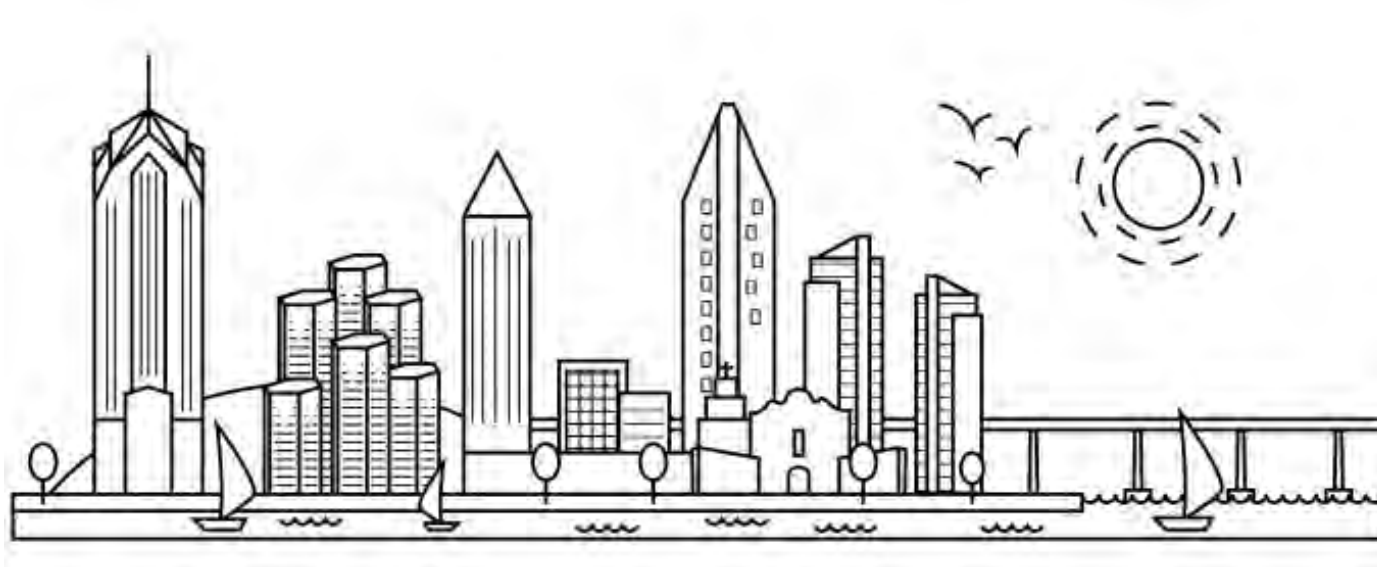# DATA SONIFICATION
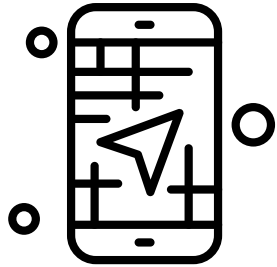# FOR URBAN WAYFINDING

BY PENNY TALALAK
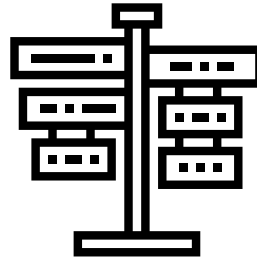
WAYFINDING

noun

a person's ability to successfully reach one's destination by dealing with the environmental restrictions and uncertainties
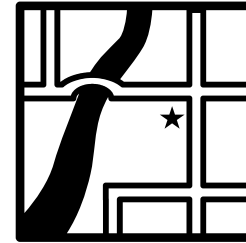
Vaez Eslami et al. 2016

CURRENT METHOD
OF WAYFINDING

APP

SIGN

MAP

SO WHAT'S THE PROBLEM?

Achères-Grand-Cormier
Cormeilles-en-Parisis
Sannois
La Barre-Ormesson
Epinay-Villetaneuse
Pierrefitte-Stains
Villepinte
Saint-Gratien
Maisons-Laffitte
Épinay-sur-Seine
Argenteuil
Sevran-Beaudottes
Val-d'Argenteuil
Gennevilliers
Saint-Denis
Le Bourget
Drancy
Le Blanc-Mesnil
Sartrouville
Le Stade
Colombes
Les Grésillons
Stade de France-Saint-Denis
La Courneuve-Aubervilliers
Aulnay-sous-Bois
Houilles-
Carrières-sur-Seine
Bécon-les-Bruyères
Bois-Colombes
La Plaine-Stade de France
Saint-Denis-Aubervilliers
L'Abbay
Lycée
Nanterre-Université
La Garenne-Colombes
Asnières-sur-Seine
Gargan
Germain-en-Laye-Grande-Ceinture
Les Vallées
Saint-Ouen
Pantin
Noisy-le-Sec
Bondy
Les Pavill
Le Vésinet-Le Pecq
Courbevoie
Porte de Clichy
Gare Saint-Lazare
Remise à Jorelle
Saint-Germain-en-Laye
Nanterre-Ville
Clichy-Levallois
Haussmann-Saint-Lazare
Le Raincy-Vi
Le Vésinet-Centre
La Défense
Grande Arche
Pereire-Levallois
Gare du Nord
Roissy-Bois-Perrier
Les Coquetiers
Marly-le-Roi
Nanterre-Préfecture
Magenta
Châtou-Croissy
Rueil-Malmaison
Puteaux
Neuilly-Porte Maillot
Port-Cardinet
Gare de l'Est
Suresnes-Mont-Valérien
Avenue Foch
Charles-de-Gaulle-Etoile
Auber
Châtelet-Les Halles
Rosny-sous-Bois
L'Étang-la-Ville
Louveciennes
Avenue Henri Martin
Invalides
Saint-Michel-Notre-Dame
Le Val d'Or
Musée d'Orsay
Gare de Lyon
Val de Fontenay
Neuilly-Pl
Boulainvilliers
Pont de l'Alma
Boungival
Avenue du Président Kennedy
Champ de Mars-Tour Eiffel
Port-Royal
Luxembourg
Sénat
Nation
Vincennes
Bry-sur-Marne
La Celle-Saint-Cloud
Garches-Marnes-la-Coquette
Saint-Cloud
Javel
Gare d'Austerlitz
Nogent-Le Perreux
Noisy-le-Roi
Pont du Garigliano
Gare Montparnasse
Fontenay-sous-Bois
Nogent-sur-Marne
Vaucresson
Issy-Val de Seine
Denfert-Rochereau
Bibliothèque François Mitterrand
Joinville-le-Point
Les Boullere
Champigny
Sèvres-Ville-d'Avray
Issy
Sèvres-Rive-Gauche
Cité Universitaire
Saint-Maur-Créteil
Chaville-Rive-Droite
Bellevue
Meudon
Vanves-Malakoff
Genibly
Champigny-Saint-Mau
Versailles-Rive-Droite
Montreuil
Viroflay-Rive-Droite
Clamart
Ivry-sur-Seine
Le Parc de Saint-Maur
Chaville-Rive-Gauche
Meudon-Val-Fleury
Laplace
Maisons-Alfort-Alfortville
Versailles-Château
Chaville-Vélizy
Arcueil-Cachan
Vitry-sur-Seine
La Varen
Viroflay
Fontenay-
Maisons-Alfort

STATISTICS

In Australia, pedestrians represent approximately 14% of road fatalities, accounting for 2,022 deaths in the ten years 2003-2012
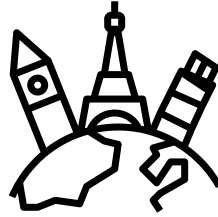
Pedestrian deaths are on the increase – up 9% year-on-year.

Distraction has been identified as a contributing factor in 22% of car crashes and near crashes[1] and 71% of truck crashes (and 46% of near crashes) in naturalistic driving studies.[2]

AUDIO IN WAYFINDING

**VISION
IMPAIRED**

TOURISM

ALERT

DATA SONIFICATION

noun

The transformation of data relations into perceived relations in an acoustic signal for the purposes of facilitating communication or interpretation.

Kramer et al. 1999

RESEARCH QUESTION

Can data sonification assist and enhance spatial knowledge acquisition about
a specific point of interest?

RESEARCH QUESTION

How can data sonification influence the process of wayfinding?

DESIGN

RESEARCH STRUCTURE

UX RESEARCH
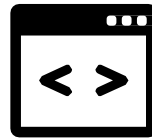
PROTOTYPE

TESTING

UX RESEARCH

DISCOVER

Field Studies

Interviewing Users

Competitive analysis

EXPLORE

User Persona

User Journey

RESULTS

41.6%

33.3%

16.6%

8.3%

Google Maps

100%

CHECK TRAIN TIMETABLE
ALL THE TIME

83.3%
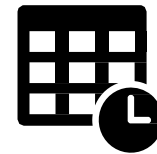
MUSIC WHILE NAVIGATE

83.3%

RESULTS

58.3%

HAZARD

USER JOURNEY

| STAGES OF JOURNEY	DAY BEFORE NAVIGATION PLANNING, WAKE UP AND LEAVE TIME ESTIMATION													MORNING WAKE UP		NAVIGATION TO WORK												
ACTIVITIES	OPENS WORK FOR NEXT DAY	FINDS STARTING ADDRESS	COPYS ADDRESS USING COPY FUNCTION	FINDS GOOGLE MAPS ON IPHONE SCREEN	OPENS GOOGLE MAPS BY TAPPING ON ICON	TAPS ON SEARCH HERE	PASTES ADDRESS INTO SEARCH	PRESS ON DIRECTIONS ICON	LOOKS AT ROUTES	PICKS FASTEST ROUTE (ONE WITH SHORTEST DURATION)	ESTIMATES WHAT TIME TO LEAVE NEXT DAY TO ARRIVE AT WORK START TIME	ALLOWS EXTRA TIME AND WHAT TIME TO WAKE UP	CHANGES ALARM TO SUIT	WAKES UP TO ALARM AND GOES TO CAR AT ESTIMATED LEAVE TIME	IN CAR OPENS GOOGLE MAPS	PRESSES ON SEARCH	PRESSES ON LAST ADDRESS TO START	PRESSES ON DIRECTIONS (AUTOMATICALLY SET TO FASTEST ROUTE)	PRESSES START IF HAPPY	PUTS PHONE ON CAR PHONE MOUNT	CHECKS WHICH DIRECTION TO START HEADING IN BY JUDGING OFF STREETS, AND LANDMARKS SHOWN ON MAP AND BY VISUAL GLANCE	STARTS DRIVING IN THAT DIRECTION	FOLLOWS DIRECTIONS BY CASUALLY LOOKING AT SCREEN DUE TO MUSIC ON RADIO MAKING AUDIO FROM PHONE TOO HARD TO HEAR	WHEN TURNS ARE NEAR LOOKS IF HE CAN SEE LANDMARKS ON APP SO HE DOESN'T HAVE TO KEEP LOOKING AND TURNS AT THEM WITHOUT LOOKING AT PHONE	WHEN NEAR DESTINATION LOOKS AT APP TO SEE WHAT NUMBER HOUSE OR BUILDING HE IS STOPPING AT	SLOWS DOWN CLOSE TO DESTINATION TO CHECK IF AT RIGHT ADDRESS AS PLACES ARE NOT ALWAYS WHERE THEYRE SHOWN ON MAP	REACHES DESTINATION	ENDS NAVIGATION ON GOOGLE MAPS
FEELINGS HAPPY					🟩										🟩	🟩	🟥		🟩			🟩					🟩	
FEELINGS SATISFIED	🟨	🟨	🟨		🟨		🟨		🟨	🟨	🟨	🟨		🟨				🟨		🟨						🟨	🟨	🟨
FEELINGS UNHAPPY								🟥																🟥		🟥		
EXPERIENCE	IRRELEVANT	IRRELEVANT	IRRELEVANT	EASY TO FIND AND GREAT UI EXPERIENCE	AMAZING UI MAKES IT SO EASY TO TARGET APP ICON AND ENTER WITH SPEED	EASY TO FIND IN THE APP AND EASY TO PRESS ON	CAN BE HARD TO BRING UP THE PASTE FUNCTION DUE TO UNKNOWN TEXT SET UP	SEEMS LIKE AN IRRELEVANT STEP DUE TO ENTERING ADDRESS SINCE ITS OBVIOUS THAT YOU WANT TO GET DIRECTIONS	REALLY HELPFUL WAY OF FINDING ROUTES TO PLACES BUT DOESN'T GIVE A LOT OF INFORMATION	SINCE ITS SET UP AS DEFAULT FASTEST ROUTE ITS EASY TO PICK BUT IT DOESN'T ALLOW FOR TAKING THAT ROUTE BUT CHOOSING SLIGHTLY DIFFERENT PATHS AS IT ONLY SHOWS FASTEST, SHORTEST.	SINCE IT SHOWS AN ESTIMATED TRIP TIME ITS QUITE EASY TO WORK OUT LEAVE TIME BUT HAVE TO ALWAYS LEAVE EXTRA TIME DUE TO IT NOT BEING EXTREMELY ACCURATE	ALWAYS ALLOW TIME TO EAT, SHOWER, AND GET READY	EASY TO CHANGE TIME ON CLOCK	ALWAYS WAKES UP WITH REMEMBERING HOW LONG TILL HE HAS TO LEAVE AND TRIES TO FIT IN ALL THINGS NEEDED TO BE DONE BEFORE LEAVING	EASY TO ACCESS	EASY TO FIND AND PRESS ON	MOST OF THE TIME IT IS STILL PRESENT AT TOP OF LIST BUT SOME TIMES YOU HAVE TO RE ENTER IT SINCE IT DIDN'T REGISTER AS AN ADDRESS	NORMALLY COMES UP REALLY FAST AND SHOWS WHAT TO EXPECT TRAFFIC WISE AND TIME WISE	EASY TO PRESS ON	OLD CAR MOUNT MADE IT HARD TO PUT ON AND IT FELL OFF A LOT. NEW ONE IS A LOT BETTER AND EASIER TO USE DUE TO MAGNITISM	ALOT OF THE TIME IT IS HARD TO JUDGE WHICH DIRECTION YOU SHOULD START HEADING IN DUE TO NO LANDMARKS TO BE SEEN AND NOTHING TO JUDGE OFF	ONCE DRIVING IN RIGHT DIRECTION EVERYTHING BECOMES ALOT SIMPLIER	SOMETIMES THERES NO LANDMARKS TO GO OFF SO YOU NEED TO LOOK AT PHONE QUITE OFTEN ALSO IT CAN LOSE RECEPTION IN TUNNELS AND MISS TURNS. CAN LEAD TO NEAR MISSES OR CRASHES LOOKING TOO MUCH	SOMETIMES THERES NO LANDMARKS TO GO OFF SO YOU NEED TO LOOK AT PHONE QUIET OFTEN ALSO YOU SHOULD START RECEPTION IN TUNNELS AND MISS TURNS. CAN LEAD TO NEAR MISSES OR CRASHES LOOKING TOO MUCH	SOMETIMES HOUSE/BUILDING NUMBERS ARE NOT DISPLAYED SO IT CAN BE HARD TO FIND. ALSO PLACES SOMETIMES MOVE AND ARE NOT THERE NO MORE	SOMETIMES THERES NO STREET PARKING OR PARKING SO YOU NEED TO DRIVE AROUND DESTINATION TO FIND IT	EASY TO END NAVIGATION AS IT DOES IT AUTOMATICALLY WHEN YOU HAVE ARRIVED
CUSTOMER SATISFACTION	IRRELEVANT	IRRELEVANT	IRRELEVANT	UNHAPPY ABOUT THINKING ABOUT WORK BUT HAPPIER WITH HOW EASY IT IS TO FIND THE APP	HAPPY BECAUSE OF HOW EASY IT IS TO ACCESS	SATISFIED WITH HOW EASY IT IS TO ACCESS THE FUNCTION	HAPPY WITH THE TIME IT SAVES COMPARED TO TYPING ADDRESS BUT CAN BE ANNOYING WHEN IT DOESN'T COME UP WITH PASTE OPTION	UNHAPPY WITH HAVING TO DO AN EXTRA STEP FOR WHAT SEEMS LIKE A SILLY REASON	HAPPY WITH LOOKING AT THE OPTIONS BUT DOESN'T REALLY SAY MUCH ABOUT WHAT TO EXPECT LIKE DANGEROUS AREAS TO AVOID ETC	HAPPY WITH HOW WELL DISPLAYED THE INFORMATION IS SET OUT AND HOW EASY IT IS TO INTERPERATE	SATISFIED WITH HOW ESTIMATED TIMES ARE PRETTY CLOSE TO REALISTIC TIMES	HAPPY WITH HOW EASY IT IS TO WORK OUT DUE TO NORMAL PATTERNS OF GETTING READY TIMES	UNHAPPY WITH HAVING TO THINK ABOUT WAKE UP TIME	SATISFIED WITH HOW MUCH TIME HE HAS ALLOWED TO GET READY	EXCITED TO START DAY AND HAPPY WITH ACCESSIBILITY TO NAVIGATION	HAPPY TO FIND ADDRESS	HAPPY WHEN IT DOES APPEAR IN LIST BUT WHEN IT DOESN'T IT CAN GET FRUSTRATING AS YOU HAVE TO FIND IT AND RE ENTER IT	HAPPY WITH HOW IT SHOWS GENERAL DIRECTION AND TRAVEL PATH BUT SOMETIMES WHEN IT SHOWS BAD TRAFFIC IT CAN MAKE YOU UNHAPPY DUE TO LONGER TRAVEL TIME	EXICTED TO START TRAVEL AND FEELS LIKE THE START OF THE DAY	DEPENDING ON MOUNT YOU CAN BE HAPPY WHEN IT WORKS WELL OR IF IT PLAYS UP AND FALLS OFF OR MOVES AROUND IT CAN GET REALLY FRUSTRATING AND DANGEROUS DUE TO EYES OFF ROAD	UNHAPPY WITH APPS LACK OF ABILITY TO KNOW WHICH DIRECTION CAR IS POINTING . EVEN WALKING TO CAR SHOULD BE ABLE TO TELL IT WHICH DIRECTION YOU ARE LOOKING	HAPPY WITH KNOWING YOURE GOING THE RIGHT WAY	UNHAPPY WITH HAVING TO TAKE EYES OFF ROAD IN DANGEROUS CIRCUMSTANCES LIKE RAIN AND HEAVY TRAFFIC/PEDESTRIAN AREAS	UNHAPPY WITH HAVING TO TAKE EYES OFF ROAD IN DANGEROUS CIRCUMSTANCES LIKE RAIN AND HEAVY TRAFFIC/PEDESTRIAN AREAS	NORMALLY HAPPY WITH THE ADDRESS AND DISTANCE TO DESTINATION AND SOMETIMES UNHAPPY AS ITS NOT REALLY PRECISE AND YOU DRIVE PAST ALREADY	NORMALLY HAPPY WITH THE ADDRESS AND DISTANCE TO DESTINATION AND SOMETIMES UNHAPPY AS ITS NOT REALLY PRECISE AND YOU DRIVE PAST ALREADY	IF PARKING AT SITE YOURE HAPPY AS YOU HAVE ARRIVED AND CAN START IF THERES NO PARKING YOURE UNHAPPY BECAUSE YOU NEED TO FIND PARKING AND NAVIGATE BACK TO DESTINATION BY FOOT	EXCITED AS YOU CAN NOW FOCUS ON YOUR WORK AHEAD

OBJECTIVES

Identify the gap in which data sonification can assist in the wayfinding process by introducing an audio navigational tool for knowledge acquisition so that users can physically navigate in a safe and efficient manner
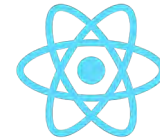
OBJECTIVES

Identify the gap in which data sonification can assist in the wayfinding process by **introducing an audio navigational tool** for knowledge acquisition so that users can physically navigate in a **safe and efficient** manner

OUTCOME
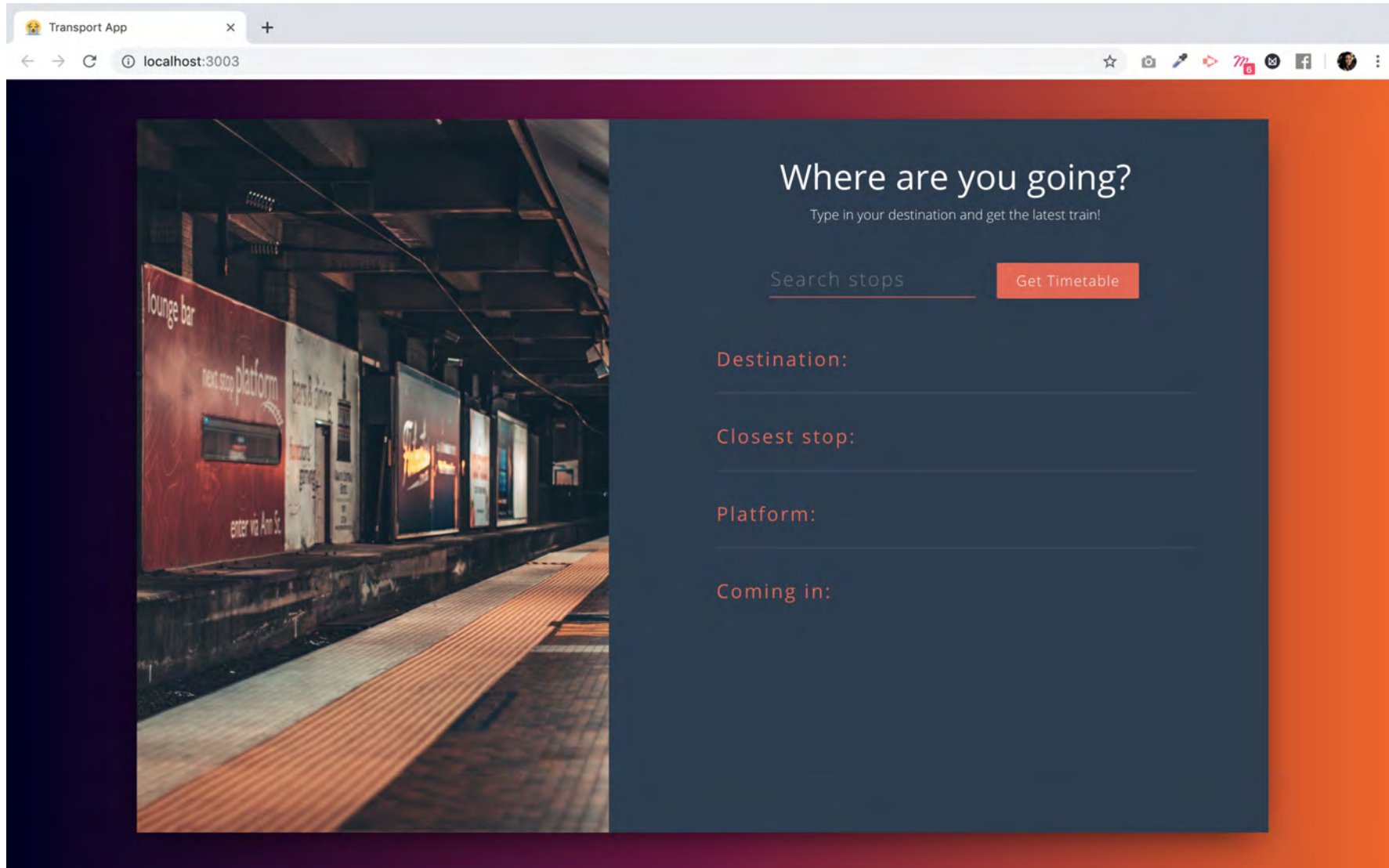
IMPLEMENTATION

DOTENV

Storing API key in
environment
variable

NODE.JS

Server
for backend

REACT.JS

Create-react-app
for frontend

TRANSPORT NSW

Request API

ADDING SOUND
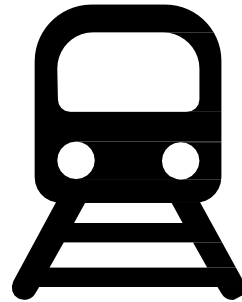
ASSUMPTIONS & CONSIDERATIONS

HEADPHONE

MUSIC

CONVERSATION

NOTIFICATION
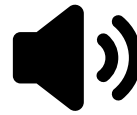
VOLUME

INTERPRETATION

TESTING

10 PEOPLE

TESTING

The sound is stressful

Not enough information displayed

I can see this being useful

It is not calming

Is it coming to me or to the station

Big army coming to me

I can tell it's the train

I wouldn't use it

What does the sound of the train means?

EVALUATION

SOUND OF THE TRAIN

PROTOTYPE LIMITATION

EMOTIONAL RESPONSE
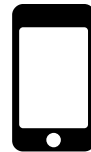
EFFICIENCY

FUTURE IMPLEMENTATION
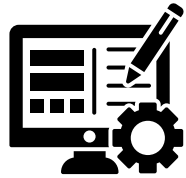
INTERFACE

MUSIC

LAYER

RESPONSIVE

INTEGRATION

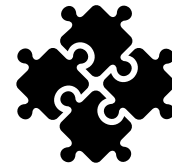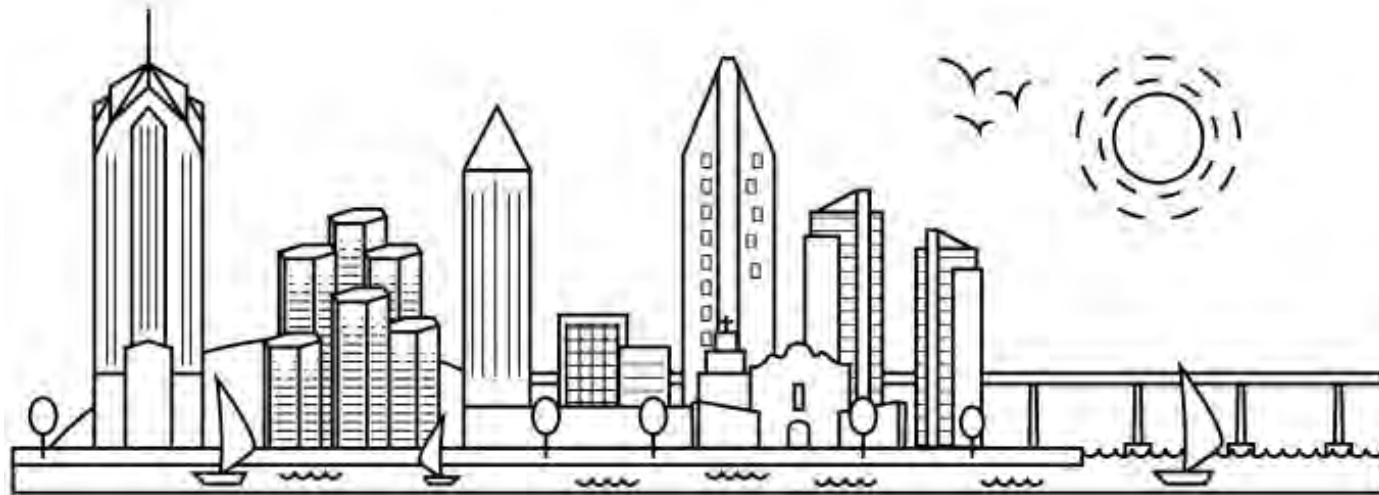# DATA SONIFICATION
FOR URBAN WAYFINDING

The End

BY PENNY TALALAK