

# Unified Transportation at UNC Charlotte

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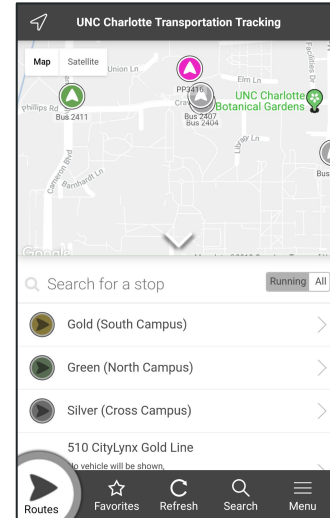
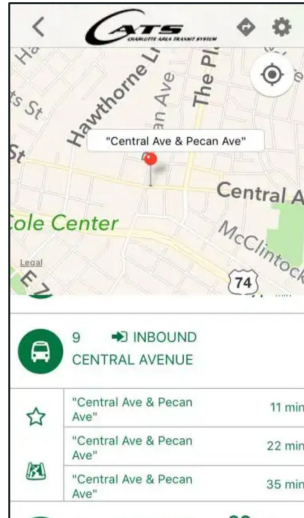
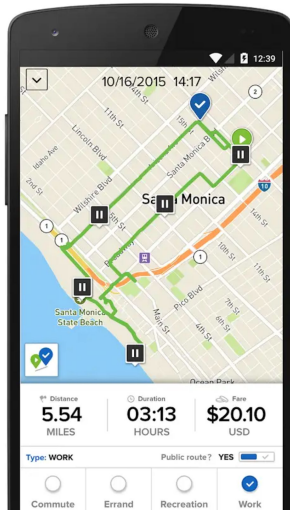
ITIS 6400/8400 Human Computer Interaction

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November 5th, 2018

# The Problem

There are many diverse methods of transportation offered in and around UNC Charlotte, but navigating the campus quickly and efficiently involves managing a number of separate applications which each host their own problems and usability pain points.



# User Goals

- Arrive to class on time
- Be aware of traffic, accidents, or other delays
- Use available transportation easily and effectively
- Be well-informed during route navigation
- Have multiple transportation options available

# Usability Goals

Our application should be...

- responsive (across device sizes)
- cross-platform (across types of devices)
- accessible
- usable indoors and outdoors
- intuitive for new users
- efficient for existing users

# Design Goals

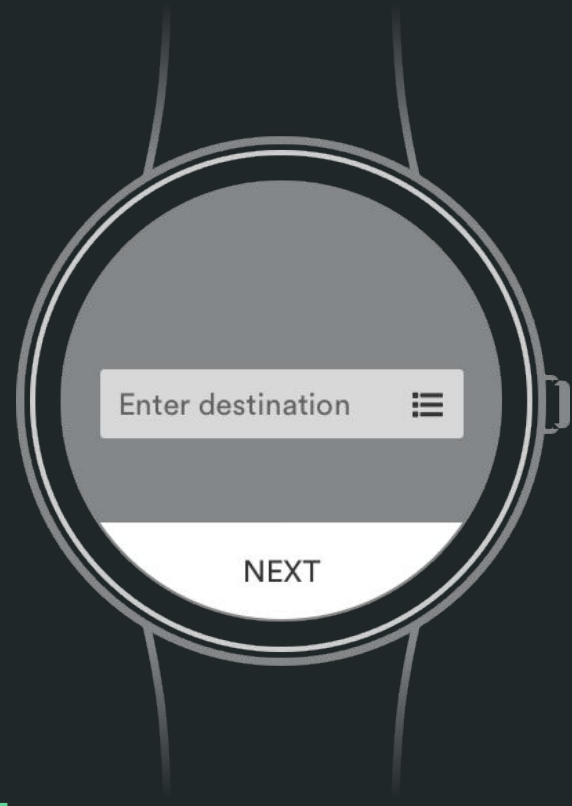
- Users can receive route guidance for a route which requires multiple transportation methods via one single application
- Users can quickly find the best route to various locations on campus
- Users can compare the travel times and availability of various transportation methods available on campus
- Users can be well-informed of en-route information via notifications
- System can automatically make predictions about helpful route guidance information

# Design Concepts

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# Concept 1

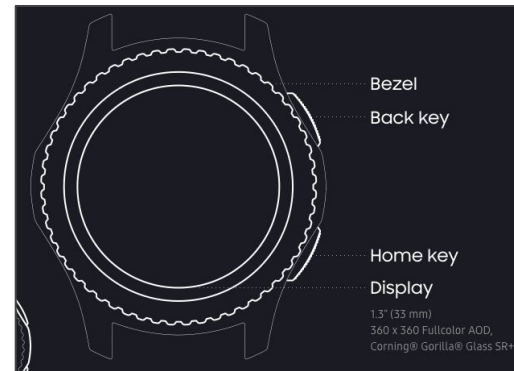
Smartwatch Application



# About Samsung Smartwatches

## Device features:

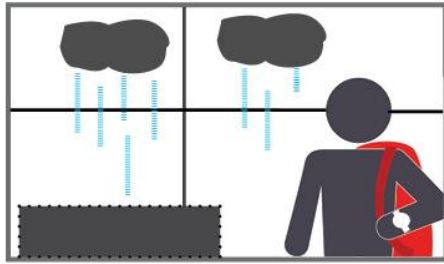
- Bezel that can be turned to scroll through screens
- Touch screen interface
- Haptic feedback
- Built-in microphone, speaker, and GPS
- Two tangible buttons, “back” and “home”
- Water and dust resistant



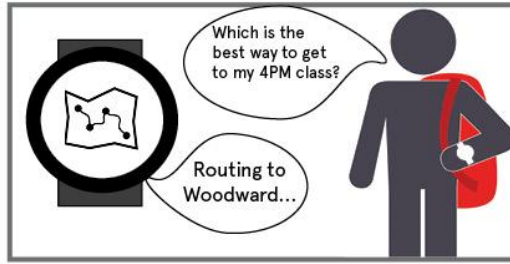


# Application Features

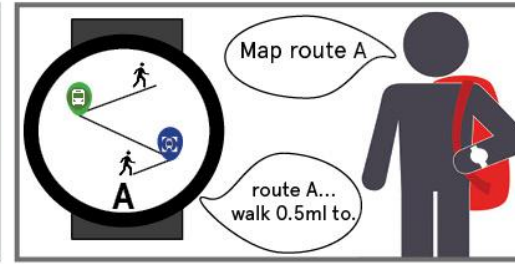
- Simple interface for achieving primary user goals
- List of preprogrammed locations to choose as departure or destination
- Multiple input types, including: list selection, keyboard, and voice
- Real-time alert notifications delivered via visual and haptic feedback
- Multiple route options displayed on separate screens which can be scrolled through by turning the bezel or swiping left / right
- En-route navigation, displayed step by step



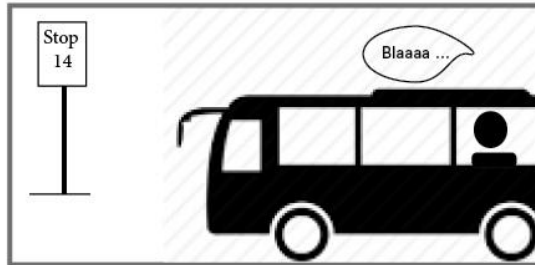
It is the first day of class for Alex a freshman at UNCC and is raining. He does not want to be late for his first class..



He downloaded all in one trans app the night before so he uses voice command to get the best route to get to his class on time...



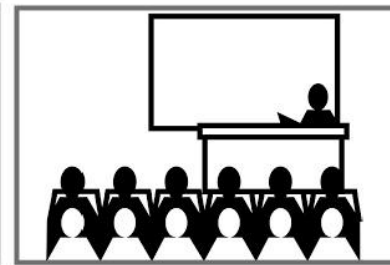
Alexander choses route A and the waterproof smart begins with the directions to UNCC...



While riding the bus Alex gets distracted by talking to a friend over the phone ...



Then his smart watch vibrates alerting Alex that his stop is coming soon. Alex notices the alert and requests his stop...



He gets to class on time thanks to the app's future of alerting when his stop is coming up.

**Storyboard:** The user uses voice command to get the best route to UNC Charlotte on a rainy day

# Wireframes

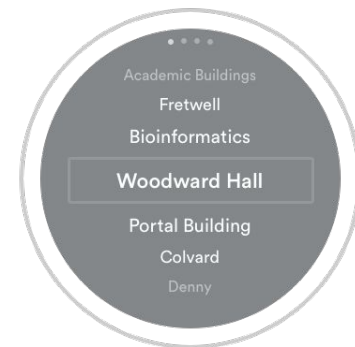
## “Enter destination” screen

When the application first opens, you are prompted to enter a destination. This can be accomplished via keyboard/voice input or selecting a preprogrammed location (next screen).



## “Select programmed destination” screen

By clicking the “list” icon on the previous screen, a list of preprogrammed locations is displayed. You can switch between types of locations by twisting the watch bezel or select a location by scrolling it into focus and pressing down.



# Wireframes

## “Enter destination with keyboard input” screen

Alternatively, by clicking the “Enter destination” input a keyboard input screen is displayed—with which you can type a location to search. Or, by turning the watch bezel you can use voice input.



## “Enter departure location” screen

Once a destination has been selected, you can enter a departure location (defaults to current location) using keyboard/voice input or selecting a preprogrammed location. Clicking “Next” will bring you to the next screen.



# Wireframes

## “Select route option” screen

On this screen, you can view the available route options side by side by twisting the watch bezel to switch through the multiple screens (see navigation dots). Once selecting the best route, you can click the “Start” button to begin navigation.



## “En-route navigation” screen

On this screen, you can see the upcoming stop on your route. Additionally, you can stop navigation by clicking the “Stop” button.



# Evaluation of Concept 1

## Pros

- Device is worn on wrist—application can be used hands-free
- Haptic feedback for notifications
- Multiple input types, including: list selection, keyboard, and voice
- Waterproof display is useful during inclement weather

## Cons

- Interacting with touchscreen can become tiring on the user's arm
- Screen size is very small
- The simplified keyboard makes text entry frustrating and time-consuming
- Difficult to see entire route in detail
- Unable to edit user preferences

# Concept 2

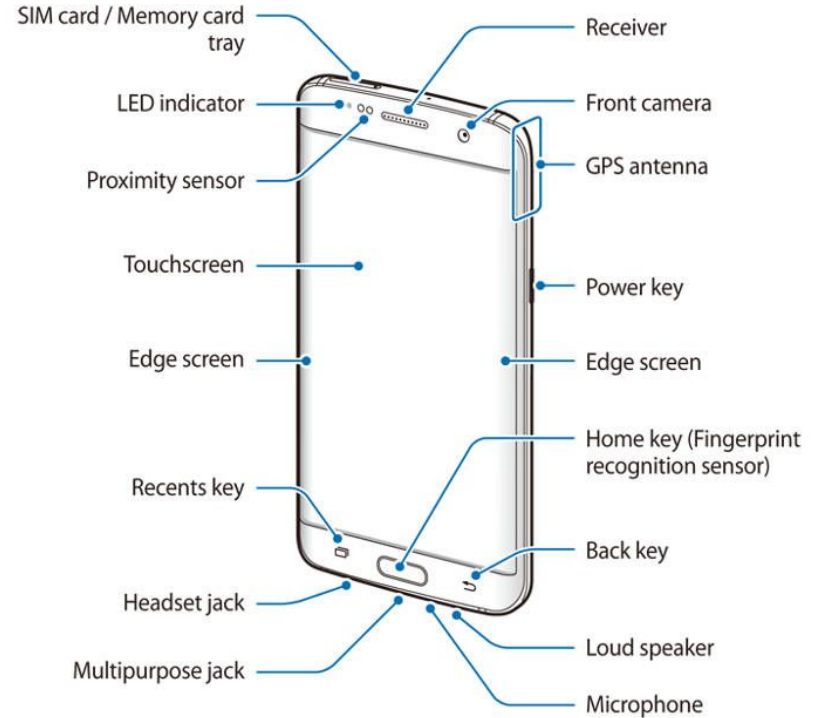
Smartphone Application



# About Smartphones

## Device features:

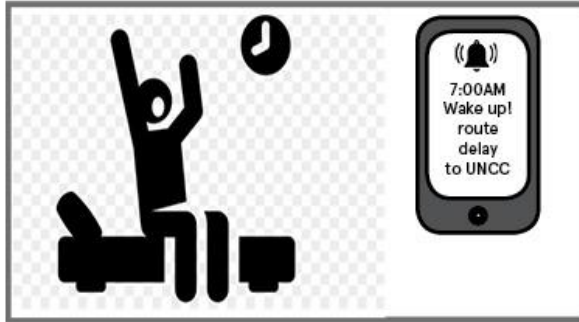
- Touch screen interface
- Full-size keyboard and voice input
- Built-in microphone, speaker, and GPS
- Universal digital buttons, “recent apps”, “home”, and “back”



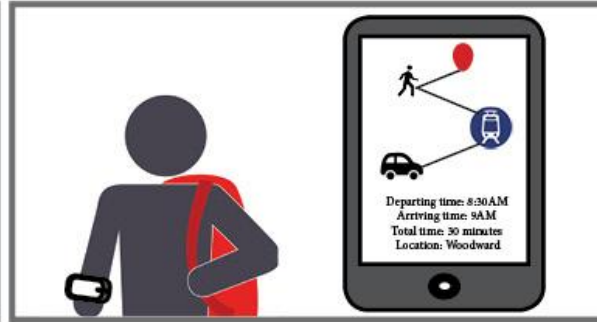


# Application Features

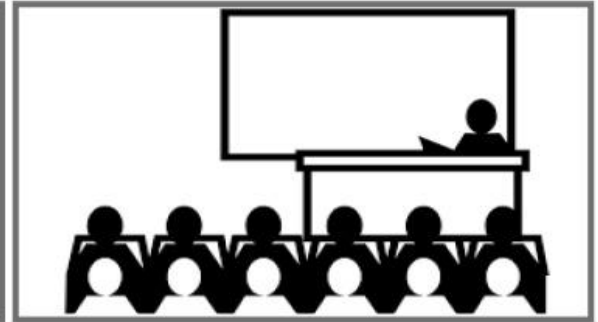
- Ability to register a user account and input preferences
- Visual map is displayed with location markers and building outlines
- List of preprogrammed locations to choose as departure or destination
- Multiple input types, including: list selection, keyboard, and voice
- Real-time alert notifications delivered via visual and audio feedback
- Full visual overview of route, including individual route segments
- En-route navigation, displayed step by step



The user is awoken earlier than usual by the app alert of a traffic delay on his route to UNCC...



The app shows the user the best route that avoids the traffic congestion and total time travel..



The user gets to class on time thanks to the app's alert.

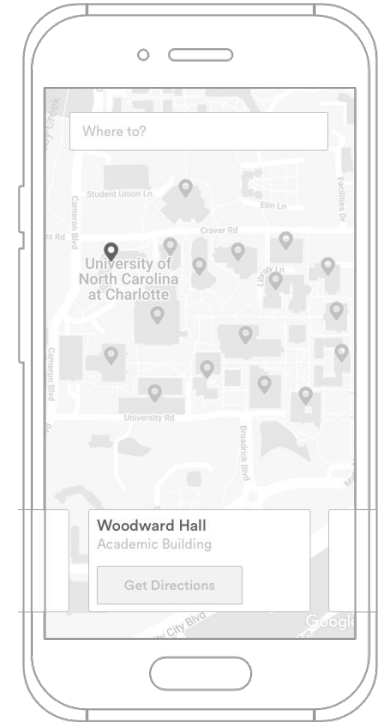
**Storyboard:** *The user gets an alert about traffic congestion on his route to UNC Charlotte*

# Wireframes

## “Select destination” screen

When the application first opens, markers appear for all the preprogrammed locations at UNC Charlotte; you can click on a marker to show it’s “info card” or swipe through the “info card list” at the bottom of the screen.

Additionally, you can click the “Where to?” input field which will bring you to the next screen.

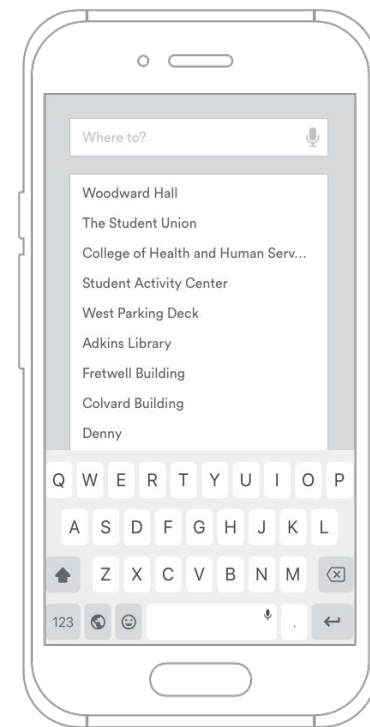


# Wireframes

## **“Search destination” screen**

On this screen, you can search an address or preprogrammed location by keyboard or voice input.

Selecting a destination will bring you to the next screen.

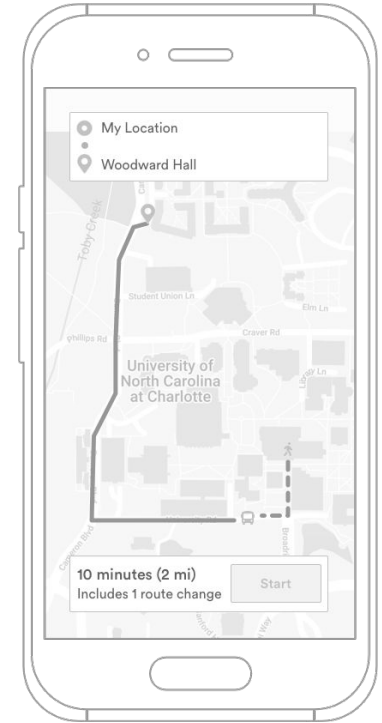


# Wireframes

## “Select route option” screen

On this screen, you can change your departure location (will always default to your current location) and select a route from the available routes provided. Each route is displayed in segments corresponding to the method of travel for that segment (i.e. dotted line for walking, solid line for bus). Additionally, an “info card” displays the travel time, distance, and number of route changes.

Once you are ready to select a route, click the “Start” button which will bring you to the next screen.



# Wireframes

## “En-route navigation” screen

On this screen, you can see the upcoming stop on your route, the time until that upcoming stop, and the final ETA time for your trip. Additionally, you can stop navigation by clicking the “close” icon.



# Wireframes

## “User preferences” screen

On this screen, you can edit the preferences for your user account, including adding entries to your schedule which will allow the application to suggest route guidance for you automatically based on the information you provide.

The wireframe illustrates a mobile application screen titled "User Preferences". It features a form with the following elements:

- Username:** A text input field containing the text "ethomp54".
- Password:** A text input field with a masked password "\*\*\*\*\*".
- Schedule:** A section containing three rows of input fields. Each row has a "Location" field followed by "Start" and "End" buttons.
- + Add another row:** A text link to add a new schedule entry.
- Save Changes:** A button at the bottom of the form.

# Evaluation of Concept 2

## Pros

- Multiple input types, including: list selection, keyboard, and voice
- Ability to register user account and input preferences
- Entire route is displayed in detail
- Many users already own a smartphone device

## Cons

- Application requires the use of hands, unless relying on audio only
- Device is not waterproof (without the use of an accessory)
- User cannot view directions while also looking at the path ahead



# Concept 3

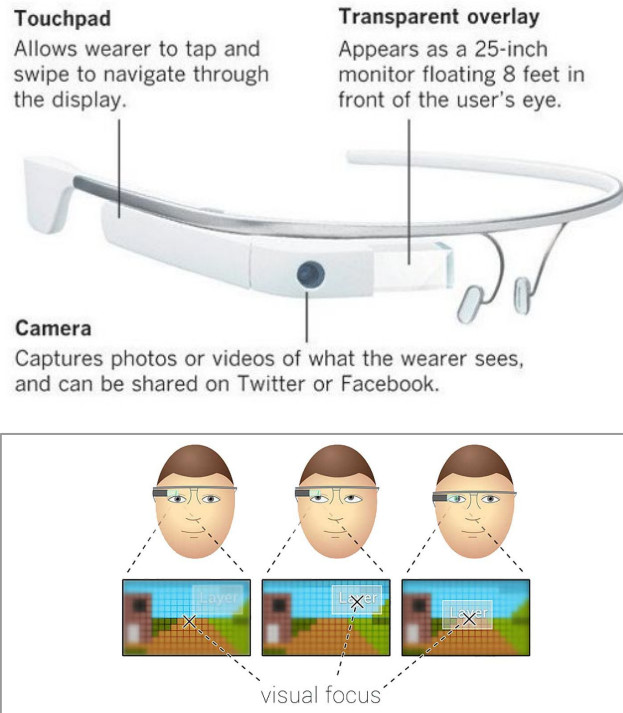
Augmented Reality Glasses  
(Google Glass) Application



# About Google Glass

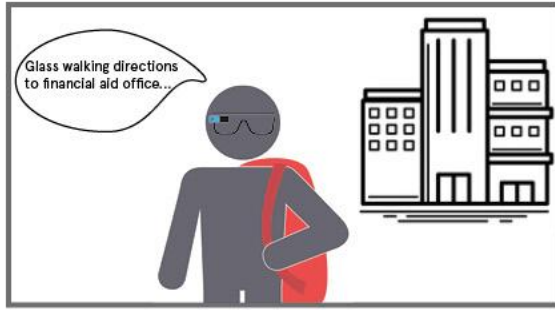
## Device features:

- Transparent interface overlay
- Voice input
- Built-in microphone, speaker, and GPS
- Google “glass” assistant
- Touchpad which supports swiping and clicking
- Can be worn over glasses

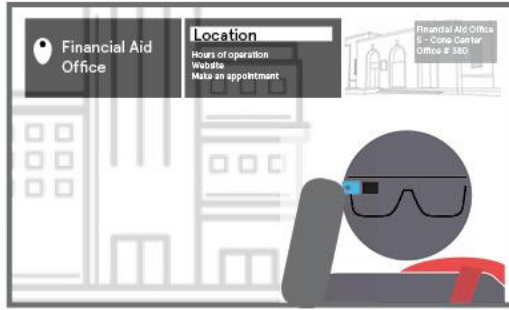


# Application Features

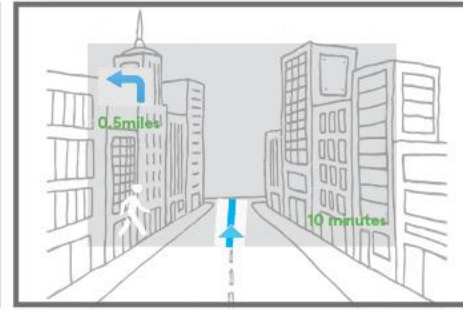
- Simplified interface to achieve primary user goals
- Location search via voice input
- Real-time alert notifications delivered via visual and audio feedback
- En-route navigation, displayed step by step on transparent interface which means directions are always right in front of the user



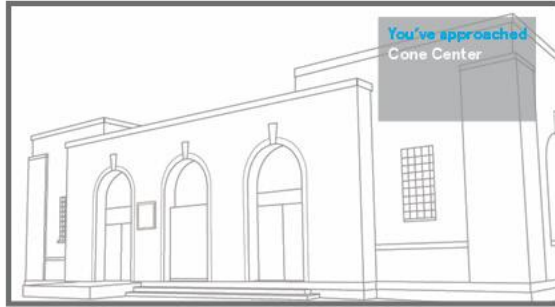
Alexander a freshman at UNCC needs to go to the Financial AID office for the first time. He uses voice command to get walking directions from his location...



Alexander scrolls through the app to obtain the location details...



Alexander is walking to the Financial Aid office..



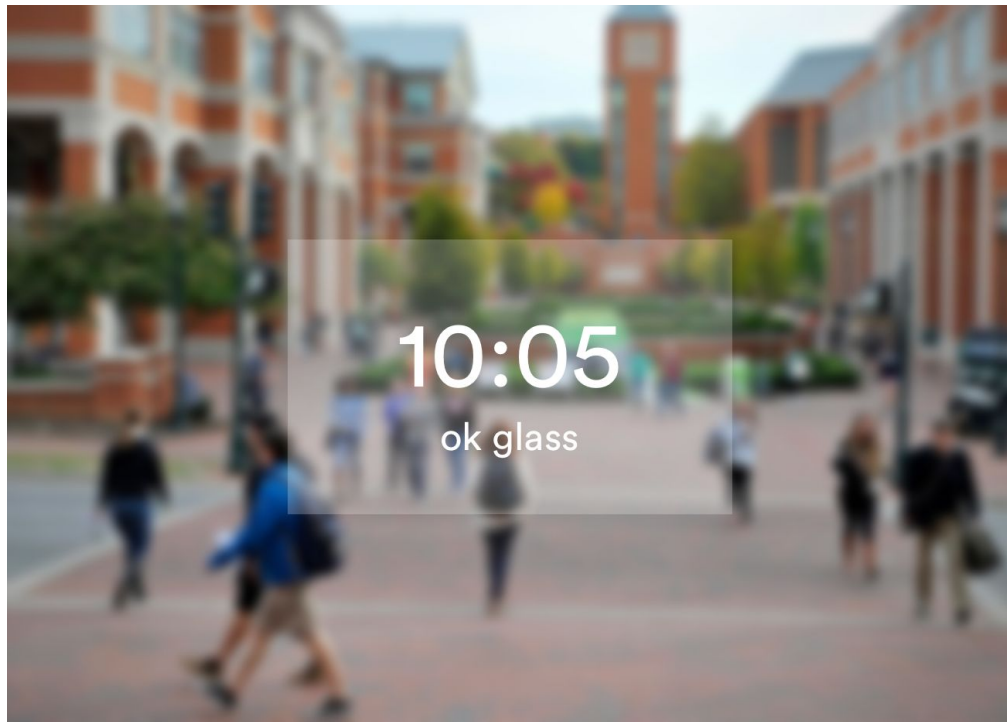
When the Cone Center gets in Alexander's view the app notifies him that he has arrived.

**Storyboard:** *The user gets walking directions inside campus*

# Wireframes

## “Home” screen

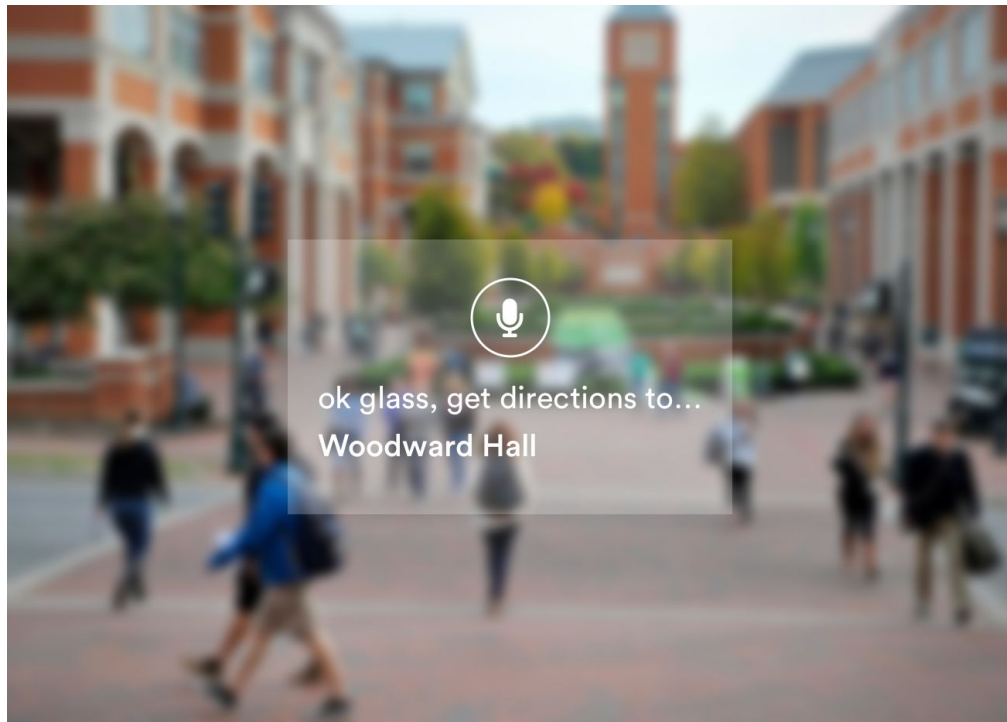
Upon tapping the touchpad, the glasses “wake up” and the home screen appears. From the home screen, you can say “ok glass” to perform an action.



# Wireframes

## “Enter destination” screen

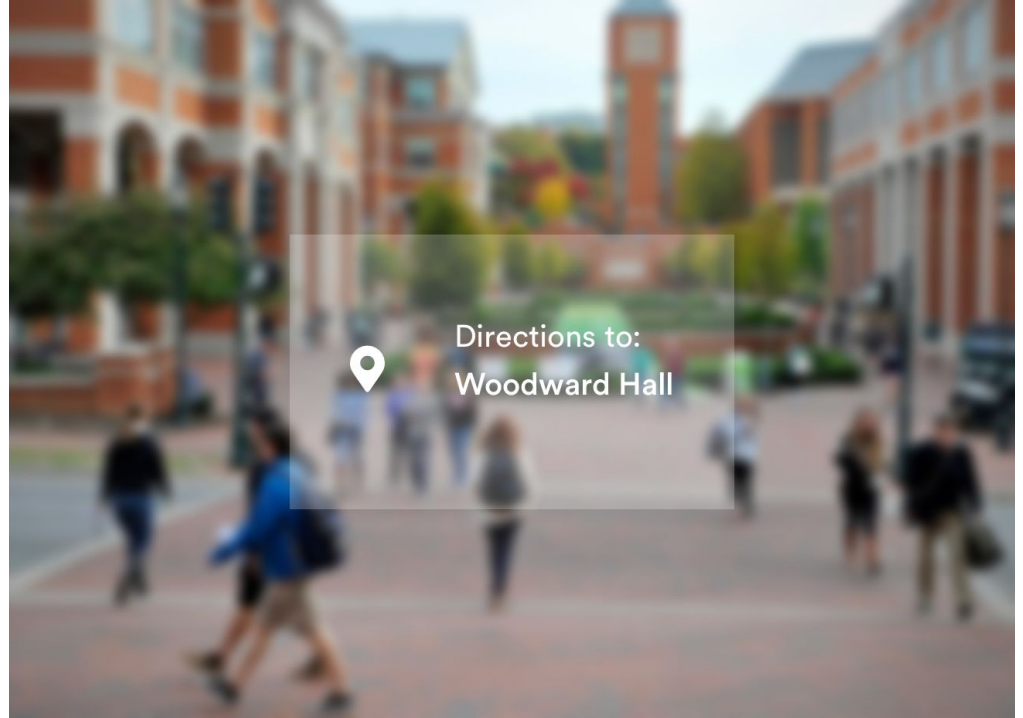
After prompting the voice assistant, you can ask “glass” to get directions to any location at UNC Charlotte. After providing a destination, the application will search for the best route to that location from your current location.



# Wireframes

## “Search result” screen

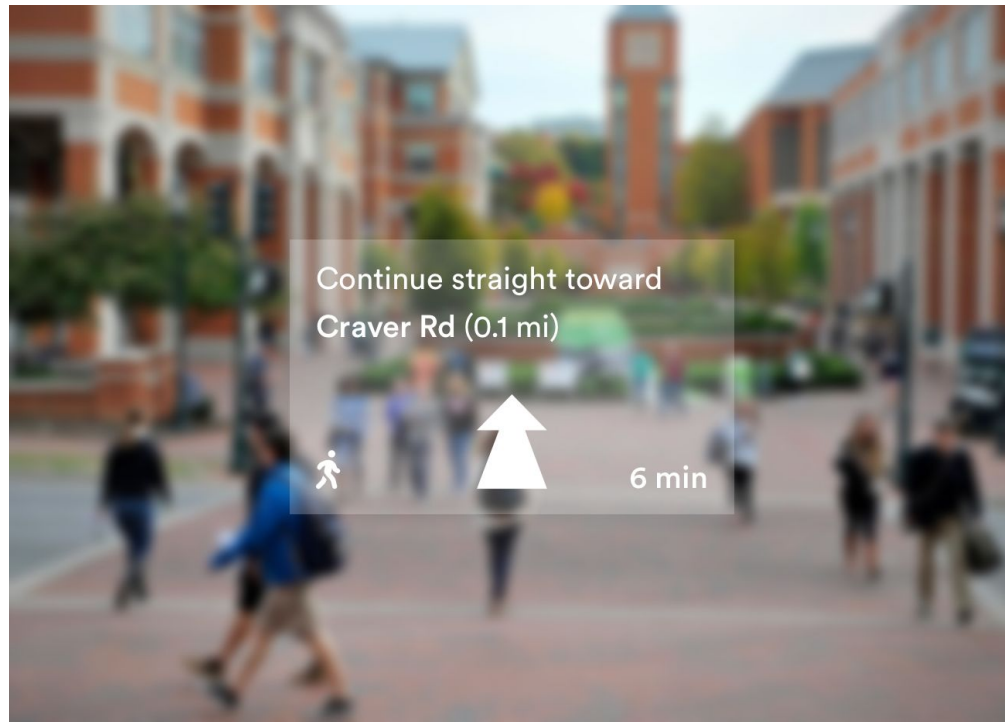
Once the application finds a route to the provided destination, you can press the touchpad to start the route.



# Wireframes

## “En-route navigation” screen

Once you have started a route, the en-route directions will be displayed in front of you one step at a time. These directions include the name, direction, and distance of the next step, the travel method, and the total remaining travel time.





# Evaluation of Concept 3

## Pros

- Device is worn on head—application can be used hands-free
- Visual feedback for notifications
- Location search via voice input
- Directions are displayed directly in front of user's field of vision

## Cons

- Visual interface can become a strain on the eyes after long exposure
- Limited to voice input only
- Difficult to see entire route in detail
- Unable to edit user preferences
- Interface could affect user's ability to see surrounding environment

# Final Evaluation

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# Evaluation of Design Goals

Design Goals	Smartwatch	Smartphone	Augmented Reality Glasses
<b>One application</b>	Very Satisfied	Very Satisfied	Very Satisfied
<b>Best route</b>	Very Satisfied	Very Satisfied	Not Satisfied
<b>Compare methods</b>	Satisfied	Very Satisfied	Not Satisfied
<b>Well-informed</b>	Very Satisfied	Satisfied	Very Satisfied
<b>System can make predictions</b>	Not Satisfied	Very Satisfied	Not Satisfied

# Evaluation of Usability Goals

Usability Goals	Smartwatch	Smartphone	Augmented Reality Glasses
<b>Responsive</b>	Satisfied	Satisfied	Not Satisfied
<b>Cross-platform</b>	Not Satisfied	Satisfied	Not Satisfied
<b>Accessible</b>	Satisfied	Very Satisfied	Satisfied
<b>Usable indoors and outdoors</b>	Very Satisfied	Satisfied	Satisfied
<b>Intuitive</b>	Satisfied	Very Satisfied	Not Satisfied
<b>Efficient</b>	Satisfied	Very Satisfied	Not Satisfied

# Chosen Design Concept

After final evaluation, we have chosen the **smartphone application** concept.

## Justification

- Satisfies design and usability goals better than other concepts
- Only concept which supports schedule and preferences input from users which is needed for the design goal of automatic route guidance predictions
- Smartphone is available on-the-go, though less portable than the watch or glasses it is more portable than a laptop or desktop
- Many users already own a smartphone, fewer own the other two devices

# Design Goals Clarity

- **One application.** The smartphone design concept allows users to find routes by bus, rail, bike, and/or walking in one single application.
- **Best route.** The chosen concept shows preprogrammed location markers on startup, making it easy to quickly find a route to any location on campus.
- **Compare methods.** The application allows users to easily compare available route options, but shows the objectively best route first.
- **Well-informed.** The smartphone supports alerts and notifications.
- **System can make predictions.** The chosen concept supports user account registration and input of preferences so the system can make predictions.