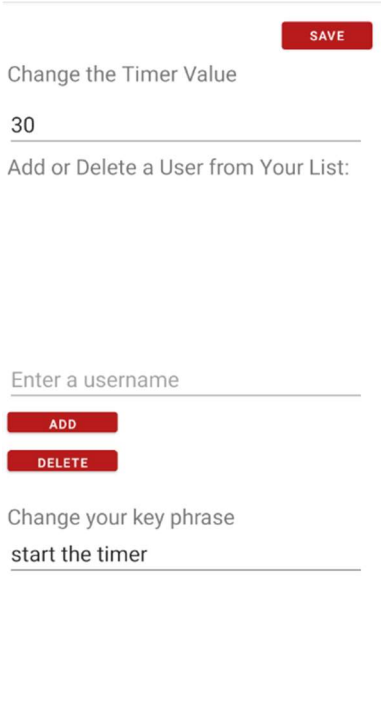
this project, we limited the scope of work with sensors to only one essential function of capturing the voice signal to activate the alert.

## Statement of Functionality & Screen Shots from App

The main functionalities of the app revolve around voice recognition and location sharing. The below figures present the ways in which the user can interact with the app functionalities.

### Green Mode

Figure 1. Green Mode Pages

| Green Mode   | Instruction Manual  | Settings   |
|--|---|--|
|  |  |  |

If the user feels safe, he/she can be in Green Mode to reflect that state. In this mode, as seen in the figure above, one can access the instruction manual that shows how the app can be used and the settings page that allows the user to change the timer value, contact list, and the key phrase that would be used to activate the timer in amber mode. The changes would be reflected in the other modes. If needed, depending on the seriousness of the situation that the user is in, one can activate either the amber mode or the red mode.

## Amber & Red Mode - Victim's Perspective

Figure 2. Amber and Red Mode from Victim's Perspective

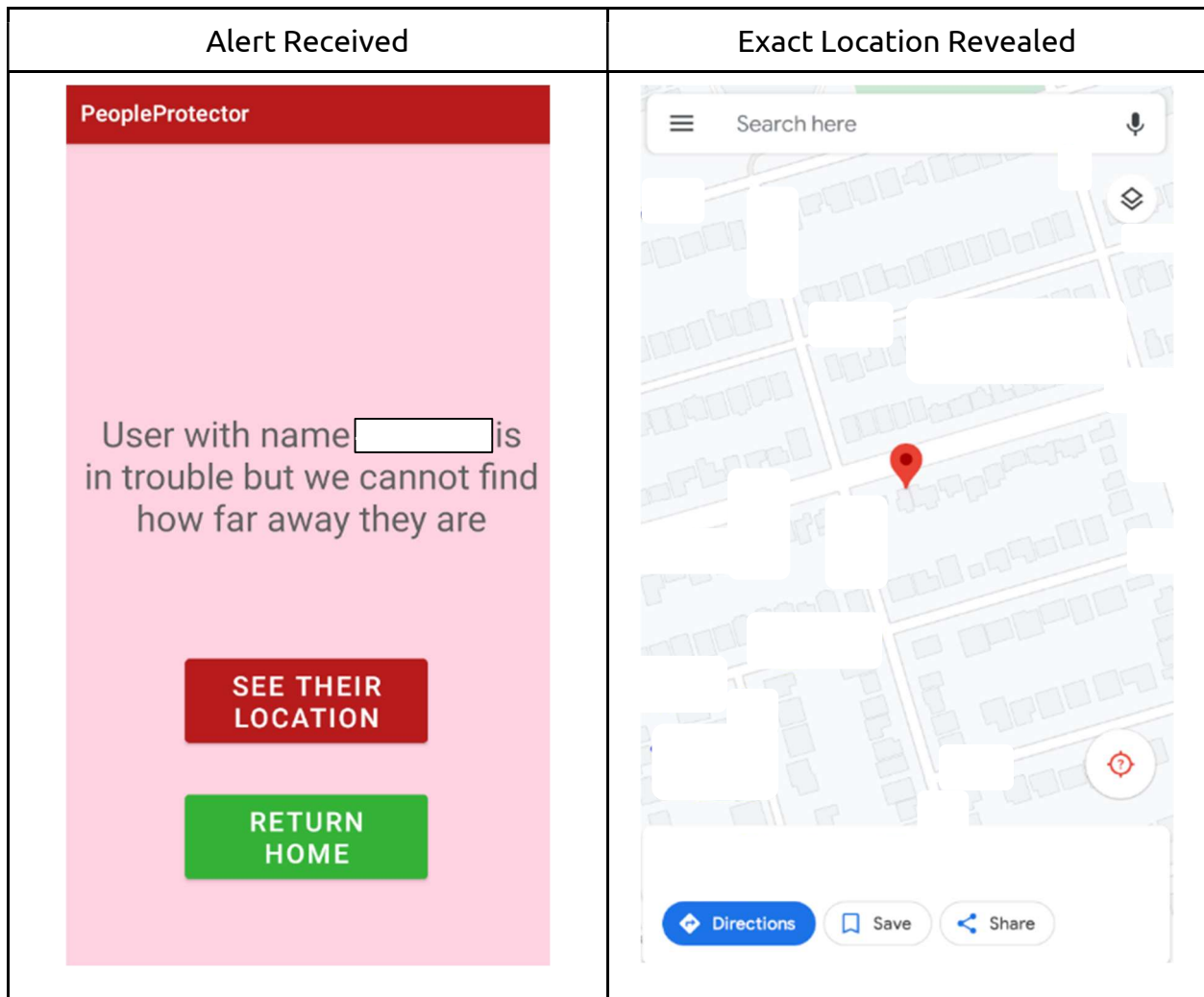
| Amber Mode - Listening | Amber Mode - Timer | Red Mode - Contacts Notified |
|------------------------|--------------------|------------------------------|
|                        |                    |                              |

Amber Mode is activated from Green Mode when the user feels uncomfortable with the situation that he/she is in and thinks that there could be potential danger to his or her well-being due to an unjust treatment from the authority. Once the "Activate Amber Mode" button is pressed in Green Mode, the app transitions into Amber Mode's listening state. In this state, the app actively listens for the key phrase that was set/changed in Green Mode's settings page. Amber Mode was put in place in order to give the user some time to decide whether the situation he/she is in, is in fact serious. Once the app detects the phrase, it triggers the timer, when the user has a predetermined amount of time to either activate Red Mode or cancel the activation if the situation doesn't escalate. The user can skip the timer and go straight into Red Mode if he/she feels immediate danger. When the app transitions to Red Mode, it notifies the people in the user's contact list of his/her location and reads out the legal rights of the user. The purpose of the audio-intervention is to de-escalate the conflict. Firstly, the audio sound should serve as a confirmation to the user that the App has activated the Red Mode, and that help is on the way. Secondly, it serves as a reminder

of the human rights standards and practice for the police officers so that it can appeal to their existing knowledge about their code of conduct. The next section shows the app from the perspective of one of the people in the user's contact list.

## Red Mode - Alert Receiver's Perspective

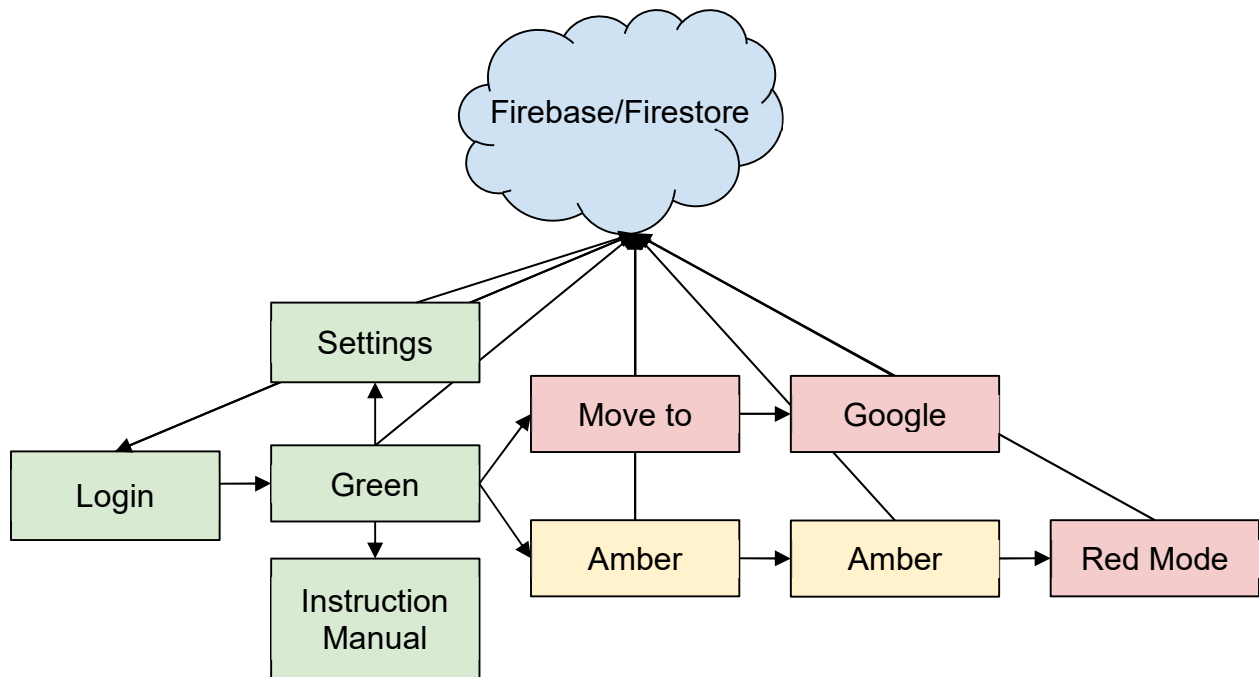
Figure 3. Red Mode from Receiver's Perspective



The notification on the left shows up when someone that the user knows is in danger and has activated Red Mode. The notification shows the distance in kilometers to that person if both users share their location (the screenshot above illustrates one-way location sharing so that the other user's location is protected).

# Overall Design

Figure 4. Block Diagram



## Login

This block deals with authorizing existing users and registering new users. Firebase authorization is used to create and manage accounts, and Firestore is used to manage other account information.

## Settings

In the settings page, the user can adjust the timer value, add/remove users from their contact list, and change the key phrase that is used to activate the timer. All of this information is stored under the users unique ID in Firestore.

## Green mode

Green mode is an indication that the user is safe. In this mode, the user can choose to logout, move to the settings page, view the instruction manual, move directly to red mode, or move to amber mode.

## Instruction Manual

This page gives a breakdown of the purpose of each mode in the app.

### Amber Mode Listening

Here, the app is running a speech-to-text API in the background that constantly listens for the key phrase the user has chosen. It grabs the key phrase from Firestore. Once it detects that the key phrase has been spoken, the app moves to the amber mode timer page. The user can also move to the amber mode timer page with the press of a button.

### Amber Mode Timer

This page grabs the user's timer value from Firestore and begins a countdown to zero from that value. Upon reaching zero, the app moves to red mode. The same speech-to-text API from the amber mode listening is also used here to detect the phrase 'skip the timer' which will also move the app to red mode. The user can also cancel the operation and move back to green mode with the click of a button.

### Red Mode

In this mode, an API is used to grab the last known coordinates of the user. This information, along with the user's username which is obtained through Firestore, is packaged into a message, and sent to the users in the contact list. The user can return to green mode from here with a button press.

### Move to Google Maps

This page activates when a user receives a message that someone is in trouble. The message contains the coordinates and the username of the user in trouble. This information, along with the current user's coordinates, are used to display a message containing the username of the person in trouble, and the distance between the two users. There is also an option here to see the user's location in google maps.

## Google Maps

This page is activated from a google API. The API takes coordinates and drops a pin on the given location. In this case, it is the location of the user in trouble.

## Firestore/Firebase

This is where all the information not directly used for authorization is stored. It includes the contact lists, timer values, usernames, key phrases, and emails for all users.

## Reflection: What did you learn - What would you do differently?

### **Specialist**

The key learnings are preparation, early engagement with the users, more iterations and back-up to mitigate the risks from the 3rd party software.

The proper demonstration of the app with the two devices was requiring better equipment: an external HD camera, extra phone, and the setting with the right lighting to allow for perfect quality of video recording.

I would engage with the users earlier in the process and make more iterations with them at the stage of mid-fidelity non-clickable prototype to get more insight about the functions in need.

I would make more iterations with the mock-ups, or maquettes.

To mitigate the risks from the 3rd party software like zoom, and any other multiple apps installed on my device, I would make a solid backup plan, such as a full storyboard with screenshots and video recording for the demo part of the presentation.

I have learned how to interact with the developers and to run the code on my phone with git, GitHub, and Android Studio. It was exciting to work with the color palette and apply the UI design skills to draw the interface in Figma and then transport it into the layouts in xml files.

### **Programmers**

As students in ECE, the focus of our projects has always been code readability and functionality. Rarely did we have to take into consideration the user experience of our end project. This course forced us to do exactly that. We had to tackle problems from



the viewpoint that a user will eventually be using this app, and implement functionality that would be useful and intuitive for them.

If we could go back and change our approach, we would put more effort into the planning process on our end. We designed the functionalities first without regard for the assembly of the code. Because of this, we had to change the outline significantly when it came time to complete the application.

Another new experience for us was working with a specialist who did not come from an engineering background. We had to rethink the way we communicated various ideas to accommodate for this. Overall, what we learned went beyond just the technical skills of writing an application.

## Contribution by Each Group Member

### Specialist (Andrei)

- User Research
- Storyboards (“as-is” and “to-be” scenarios)
- Wireframes (Medium-Fidelity Prototypes)
- Hi-Fidelity User Interface
- Usability Survey
- Feedback from Users and Experts

### Programmer (Anonymous Student)

- Getting location and determining distance between users
- Creating a countdown timer that performs an action when the timer reaches zero
- Opening the location in google maps
- Authorization functionalities
- Integration of all functionalities into the app as a whole (joint)

### Programmer (Anonymous Student)

- Enabling speech to text to run as a background process
- Changing the key phrase for speech-to-text and timer value
- Push notifications to users on a contact list that passes relevant user information for the alert
- Text to speech
- Integration of all functionalities into the app as a whole (joint)

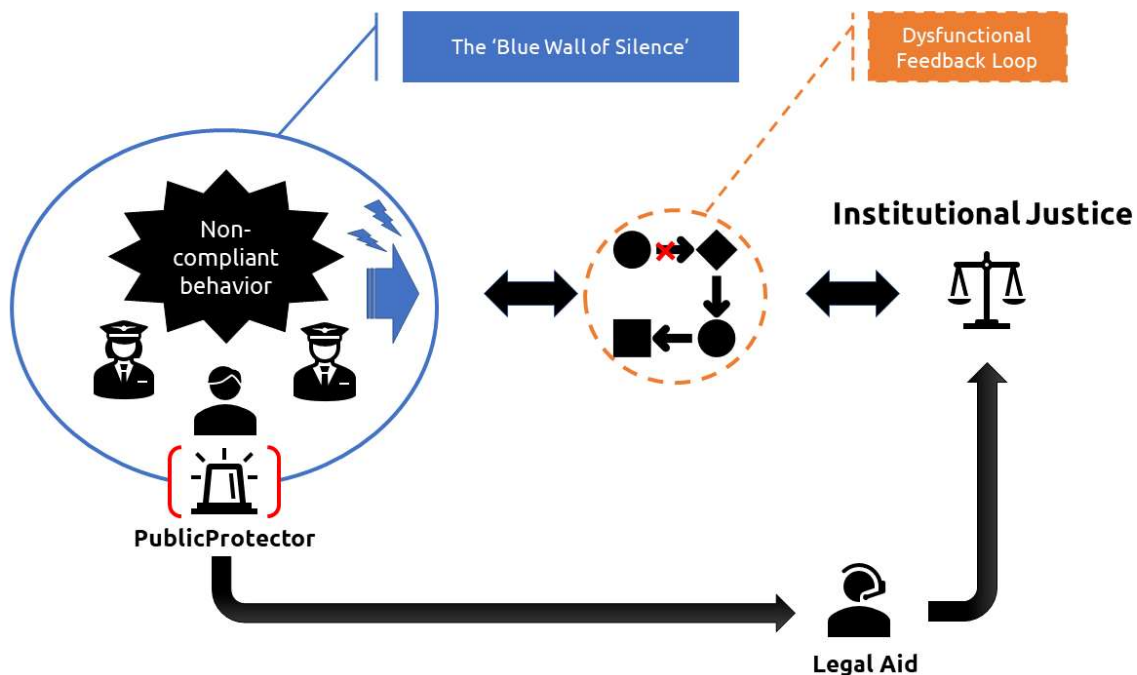
## Specialist Context

James Albrecht, a law enforcement expert, explains the cases of police agents' inclination "to inflict guilt-free physical punishment" primarily with trait theory, and social learning theory (Albrecht 2017, p.30). "The blue wall of silence" (Id.), a phenomenon of "the subcultural custom" among the members of the dangerous professions, causes the unwillingness to report the "unacceptable incidents" by colleagues (Id., p.32-33) and hinders the feedback loop which would otherwise allow to address the issue.

Squillacote and Feldman argue that such measures as internal investigations by the Department of Justice, introduction of police body cameras are "insufficient" for effective reform and put forward an idea of "civilian surveillance such as Cop Watch" as a "more effective" remedy (Squillacote, Feldman, 2018).

The PublicProtector App can serve as a means of the "civilian surveillance" by sending the Emergency alert to the support network of the affected individual (Diagram 2). The effect from regular reporting may be achieved with the mass use of the PublicProtector App to the point when the law enforcement agent will know that their behaviour is under future civilian oversight when they hear the audio intervention from the App reading out loud, for example, an excerpt from the "Human Rights Standards and Practice for the Police" (4).

Diagram 2. Breaking the 'Blue Wall of Silence'.



As part of the secondary research, we have analyzed the tragic death of George Floyd (1). The reporter admitted that “we don’t know exactly why” the officer decided to “pull his gun” however there was no evidence of George’s resistance to the police. It has been challenged in a courtroom whether the subsequent use of force was justified (2).

The purpose of the application is that neither the detainee nor the police need to resort to the use of force.

Having heard the audio-intervention by the app, the user would have confidence that the incident is being reported, and there is no need to resist.

The hypotheses (a-c) were based on the anticipated awareness of the police about the use of force in the context of the of the deaths of George Floyd (1) and Daunte Wright (3).

(a): the mention of the “human rights practice for the police” should trigger in the agents’ mind the apparatus from the training about the standards of the use of force.

(b): the fact that the appellation to these standards is being made not by the detained person but by a third party should serve to reduce the mental rejection.

(c): the “second guess” that the app which can switch on by a voice command could also record and report everything in the real time should motivate the agents to act in compliance with their regulations. As mentioned above, a broad practice of civilian complaints and subsequent investigations should help strengthen this causal relationship.

Even if the law enforcement agent has reasonable doubt and decides to use force, the user should know that everything is being recorded and reported to the Legal Aid (a function for future work).

## Future Work

The main objective for future steps would be to get the app out the window; therefore, we wish to add crowdfunding functionality so that the community of the users could support further development of the app. Hopefully, this will enable us to publish the app as soon as possible to Google Play Store. Once the basic functionalities that the app currently has have been optimized, next steps would be to use different sensors such as microphone and camera to capture evidence, and to send the recordings to Legal Aid. When all these functionalities are established, adding more languages to the app would be helpful for deploying the app to different countries.

## Permission for publication on the Course Website:

We, two anonymous students as programmers and Andrei Gulnev as specialist, give our permission to publish the materials (1-3 as specified below) for the education purposes:

1. Video of final presentation: yes
2. Report: yes
3. Source code: yes

# References and Bibliography

References and Bibliography were compiled in line with the Canadian Guide to Uniform Legal Citation 9<sup>th</sup> edition (McGill Guide).

## References

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2. Dewan, Shaila & Tim Arango, "In Early Testimony for Defense, Witness Says Chauvin's Force Was 'Justified'", The New York Times (14 April 2021), online: <<https://www.nytimes.com/2021/04/13/us/george-floyd-derek-chauvin-trial-defense.html>>.
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