Learning to drive in Nova Scotia

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Table of contents

The motivation of the project 3

Clear definition of the problems to be addressed 3

Survey of existing or related problems / solutions 4

Additional research: Top simulation apps/games as interactive platforms like the following: 8

Research summary: 10

Analysis of key app characteristics: 11

Research conclusion 12

Sample set of questions for study protocol 14

A letter of recruitment 16

The motivation of the project

The motivation of this project is to provide users with an interactive, user-friendly and dynamic way to obtain the necessary information and learn how to drive in and get a driver's license in Nova Scotia, Canada. To address the pain points and challenges currently facing individuals when going through the process of getting a driver's license, we're aiming to address the following elements:

- Provide the necessary information and materials to learn the road rules, traffic signals and other elements necessary
- Parking rules and tips to navigate the local area
- Language friendly options
- Navigate the local licensing system and process
- Interactive and user-driven
- Driving safely in different weather conditions
- Portal or help guides to other local resources
- Mechanical and handy car skills

Survey of existing or related problems / solutions

Before our team comes up with a new design, it is important to study the existing solutions and be familiar with their features. As discussed in the problem definition, we are trying to build a software platform where users can learn the initial steps required to start driving. Studying about the existing platforms will provide an idea as what features make the solution popular among the users. We can also learn from the weak features and work on the methods as how to overcome those in our new solution. Future is always built upon the experience we have derived from our history. Based on this thought, our team has done a deep study of the market in which the top apps [1] that are popular in teaching driving are as given below:

1. **Learn Driving:**

The app is built by Xtell technologies. The company owns 65 apps and leads in multiple fields like – Education Tools, Food & Drink, Health & Fitness Personalization, Entertainment , Books & Reference, House & Home Finance, Lifestyle, Medical, Travel & Local Business, Shopping, Weather and many more.[1]

Key features:[2]

- The objective of the app is to provide basic foundation for learning to drive without going to a driving school.
- It provides step by step driving tutorials with the help of pictures.
- Rating is 3.8/5.0
- Available only for android
- Size is 4.2 M
- Best critics say the app provides good information, useful for automatic driving, novice feel good, easy to use.
- Worst critics find only pdf forms are provided containing the instructions, pages cannot be zoomed, downloading the app is slow, instructions include spelling mistakes.

[1] https://appgrooves.com/publisher/715322893-Xtell+Technologies/xtell-technologies
[2] https://play.google.com/store/apps/details?id=com.xtelltechnologies.learndriving

2. Driving Theory Test Genius

Elegant e-learning has built the technology. Since 2008, the company has been educating learners in the USA, Canada, the UK, Australia, India and New Zealand. Their products are free, registration-free and ad-supported. On average, they have 200000+ thousand daily users and they spend 11 minutes on site.[3]

Key features:[4]

- Centred for United Kingdom (UK) users.
- Prepares users for UK theory test for DVSA test where DVSA is Driver and Vehicle Standards Agency, an executive agency working for UK Department for Transport. Database for 725 questions.
- It provides mock tests based on the official 2019 Highway Code manual issued by DVSA. It also provides detailed explanation with difficulty levels from easy to exam mode.
- Rating is 4.7/5.0
- Available only for android and ios, offline facility.
- Size is 268.6 M
- Best critics say the app helps passing the theory test in first attempt.
- Worst critics find repeated questions, low value for money, no audio feature, not for dyslexics.

[3] https://elegantelearning.com/#about
[4] https://play.google.com/store/apps/details?id=dto.ee.theory.test.genius

3. **Learn how to drive : manual car**

Owner: Lovely AI

Key features:[5]

- Useful only for people who are willing to learn manual driving.
- Available as offline.
- Rating is 4.0/5.0
- Available only for android
- Size is 5.3 M
- Best critics say completed learning in two weeks, easy to understand, informative, fun .
- Worst critics find the app a waste.

4. **Traffic and Road Signs**

Shoyo has developed the add. The company has built 17 apps for education and games.[6]

Key features:[7]

- Provides instructions in 68 preferred languages.
- Rating is 4.5/5.0
- Available on android.
- Size is 21 M
- Best critics say the app is easy to use, covers all the road signs.
- Worst critics found difficulty to switch the mode of instruction to English.

[5] https://play.google.com/store/apps/details?id=com.LovelyAI.LearnHowToDriveManualCar
[6] https://appgrooves.com/publisher/Shoyo/shoyo
[7] https://play.google.com/store/apps/details?id=com.shoyo.irska

5. **Theory Test Pro**

Owner: Well Informed Limited

Key features:[8]

- Again UK Based program
- Bank of Multiple Choice questions containing all 960 practice questions.
- A tutorial video and replay mode so that you can master the Hazard Perception test.
- Rating is 4.0/5.0
- Available for android and ios.
- Size is 97 M
- Best critics say driving instructors refer this app to learn.
- Worst critics not value for money, freezing.

6. **US DMV Driving test**

Monologix, Inc. has come up with designing and building the app.[9]

Key features:[10]

- It is ranked number 1 as Driving Test App in the US.
- Only for US Drivers covered under Department of Motor Vehicles in USA.
- Rating is 4.3/5.0
- Available on android.
- Size is 12 M
- Best critics say the app is easy to learn state specific signs, adapt the rules on wheels.
- Worst critics say failed the test after using the app, has a lot of wrong answers, misleading.

[8] https://play.google.com/store/apps/details?id=uk.co.theorytestpro.theorytestprobilling
[9] https://drivingtests101.com/
[10] https://play.google.com/store/apps/details?id=com.kep.driving.us

Additional research: Top simulation apps/games as interactive platforms like the following:[11]

1. **Parking Mania 2**

   Owner: Mobirate

   Key features:[12]

   - 3D graphics
   - Road Challenges, reverse parking, simple practice with accelerator pedal, brake pedal and steering wheel.
   - Rating is 4.015.0
   - Available only for android.
   - Size is 95 M
   - Price is $1.39 - $69.99 per item
   - Best critics say best graphics, fun, good physics.
   - Worst critics black screen, awful racing, too much advertising.

2. **Dr. Driving 2**

Owner: SUD Inc.

Key features:[13]

- Stunning Graphics
- Challenging multi-stage levels
- Realtime online multiplayer
- Rating is 4.3/5.0
- Available for android.
- Size is 20 M
- Price is $2.29 - $129.99 per item
- Best critics say smooth controllers, addictive, fun, most instructional yet creative.
- Worst critics says time wait is more to open new level, too many ads, car update is not good, more crashing of cars.

[11] https://www.guidingtech.com/android-apps-learn-car-driving/
[12] https://play.google.com/store/apps/details?id=com.mobirate.parkingmania3d&hl=en
[13] https://play.google.com/store/apps/details?id=com.ansangha.drjb&hl=en

3. **Driving School**

Owner: Ovidiu Pop

Key features:[14]

- Teaches driving many different cars
- Covers different environments like cities, country roads, highways, deserts, mountains, etc.
- Playing with friends.
- Free multiplayer modes.
- Rating is 4.3/5.0
- Available for android.
- Size is 27 M
- Price is $1.19 - $17.99 per item
- Best critics say good graphics, teaches teens, offline facility available.
- Worst critics say not easy to find controls, buttons not working, bug about not completing a level.

4. **Car Driving School Simulator**

Owner: BoomBit Games

Key features:[15]

- Covers California, New York and Canada
- Focuses on traffic rules
- 26 unique cars
- Online multiplayer free roaming mode
- Rating is 4.4/5.0
- Available for android.
- Size varies with device
- Price is $2.49 - $30.99 per item
- Best critics say addictive, optimization, realistic.
- Worst critics says no proper instructions, unpredictable controls, too many ads.

[14] https://play.google.com/store/apps/details?id=com.ovilex.drivingschool2017&hl=en

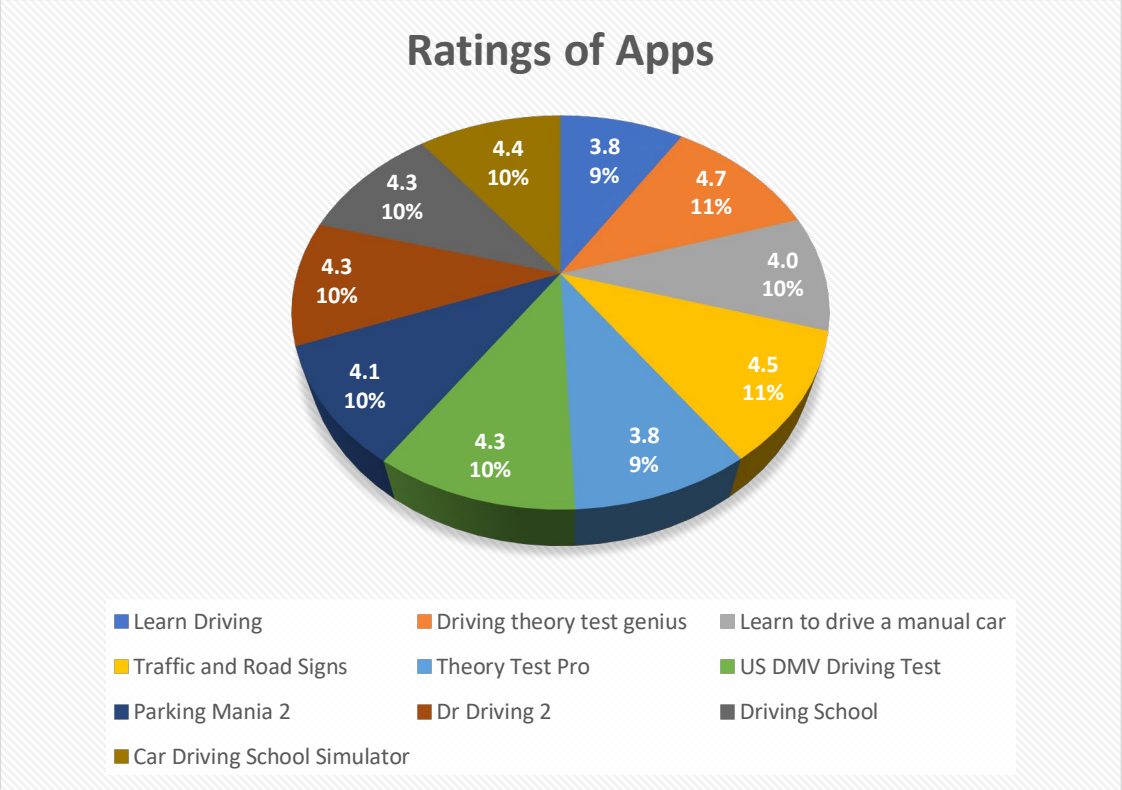
[15] https://play.google.com/store/apps/details?id=com.boombitgames.DrivingSchoolParking&hl=en

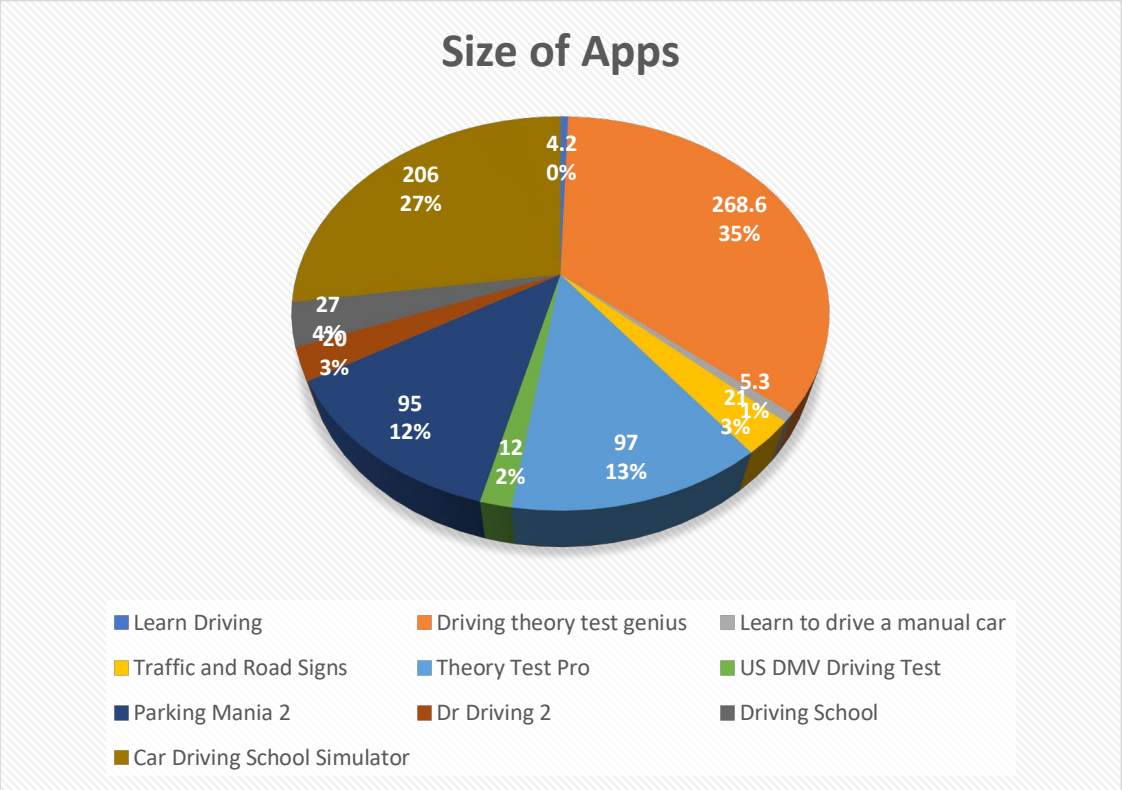
Research summary:

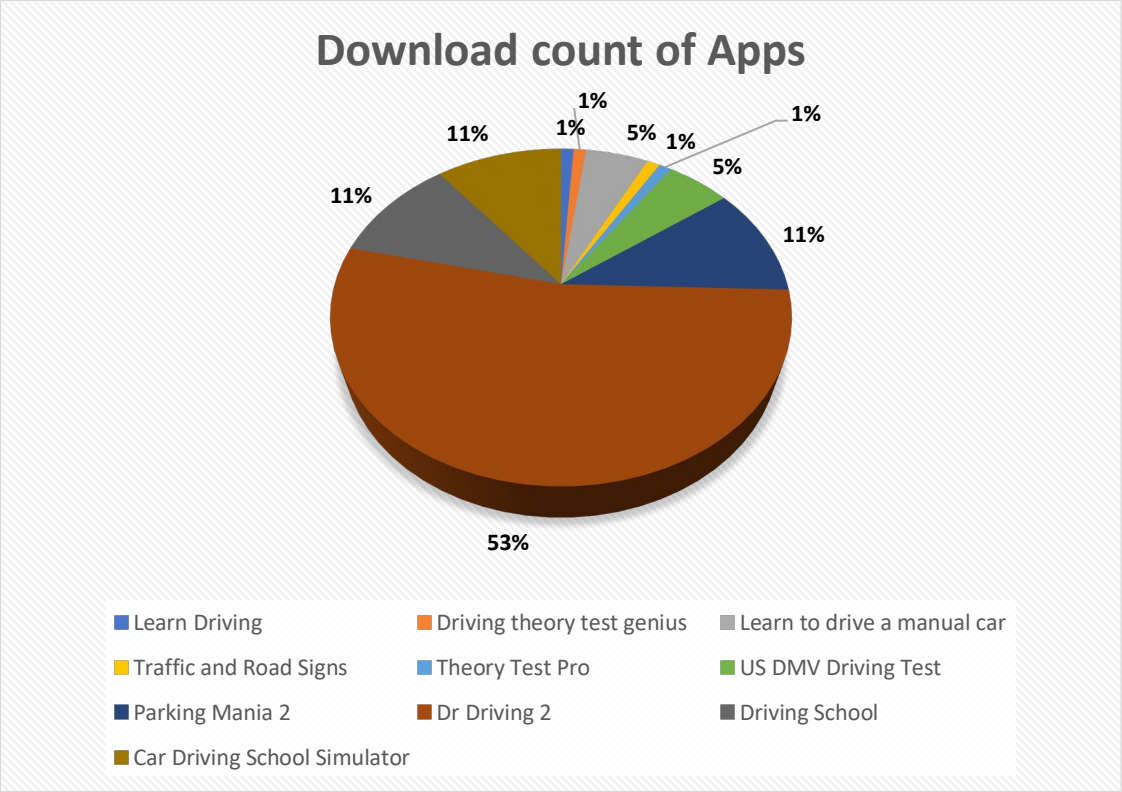
The following table summarizes the key features of the design researched as part of this study.

Learning Apps	Company	Ratings	Count of ratings	Size	No. of downloads	Compatibility
Learn Driving	Xtell Technologies	3.8	577	4.2 M	100000+	Android
Driving theory test genius	Elegant elearning	4.7	7800	268.6 M	100000+	ios
Learn to drive a manual car	Lovely AI	4.0	746	5.3 M	500000+	Android
Traffic and Road Signs	Shoyo	4.5	675	21 M	100000+	Android
Theory Test Pro	Well Informed Limited	3.8	603	97 M	100000+	Android / ios
US DMV Driving Test	Monologix	4.3	2839	12 M	500000+	Android
Simulation Apps						
Parking Mania 2	Mobirate	4.1	32459	95 M	1,000,000+	Android
Dr Driving 2	SUD	4.3	535431	20 M	50,000,000+	Android
Driving School	Ovidiu Pop	4.3	502408	27 M	10,000,000+	Android
Car Driving School Simulator	BoomBit Games	4.4	181305	Varies	10,000,000+	Android

Analysis of key app characteristics:







Research conclusion

Simulation apps are clearly more popular with users in terms of teaching driving skills with the most easily adaptable methods. Alternatively, these apps are expensive and require highly compatible graphics devices for support. The educational oriented apps are simple yet efficiently help the users to pass the test.

Our approach aims to balance the best features of both the platforms and add “out of box” thinking process to create a new design for teaching our target audience how to drive the way that appeals to them and delivers the necessary education content.

Description of study protocols

To better understand the challenges of our user groups and the potential features of most interest to each, our study will solicit feedback, ideas and gather the necessary user requirements to designing a needs-based and user-centric solution.

Our study will focus on targeting four different target populations and user groups based on their driving experience and specific high-level demographic factors that help better identify and target a specific subset of the population. The user groups are listed and defined below:

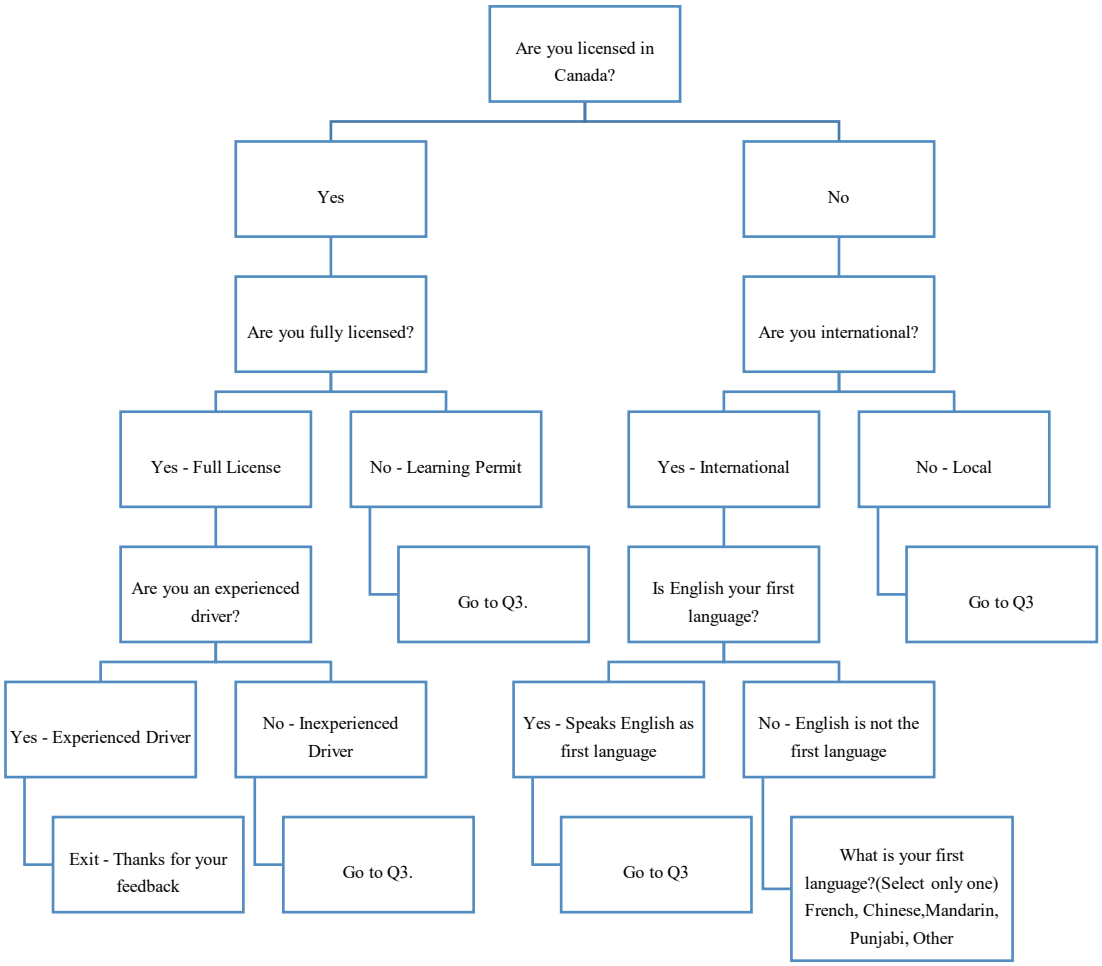
- Group 1: Individuals with no Canadian driver's license
- Group 2: Individuals with a Canadian driver's license but have limited to no driving experience
- Group 3: Individuals with a Canadian learner's permit
- Group 4: Out of country individuals divided into two further sub-groups; A: individuals with limited to no driving experience and B: individuals with driving experience outside of Canada

To best reach the target audience within the time and resource constraints, an online survey is best suited to gather the necessary information. Key features and design principles of the survey will focus and include the following:

- Limiting the time to completion to < 10 minutes (1-2 minutes per question) to help achieve higher completion rates and gather impactful responses
- Well-crafted and clear questions defined to gather the needed data across the user groups
- Focus on closed-ended questions to concentrate on quantitative data for analysis purposes
- Quality is important to us, we will conduct 1-2 survey tests prior to launch to ensure questions are clear and well-balanced, survey logic is optimized and the collected data is clean, analysis-ready and enables segmenting and analyzing the population into intended target groups.

Sample set of questions for study protocol

1) What is your age group? (Select only one)
    - Less than 16 years
    - 16 years – 30 years
    - More than 30 years
2) Classification of stakeholders / users:



3) What are the challenges you think you will face for getting a license? (select all that apply)
    - ☐ Expense
    - ☐ Time consuming
    - ☐ Language barrier
4) How much time do you want to spend a week learning to drive?
    - ☐ Less than 3 hours
    - ☐ 3 to 7 hours
    - ☐ 7 to 14 hours
    - ☐ More than 14 hours
5) When you drive, the road conditions you encounter will be the most difficult to deal with.
    - ☐ Heavy rain, fog, snow, or other extreme weather condition
    - ☐ The road crowded by people
    - ☐ Highway
    - ☐ other_____
6) Are you interested learning via an App?

    If Yes, continue to Q5.

    Otherwise, Thanks for your feedback.
7) What is your mode of preference for learning? (select all that apply)
    - ☐ Video
    - ☐ Audio
    - ☐ Interactive
    - ☐ Gaming
    - ☐ Virtual Reality
    - ☐ Text
8) What features listed below, do you want to use in the learning app? (select all that apply)
    - ☐ Learning how to drive under severe weather conditions
    - ☐ Learning mechanical skills required for driving
    - ☐ Learn how to shift driving skills from experienced right steering to novice left steering
    - ☐ Traffic rules and regulations
    - ☐ Tips for passing vision test / knowledge test
    - ☐ Practice questions
    - ☐ Protocols followed by authorities (like Service Nova Scotia or Official Ministry of Transportation) to give you a full license.

Note: - We have a total of 8 questions and one question breaks down into 9 sub-questions to enable classification of stakeholders/users.

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Participants Needed for a Course Project (MCDA 5530 UI/UX Design and Quality Engineering)
Design, Development, and Evaluation of Technologies for Engaging Communities (SMU REB#: 17-480)

We are recruiting participants to take part in a research study for the course projects for MCDA 5530: UI/UX Design and Quality Engineering, under the supervision of Dr. Yasushi Akiyama (Math & Computing Science, Saint Mary's University).

Purpose of the study. The goal of this study is to gather the information regarding the technology designs that helps young drivers willing to learn the necessary skills such as how to drive, driving in different road and weather conditions, mechanical skills and road rules in Nova Scotia.

Study. The study will consist of *2* phases: In the 1st phase, we will conduct survey by means of online questionnaire, to collect data about common issues that the individuals face. Each study session is expected to last less than *10 minutes* in the 1st phase. The 2nd phase will be usability studies, either individually or in a focus group setting to evaluate our proposed solutions. You will be asked to perform certain tasks and to answer questions regarding the usability of our new technology. Each study session in this phase will last *30 minutes to 1 hour*.

Participants. Our group is seeking young learners, people having Canadian driving licensed or people having license from another country but don't have Canadian driving experience to participate in our study. Although you may not be eligible for our study, you may still be eligible for other group projects that you may be interested in. Thus, if you are interested in connecting with other groups, please contact the course instructor (Dr. Yasushi Akiyama, Yasushi.Akiyama@smu.ca) to find out about the other group projects.

Date & Location. All studies are expected to take place either on or near Saint Mary's University campus, on your site, or in the form of online questionnaires. These sessions will take place between Feb 1st, 2019 and April 2nd, 2019.

How to participate. If you think you might be interested in participating in our study or would like more information, please contact Bijay Khadka by bijaykhadka250@gmail.com, or the course instructor (Dr. Yasushi Akiyama, Yasushi.Akiyama@smu.ca). We may have a few questions to help determine whether you would be eligible to participate in our study (or possibly other groups' studies).

Thank you very much,

Principal Investigator: Yilong Wu
Course: MCDA 5530
Email: wuyilong182@gmail.com
Phone: (902) 412 - 6350

Supervisor: Dr. Yasushi Akiyama
Mathematics & Computing Science Department
Saint Mary's University,
923 Robie Street
Halifax, NS B3H 3C3
Email: Yasushi.Akiyama@smu.ca
902-420-5072

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INFORMED CONSENT FORM

MCDA 5530 Course Project
Design, Development, and Evaluation of Technologies for Engaging Communities

SMU REB # 17-480 (SMU REB File Number)

Group Members:
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INTRODUCTION

We are conducting a research study as part of a graduate-level course MCDA 5530 UI/UX Design and Quality Engineering, under the supervision of Dr. Yasushi Akiyama (Mathematics and Computing Science). Our group consists of 5 MSc students. We have no financial interest in conducting this research study. You are being invited to participate in this study, which is described below. This description tells you about the risks, inconvenience, or discomfort which you might experience.

PURPOSE OF THIS RESEARCH

The goal of this study is to gather the information regarding the technology designs that will help people of different levels learn to drive.

WHO IS ELIGIBLE TO TAKE PART?

You can participate in this study if you want to pass the driver's license test or to improve your driving skills. Although you may not be eligible for our study, you may still be eligible for other group projects that you may be interested in. Thus, if you are interested in connecting with other groups, please contact the course instructor (Dr. Yasushi Akiyama, Yasushi.Akiyama@smu.ca) to find out about the other group projects.

WHAT WILL YOU BE ASKED TO DO?

Each study will consist of 2 phases: In the 1st phase, we will conduct survey by means of questionnaires, to collect data about common issues that the individuals face. Each study session is expected to last less than 10 minutes in the 1st phase. The study sessions will take place in the form of online questionnaires. You will be

asked about issues that you may face in daily life, such as "What are the challenges you face in obtaining a driver's license?", "What features listed below, do you want to use in the learning app?", "What is your mode of preference for learning?".

You may also be invited for the 2nd phase, which will be a usability study, either individually or in a focus group setting to evaluate our proposed solutions. You will be asked to perform simple tasks, such as "Please use this app/system," and to answer questions regarding the usability of our new technology designs, such as "What did you, or did you not like about our app/solution?" Each study session in this 2nd phase is expected to last 30 minutes to 1 hour**.** You are welcomed to participate in either one of the sessions or both.

WHAT ARE THE POTENTIAL BENEFITS OF THIS RESEARCH?

Although you may not benefit directly from participating in this study, the goal of the project is to develop approaches/tools which will have direct long-term benefits for individuals with no Canadian driver's license; individuals with a Canadian driver's license but have limited to no driving experience; individuals with a Canadian learner's permit; out of country individuals with limited to no driving experience; out of country individuals with driving experience outside of Canada. You will also have opportunity to give feedback on this new approaches/tools so that we can improve its functionality/service performance that may benefit you and people in the community in the future.

WHAT ARE THE POTENTIAL RISKS FOR PARTICIPANTS?

The study will be conducted in an environment that is comfortable to you. Very minor fatigue associated with general use of digital tools is expected. You might also feel slight discomfort in performing tasks that you may not entirely be familiar with and answering questions that you may not know the answers to or feel uncomfortable to answer. If you feel uncomfortable with performing any tasks or answering any questions, or do not wish to answer questions for any other reasons, simply let us know and we will not proceed with those tasks and questions. We are only concerned with the evaluation of our own system, and not your ability to perform tasks or answer questions.

WHAT WILL BE DONE WITH MY INFORMATION AND WHO WILL HAVE ACCESS TO IT?

We are collecting your feedback regarding your experience, and your opinions about the existing and our new approaches to address certain issues that may be observed. Your confidentiality will be of the utmost importance. The study will be conducted by one or two of our group members, and potentially with the presence of one or more of support staff from your organization/institution in order to ensure the safe environment for you. While this may not allow for the complete confidentiality or anonymity, the sessions will only be attended by you, our interviewers, and the staff member(s) with your approval. We will use numbers for any reported data instead of real names, no identifying information will be used in any written, verbal, or presented information without your permission. The study session may be recorded and transcribed, with anonymous code numbers. The recording will be destroyed after they are transcribed.

The collected raw data may be accessed only by our group members and Dr. Akiyama. Once all the data are collected and analyzed for this study, we plan on sharing the summary data and results with our peers in the course and potentially at an academic conference. The summary data will not contain any personal or identifying information. The raw data will be kept and maintained by our group members for this academic year. You may ask to receive the results of this study once completed.

HOW CAN I WITHDRAW FROM THIS STUDY?

Your participation in this study is voluntary and you may withdraw from the study at any time. If you choose to withdraw, your data will not be used in the subsequent analysis and will be destroyed (note that once your data is included in the study analysis, it cannot be retracted). Should you wish to withdraw, you can contact us or Dr. Akiyama.

HOW CAN I GET MORE INFORMATION? (OR HOW CAN I FIND OUT MORE ABOUT THIS STUDY?

If you have any questions, please contact either the principal investigators Bijay Khadka by bijaykhadka250@gmail.com or the course instructor Dr. Yasushi Akiyama at yasushi.akiyama@smu.ca.

Certification:

The Saint Mary's University Research Ethics Board has reviewed this research. If you have any questions or concerns about ethical matters or would like to discuss your rights as a research participant, you may contact the Chair of the Research Ethics Board at ethics@smu.ca or 420-5728.

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Signature of Agreement (Participant's copy):

Course Project (MCDA 5530)
Design, Development, and Evaluation of Technologies for Engaging Communities
SMU REB # 17-480 (SMU REB File Number)

I understand what this study is about, appreciate the risks and benefits, and that by consenting I agree to take part in this research study and do not waive any rights to legal recourse in the event of research-related harm.

I understand that my participation is voluntary and that I can end my participation at any time without penalty.

I have had adequate time to think about the research study and have had the opportunity to ask questions.

Participant

Signature : _____ Name (Printed) :_____ Date :_____
(Day/Month/Year)

Principal Investigator

Signature : _____ Name (Printed) :_____ Date :_____
(Day/Month/Year)

Please keep one copy of this form for your own records.
(Participants must be provided with a copy of the signed Informed Consent Form.)

SAINT MARY'S UNIVERSITY SINCE 1802

One University. One World. Yours.

Signature of Agreement (Investigator's copy):

Course Project (MCDA 5530)
Design, Development, and Evaluation of Technologies for Engaging Communities
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Participant

Signature : _____ Name (Printed) :_____ Date :_____
(Day/Month/Year)

Principal Investigator

Signature : _____ Name (Printed) :_____ Date :_____
(Day/Month/Year)

Please keep one copy of this form for your own records.
(Participants must be provided with a copy of the signed Informed Consent Form.)