Raw Ideas

* PITCH VIDEO IS NOT USED IN DE PRESENTATION *

Problem
A problem that is faced by Canadians across the country stems from the natural, harsh winters. The freezing cold temperatures carry many consequences, such as the formation of ice on roads and sidewalks, large piles of snow, blurry and frozen windshields, and more. The vision issue can also cause Canadians to believe they are going slower than they actually are (ie. a 60 kph speed could make you feel like you're going 30kph). As a result, many Canadians experience unexpected incidents, such as collisions, crashes, sidetracks, and ultimately congestion. The extra time and energy wasted on waiting in long lasting traffic, only results in an increased amount of fossil fuels and carbon emissions being released, yet there is still a decrease in efficiency compared to warmer temperatures. These accidents caused by the cold winters also put unfortunate Canadians in a situation where they may have to a replacement for their source of transportation (e.g. a new car), leading to unnecessary expenses and negative environmental impacts that follow – such as the disposal of materials which can lead to the leakage of toxic materials.

How might we prevent collisions in cars while still being sustainable

PROBLEM

Heat generating car in some way
Stakeholders + **Aspects**
1. Those in the working industry that need to drive large distances
   a. Truck Transporters
      i. Job requires hours on the road, and the faster they are able to travel faster clients
   b. Office workers
      i. Office workers need to wake up earlier to arrive to their workplaces on time
   c.

Government Methods of Mitigation:
- **Snow removal and de-icing:** Municipal snow clearing programs ensure roads and sidewalks and bike lanes are plowed quickly after the snow falls – this is an issue because sometimes, these programs do not act quickly enough to be effective, causing people to be delayed in moving from place to place (eg. important meetings – Gideon's

example)

- **Salt/Sand/Brine treatments** - Salt on roads is detrimental to transportation methods' stability as it causes corrosion which impacts both vehicle and infrastructure integrity

- **Use of Road Weather Information Systems (RWIS) to monitor pavement temperatures, humidity and precipitation** - has limited coverage and placement; maintenance and reliability issues; Lack of real-time responsiveness; Requires integration with other systems; high cost solution

- **Anti-icing methods done pre-snowfall to reduce accumulation and make plowing more efficient** - timing is critical; weather condition uncertainty

Specific Examples of Action:

- Strengthening Winter Tires (2019 – 2020):

    - Transport Canada sets safety standards for all tires, including winter tires
    - All winter tires must meet traction tests on packed snow and carry the Alpine symbol if they pass
    - Quebec is the only province requiring winter tires by law
    - From 2013, stricter winter tire standards led to a 19% drop in enter collisions in Quebec
    - TC tests the tires regularly and few fail compliance

- Public Consultation (2024–2025)

    -
    -
    -

- Mandatory Winter Tire Policies

STATS

Event & Date	Location	Vehicles	Fatalities	Notes

		Involved		
Jan 26–27, 1971 Blizzard	GTA (DVP, Hwy 401)	Dozens to hundreds	1+	32-car pileup + widespread
Sep 3, 1999 Dense Fog	Hwy 401 near Windsor/Essex Co.	87s	8	Chain-reaction crash
Feb 7, 2025 Snow Squall	Hwy 11 near Orillia	50–60	1	White-out snow squall
Dec 29, 2024 Winter Storm	GTA	330+ collisions	Not stated	Hundreds of minor to mid-crashes

- In November 2021, when the Fraser valley and Sumas Prairie in British Columbia's Lower mainland were overwhelmed by massive flooding. Metro Vancouver was cut off from the rest of Canada by road. Nothing could leave the port of Vancouver, massively impacting the supply chain, prairie farmers, manufactures, and many other businesses.

- About 18% of fatal collisions occurred during poor weather conditions in Canada in 2021

- About 30% of accidents occurred on wet, icy, or snowy roads, with about one-third of all accidents in Canada

Environmental Factor	23.4%	22.3%	20.0%	21.0%	21.9%

-

29% of collisions were caused by environmental factors (unlisted)

- ~30% of Canadian collisions were caused by wet roads, snow or ice. (chatgpt)

- 1/3 of car collisions happen in winter in Canada (chatgpt)

- Approximately 30% of reported collisions happen on wet, snowy, or icy roads.

- According to Natural Resources Canada, fuel consumption can increase by approximately 1.3% on highways due to increased wind resistance alone.

- Colder temperatures can reduce fuel efficiency by 12-28% on urban commutes.

- Collisions drastically increase energy usage in vehicles because the kinetic energy of the cars is converted into other forms of energy during the impact, primarily heat and sound, and also through deformation of the vehicle's structure.
- Collisions are more prominent during winter in Canada due to hazardous road conditions, reduced visibility, and increased travel during the holiday season. Icy roads, especially black ice, and snowy conditions reduce tire traction, making it harder to stop or steer safely. Reduced daylight hours and inclement weather, like heavy snowfall, also impair visibility, making it challenging for drivers to react to hazards.
- In 2017, nearly 30 percent of collisions reported to the National Collision Database happened on wet, snowy or icy roads. One third happened in January, February, November and December
- Victoria, British Columbia, is generally considered the Canadian city with the least amount of snowfall and 232 reported incidents while Edmonton is generally one of the most snowfall 24,003 motor vehicle collisions in Edmonton

STEPS

1. Identify Weather-Related Hazards

- Analyze collision data to determine which weather conditions (e.g. snow, freezing rain, fog, heavy rain) cause most accidents.
- Map high-risk areas (intersections, highways, rural roads) with frequent weather-related incidents.

2. Improve Road Maintenance and Response

- Increase frequency and coverage of salting and plowing during snow or freezing rain.
- Deploy real-time weather monitoring stations to inform rapid deployment of maintenance crews.
- Implement brine pre-treatment strategies before snowfall or freezing rain to reduce ice formation.

3. Enhance Driver Awareness and Communication

- Use digital highway signs to display real-time weather and hazard warnings.
- Integrate weather alerts with navigation apps and local radio to inform drivers promptly.
- Conduct seasonal public education campaigns on driving behaviour in specific weather conditions.

4. Upgrade Road Infrastructure

- Improve drainage systems to prevent pooling during heavy rain.
- Install heated pavement technology or road surface treatments in critical zones to reduce ice build-up.
- Enhance street lighting and reflective lane markings for reduced-visibility conditions like fog and heavy rain.

5. Enforce Appropriate Speed and Safety Regulations

- Implement variable speed limits adjusted to weather conditions using digital signs.
- Increase penalties for reckless driving during hazardous weather.
- Deploy more police patrols or automated enforcement in areas with high weather-related collision rates.

6. Promote Vehicle Safety Standards

- Encourage use of winter tires through rebates or mandatory regulations in winter months.
- Promote regular vehicle checks (tire tread depth, windshield wipers, brake efficiency) before winter.

7. Monitor, Evaluate, and Adapt

- Continuously evaluate the effectiveness of interventions using accident and response data.
- Adjust policies, resource allocation, and infrastructure planning based on evaluation results

TARGET AUDIENCE:
- Edmonton drivers

- GTA drivers

- Montreal drivers

- Winnipeg drivers

- Calgary drivers

- Saskatoon drivers

- Sudbury drivers

PERSONAL STORIES

- Sudbury- Has little transport and due to this some kids cannot even go to school because their bus is an hour late (even worse for adults who need to be present at their workplaces in order to attend meetings and earn livelihood)

- Car stuck multiple times due to snow and ice

- Skidding due to ice and hitting trees

SOLUTIONS - Each of us makes one

Possible Solutions

Leo:
- Airships
  - Solves problem of car collisions due to ice
  - Introduces problem of zeppelin collision and hindenburg
  - Can carry many passengers (like buses but air)
  - Can pick up and deposit passengers without requiring airstrip or large open area
  - smart
  - Less fuel consumption than passenger planes
  - Quieter than passenger planes
  - Similar speed to cars
- More buff snow tire
  - Deeper crevices
  - More crevices

- 🌑 Silica infused rubber

- 🌑 Porous rubber (allows water layer to drain to reduce slip)

- 🌑 Microscopic abrasives for more traction

- 🌑 tracks

Vincent + Ram:
- LiDAR Material Sensing Camera
  - 🌑 LiDAR camera under the car detects the material under the car tires
    - AI detects the material based on how the light reflects off the road
  - 🌑 Warning appears on dashboard when ice/black ice is under the tires
  - 🌑 Furthermore, when the ice is detected by one vehicle, these conditions are given as alerts to all nearby vehicles who have a probability of utilizing those roads/passengerways
  - 🌑 Furthermore, in those spaces, cars would have to adapt to those conditions by utilizing adaptive break locking mechanisms that allow the car to be able to move/operate under specific conditions to ensure user safety
  - 🌑 This includes slightly reducing speed + tightening stability control on the steering wheel
- Winter driving assists (we need a way to get through snow, water, ice, and slush so the lines are able to be detected by cameras)
  - 🌑 Lane assist
  - 🌑 Breaking assist

Nicole:
- A mobile application that gives real time route recommendations based on ice risk, snowfall and collision reports. Partners with local municipalities to deploy on demand salt spraying mini units in trouble zones and crowd sources user alerts. Freemium app with premium features and monetise with ads/subscriptions and partner with insurance companies, rideshare companies, and city governments.
- A solar powered windshield that prevents frost, ice, and buildup and fog. Use self heating nanotechnology film applied to any car windshield to auto activate 15 minutes before commute sourced from biodegradable or recycled materials. This makes winter

drives faster, safer, and more green.

Tom:
 implementation of hydroelectric mills within sewer systems, to power heaters on roads

Oxyhydrogen engines to fight carbon emissions

Pyrophoric flares deployed on roads to melt ice

Anti fog spray for car windshields

Tiffany:

Harini:
When the temp drops to a certain level and it automatically closes the circuit, allowing power from the car's 12V battery to flow.

Carbon Fiber Heating Pads (in wheel wells or near tire treads) — already used in heated seats and motorbike grips

PTC Ceramic Heaters (on underbody or brake zones)--- Many modern cars (Ford, Toyota, BMW, etc.) use PTC ceramic heaters behind mirrors and at the base of windshields. (issue: might not melt thicker ice)
1
Maybe a spray at the front that sprays salt or sand to make roads rougher?

Anna:

LINKS
[Multiple crashes reported after snowfall leaves messy conditions on Toronto roadways | CBC News](#)
[Spike in vehicle collisions in Sudbury due to weather and human error | CBC News](#)
[Nearly 300 Edmontonians reported crashes this weekend](#)
[Multiple crashes, spinouts on snowy roads as winter bites B.C.](#)

Solution:
- Enhanced tires
  - Uses porous materials that are already currently implemented in pavements such as the ones used in newer Russian roads.
  - This can also be implemented into rubber using leaching
  - This reduces the thin layer of water on ice, which also in turn also reduces the problem of slipping on ice.
  - We can also apply microfibers to the surfaces of tires to further increase friction. Gecko tape is already being manufactured, but there has not been a large-scale implementation into tires and car parts.
    - Testing has proven that aforementioned tires are reliable, sustainable and effective

- Find out why these solutions have not been implemented efficiently

Substitute
- What can be replaced?

Combine
- What can you combine?
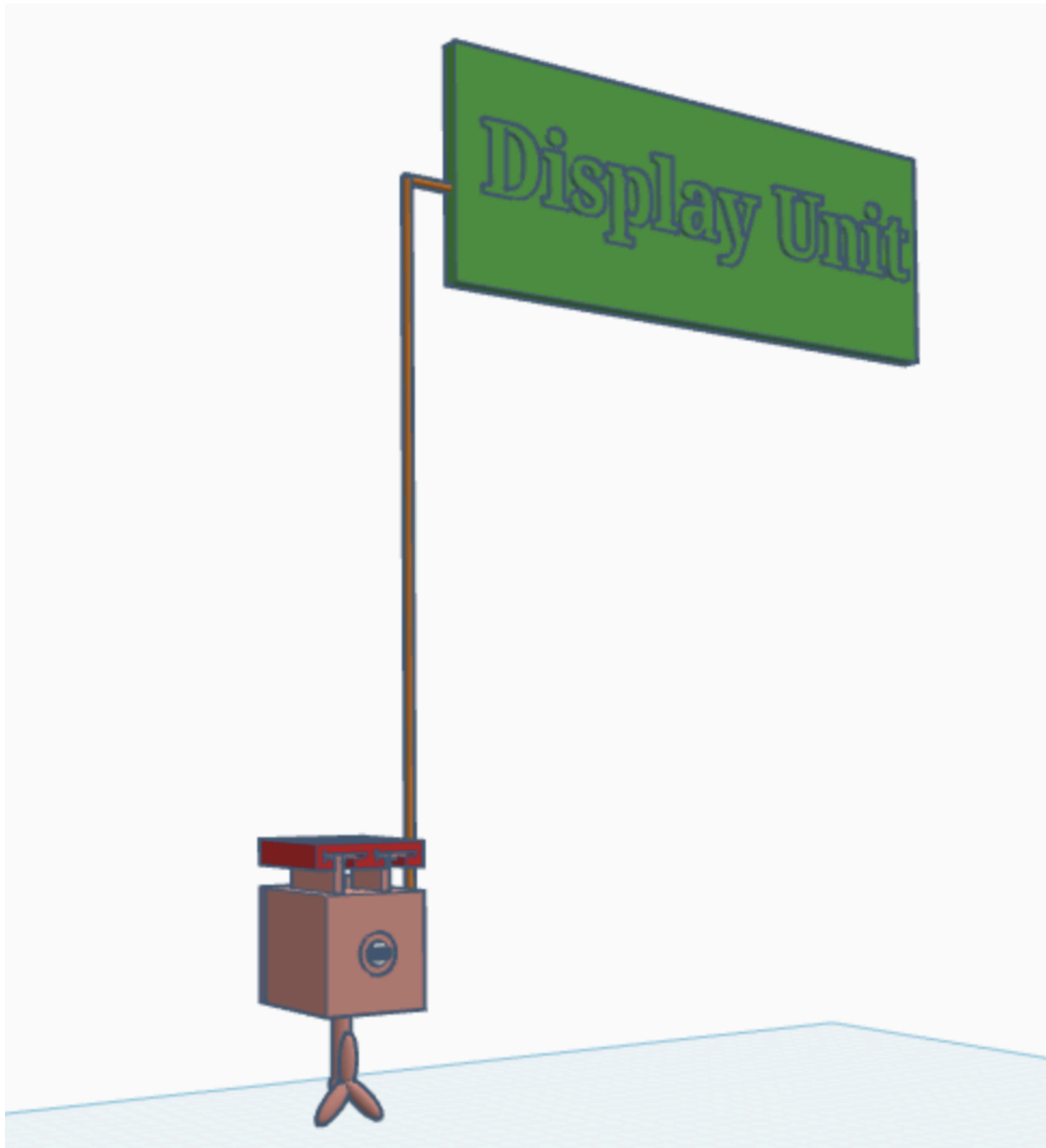 - Make sure your target market is not alienated (make sure your product is familiar)

Adapt

Modify

Put to another use
- Look at the solutions from other industries and try to apply it to your issue (?)

Prototype

Unit that has been calibrated and set up to the car

User Setup Manual:
1. Obtain the sensor box, it is roughly cubic, and has rails protruding from the top, as well as a windmill. The rails are at the top of the box, and there is a hole in the front of the box.
2. Push the 8mm Germanium Lens into its slot through the open back of the sensor box. It will click into place.

3. Push the sensor into the box through the back of the box until a click is heard. It will also click into place
4. Push the AI microcontroller chip into place from the back. It will similarly click and secure itself. The thermometer must be exposed through the hole in the top when the microcontroller is in place.
5. Screw in the back plate of the sensor box using nails provided. Make sure the groove on the back plate aligns with the hole in the box that accommodates the thermometer.
6. Use superglue to attach the rail to the bottom of the car. It should be as level as possible.
7. Slide rails on the sensor box into the rails glued on the car. It will click and lock. Ensure that the camera faces the front of the car.
8. Attach ultrathin cables to the exit port of the sensor box.
9. Attach the other end of the cables to the display panel.
10. Take off the protective cover on the sticky screen, and attach to the upper left (or lower left) corner of the windshield.
11. Drive, and the system will operate.

ICELERT

WINTER DRIVING SAFETY
SENSOR AND CAMERA

Agenda

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Business Plan

Rules:
- Ensure there is a **Table of Contents**
- **Consistent formatting** in terms of headers, fonts, colours, etc.
- Just because it's a business plan does NOT mean you can't add visuals. **Visuals** are a great way to break up heavy blocks of text and make it more engaging for the reader
- Include **footnotes** or **citations** to back up your facts and findings
- Be **concise** and to the point. Your plan shall **not exceed 5 pages**
- The structure below is just a general guideline - you do not have to follow it exactly
- Include an **Executive Summary (One Pager)** but remember this gets **written last** – it acts as an **overview** to your entire plan

1. **Company and Product - Introduction to our company →** <mark>Nicole</mark>
- ~~Who are we + our values → include logo, name, visuals, etc.~~
- ~~Introduction to product → show our product through prototypes with labels, explain how it works~~
- ~~Big vision → **NOT IN SPECIFIC ORDER:** explain what the vision is for the product (how does it serve customers and why should they buy it?) and make sure the purpose/impact is clear, include our vision for the future as well (e.g. with our product, we envision a _____ future . . .), include core principles, *WHAT MAKES US DIFFERENT*~~
- ~~NOT MUCH DETAIL → just like a hook~~

2. **Opportunity/Problem Identification and Market Research →** <mark>Tiffany</mark>

Market Problem vs Opportunity

Market Problem: specific pain point or challenge faced by a group of people (your target market). It's the gap, frustration, or inefficiency your product or service aims to solve.
Market Opportunity: potential for your business to grow by offering a solution to that problem. It reflects unmet needs, trends, or gaps in the current market.

- Use the gathered data from the form and explain what we can extract from it → CONVINCE the judges that our problem is one worth solving by explaining how our problem is one faced by people all over the country
- Identify whether our problem is a market problem or opportunity →include research and

current trends: consumer trends, economic/social/political factors that influence your business
- Analyze strongly

3. **Market Analysis** → <mark>Anna and Vincent</mark>
- ~~Target Market → define customer, demographic, why they would want your product, what consumers are currently doing~~
- ~~VERY SPECIFIC → include how our product appeals to these specifics~~
- ~~Name other competitors: describe the nature (what the industry is like), highlight our uniqueness, strengths and weaknesses of competitors, why we're better~~
    - Glaze.

4. **Sales and Marketing** → <mark>Anna and Vincent</mark>
- Method of reaching our target audience and tone of communication (e.g. persuasiveness, humour, appeal, etc.)
    - How will they discover our product? (e.g. word of mouth, social media, newspapers, ads, billboards, etc.)
    - Out line and clearly identify use
    - Creative marketing campaigns that would appeal to our target audience
- ~~Pricing → price of product, breakdown our costs of production, materials, competitor's prices, and expectations/supply and demand~~
- ~~Retailing → where are we selling our product (e.g. in person or online), our appeal and how we want to look on the shelf~~

5. **Finances** → <mark>Harini</mark>
- Expected costs and revenue to show how our project would be possible → how soon to expect profit
- Revenue → price x quantity
- State major costs → include assumptions and justifications for costs
    - Major costs: general & administrative, rent, marketing expenses, cost to purchase inventory or raw materials, shipping, labor costs

6. **Appendix** → <mark>Nicole</mark>
- It is not for putting in content that you could not find space for elsewhere. Don't pad your appendix for the sake of adding more information and make sure each bit of content you put into your business plan adds value to the reader (or investor).
- Keep it simple! Label any diagrams, charts, spreadsheets properly. What is the long-term growth plan for your company? (i.e. expanding to other products, expanding to other countries or different target audiences, etc.)

Presentation:
- Summary of the business plan
- 10 min presentation, 10 min Q and A

The Hook:
- Hook the audience with realistic scenarios (tell a story)

Introduction of the idea:
- Introduce your company and your vision (who are you, what do you do?)
- What do you want to accomplish?
- Differentiation (why would a consumer buy your product?)

Opportunity or problem identification
- ~~What problem are you solving~~
- Prove that opportunity exists within the problem
    - Show your market research
    - Define your target market (demographics, geographic, psychographic, behavioral)
    - Differentiate yourself from your competition

Business model:
- Restate your solution
- Explain your business model/idea/product
- Present distribution channels (how do you get the product to your customers?)
- Present operations (where are your materials and supplies from, do you have any partners that will help?)
- Explain feasibility

Marketing:
- How will you inform customers about your product
- What kind of campaigns will you have?

Finances:
- ~~Product sale price~~
- ~~Costs~~
- State assumptions about finances and justify them
    - Know exactly where certain numbers came from

Appendix (lowkey optional):
- Backup slides for additional information
    - Additional research

- - Additional finances
  - Marketing examples
- Anticipate the questions that will be asked and adjust the appendix accordingly

<u>Prototype:</u>
- Present a physical version of the product being sold or be able to show an online version - an app (likely not feasible right now) or website that allows us to show that our service can be implemented/is realistic

<u>60 Second Video Pitch:</u>
- Contains the following information - can include more if time provides so:
  - Group name + the names of all the members present
  - Who our product is targeted towards (mainly drivers across Ontario/Canada)
  - What problem we are trying to use our product to solve/improve:
    - <u>Problem:</u>
      - How can we prevent congestion/accidents caused due to ice on the road, among other secondary effects caused (eg. carbon emissions)
  - How does our solution help solve the issue:
    - <u>Solution:</u>
      - Thermal sensor attached to vehicles that help reduce rate of collisions due to ice (more importantly extreme conditions such as black ice)
      - The use of this sensor can be used in collaboration with insurance companies in order to validate insurance claims
      - The information received from the device will allow city council teams responsible for clean up methods (de-icing, de-sanding) to be more efficient in placement, increasing safety
  - Essentially, the video pitch is a more condensed/focused version of the overall presentation

Market Analysis and Marketing - Anna and Vincent

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Research

Primary Target Market Demographic:
- Age: 25 - 60 years old
    - 🌕 Start at 25 because a lot of people have graduated by now and have settled into a job, earning stable income, which allows them to be able to afford and have need for our product
        - People at this age are often focusing on their careers, which require a lot of transportation which is why the age of 25 makes an ideal start target
    - 🌕 End around 60 because many people retire by this time and have less of a need to drive, *especially* those living in populated areas where congestion is a major problem
    - 🌕 Everyone in between, that is part of the working class, is a major target for us, specifically those that need to travel quite a distance to get to and from work

- Location: *major cities* and areas with extremely harsh winter conditions (rural areas)
    - 🌕 We will target major cities, especially ones that face a lot of winter problems,

because congestion is a significant issue in this area, which aligns with our problem statement of excess energy/fossil fuels being burnt to maintain efficiency due to accidents.
- We will also target rural areas to assist drivers who may experience harsher and more dangerous driving conditions

- Specific Occupations:
  - *Drivers:*
    - Truck drivers → transporting materials a lot in the winter, and burns extra energy due to excess heating, longer travels, and more
    - Carpoolers → drive to various locations, and requires extra safety in the winters since there's a lot of ice and a lot of people are in the car
    - Taxi drivers → main job is to drive people all day so our product would ensure the safety of the driver and their passengers
    - Chauffeurs → they need to drive important people safely through varying conditions (they would be willing to pay more to better ensure their safety

  - *Government:*
    - Find specific areas to focus on and fix, which reduces cost on transportation to search for places, less time and resources wasted on less important tasks, and overall reducing accidents by increasing the efficiency of cleaning/emergency services
    - By reducing accidents between drivers on the road, public transit can also benefit by not being slowed down by these accidents, which can make the lives of others more efficient as well

  - *Insurance Companies/Users:*
    - Allows people under the companies to support their cases with evidence so insurance is fairly compensating their users and also not losing money
      - Insurance companies won't lose money if there is evidence against a driver's claim

  - *Autonomous Vehicles Companies*
    - AV companies would want our product to increase the safety of their AV's (allows them to determine road conditions and adjust driving styles accordingly)

Current Market/Companies:
- The Automotive Thermal Imaging market is worth about $1.2 billion in 2024, and has a projected compounded annual growth rate of ~8.5% per year until 2033, where it will reach $2.3 billion
- Most current companies use Uncooled Microbolometer sensors which are the cheapest,

but most basic variant. This type compensates for ~60% of the market.
- As of now, only luxury vehicles are mounted with thermal cameras as a driving aid. Thermal sensors are not widely available for people in lower tax brackets.
- Current Automotive Thermal Imaging market structure:

    🌕 ~48% share in 2026, 12.6% CAGR

    🌕 ~52% in electric vehicles, government/transport vehicles, and other utility vehicles.
- Electric vehicles have a CAGR of 16.8% in this market (highest of all vehicle categories).

Why We Are Special and Different

Brainstorm:

- Keeps people safe

- PLACED ON CARS rather than roads to allow for more real-time data

- Differentiates by using real-time sensing rather than having to check the weather app and making predictions
    - Allows quick reaction to safety

- The *mobile app* allows the universalization of safety throughout the area by informing others of real-time accidents or locations with ice so people ensure safety
    - By using apps as they would

- Use of sustainable materials to make other parts of the camera

    - Use of **recycled aluminum?**

        - Used to make frames of plane which means that it is durable

    - Use of old ship materials so they can recycle materials when shipbreaking

        - Shipbreaking is a really unsustainable activity

            - By reusing materials extracted from shipbreaking, we are able to reduce the amount toxic materials that can build up from piles of broken ships
                - Less contamination and accumulation of rust and metal remnants in soil

- EXAMPLES: **recycled aluminum, steel, and copper**

- Competitors are more expensive → thousands of dollars per camera

    - If we can complete the same task, or a task to a similar extent at a much more affordable price, it helps us stand out amongst the rest

Main:
1. *Real-Time Detection*
    a. Rather than placing our cameras on roads, our device allows the user to attach the thermal sensing camera to their own vehicle, allowing them to detect ice, snow, or any other hazards as they're driving. Users will be able to cover more area and experience the effectiveness of the camera firsthand, and their data allows for more accurate spread of information as the detection is done *as* the user is driving.

2. *Sustainability*
    a. Other than the thermal sensing portion itself, the camera will be constructed out of recycled materials, in hopes of reducing waste in other industries. Specifically, parts of the camera, such as the casing or clips, will be made out of recycled aluminum, a durable metal that is often used for framing aircrafts and ships. When these transportation sources are broken down, there is often a lot of pollution and unsustainable consequences as a result. Specifically, when ships are broken down, the build up of old metals create an increase in toxins and pollutants escaping into the environment, harming the life currently existing there. By taking those materials and putting them into use, there is going to be less build up, and ultimately less toxic materials being released into the environment.

3. *Cheaper Alternative*
    a. Our camera is only a couple hundred, but can save a lot of money in the long run by preventing accidents and reducing waste of resources to manage roads. By spending $300 on a camera you can save thousands in hospital builds, and the government or other companies can save a lot of money from broken vehicles, ice for roads, etc.

Competitors:

Prylada (Installed on roads, not vehicles)

Intelligent Vision Systems (Doesn't have an app)

Trafficalm (Installed on roads, not vehicles)

Lufft (Installed on roads, not vehicles)

Vaisala (Measures temperature of surroundings for uses that allows humans and plants to grow rather than stay safe)

Drawing From Data

1. *Population*
    a. Most respondents came from Ontario (58.7% out of 46 respondents)
        i. Influenced by York University location → most members in our group are from Ontario, so our form was more likely to reach people within this province
        ii. Ontario is the province with the largest population, and also has many major cities that face congestion in both the summer and winter
            1. The people in this province would benefit greatly from our product
    b. Second-highest rate of respondents came from Alberta
        i. Influenced from the fact Anna reached out to a lot of people directly
        ii. Alberta has some of the worst weather conditions in the country, with temperatures dropping to -50 degrees Celsius in the winter
            1. This means that it is inevitable for ice to cover the roads which will ultimately contribute to an increase in accidents
                a. Worsened by the fact that Alberta does not make winter tires mandatory → increase in skidding
    c. *ONLY* provinces that make winter tires mandatory → Quebec and British Columbia
        i. Although winter tires are mandatory in those two provinces, the province that reported the least amount of road accidents was Ontario, but accidents are still prominent
            1. https://www.insurancebusinessmag.com/ca/news/auto-motor/manitoba-tops-canada-for-road-injuries-as-weather-worsens-515904.aspx
            2. Means our product will be beneficial to all provinces regardless of mandates

2. *How often do you drive during the winter time?*
    a. Majority of respondents drive everyday (32.3%) or often/4-5 times a week (26%)
        i. This means our target audience has been reached because having to drive 4-5 times a week or everyday aligns with the schedule of someone who has to attend school, go to work, or drop off a child from school before attending work
            1. Some people who answered that they never drive in the winter later explained that they are *driven*, which still supports our problem of a lot of people on the road at once in the winter → congestion
        ii. Concludes the fact that a lot of people are on the road in the winter → even if they aren't out every single day, most people are still going to be driving or being in the car with someone who has to drive

   iii. There is still a chunk of people who rarely drive outside or never drive (that don't get driven) → we can draw a couple assumptions on why this would be the case:
     1. Fear of getting into accidents: our product would help target these worries by giving the user extra security by increasing their spatial awareness and
     2. Not wanting to be slowed down in the extremely congested areas when driving
      a. That's why there's the existence of snow days → less traffic and people don't have to be worried about accidents
  b. The assumption that people choose not to drive due to fear can be supported by the results of the next question

3. *Have you gotten into accidents or lost control on the road due to weather conditions (e.g. blizzard, ice, snow)?*
  a. The majority of the respondents (63/96, 65.3%) stated that they *have* been in accidents due to weather conditions, whether they were the ones driving or in the car with a driver.
   i. Emphasizes the need to address our problem
   ii. With our product, we can hopefully reduce the percentage of people that have been affected negatively by weather when driving

4. *What winter driving issues have you personally experienced? (Select all that apply)*
  a. Results:
   i. 88.5% = 85 → slippery roads
   ii. 61.5% = 59 → congestion
   iii. 54.2% = 52 → skidding
     1. The top three major problems are all taken into consideration when we make our product
     2. Numbers highlight how winter road conditions directly contribute to dangerous driving situations → risking injury or life loss
   iv. Stress from traffic can result in bad mental health and overall quality of life

5. *How often do you check road/weather conditions before driving in the winter?*
  a. 52.1% = 50 / more than half → respondents claimed that they *often* check, leaving times where they don't
   i. By implementing our product, even the most forgetful people will be able to be aware of their surroundings
     1. This is extremely helpful in the wintertime as people are often in a rush after sleeping in or trying to adjust to the cold temperatures
  b. The amount of people that rarely, always, and never check road conditions are distributed pretty evenly, but in order to reduce the amount of collisions it's important that we increase the *always* section as much as possible

    c.   People's lives are at risk so it's important they are aware of the possible dangers that surround them

6. *Do you use winter tires during the winter?*
    a.   The number of people that DO NOT use winter tires in the winter is smaller than the number of people that do – with 16.7% of 96 (17 people) not using them
         i.   This number of people is still large enough to cause a collision and congestion on roads, which is why it's important for us to accommodate and find alternatives to minimize the result of an accident

SALES AND MARKETING

Marketing Brainstorm:

- Billboards and advertisements online

    - We want to appear more professional and credible rather than a trend (DOES NOT MEAN NO TRENDS)
        - Our product is something that could seriously save lives or make things a lot more convenient

    - Use humour in our advertisements to appeal to people
        - Do something at the start to catch the audience's attention
            - If we have time we could create a short skit that demonstrates the intro to our advertisement

    - **HOW TO GET MONEY FOR BILLBOARD + BILLBOARD LOCATIONS**
        - Show in the major cities we plan to target in areas with high levels of traffic so more people are likely to see + puts them in the situation of `being stuck so it's more convincing
            - Place the billboards near winter time, but not during the coldest months so people have time to buy and consider all the implications
               - Billboards should go from October/November → February
                   - December and January are the worst months for snow
                   - Consider the finances of the amount it costs to have a billboard for a month/months in the specific cities

- Advertisements

- Will require a business license/permit

    - Mandatory to inform people that our post is an advertisement

- Online ads and also in person on busses and other forms of transportation so cars driving by busses are more exposed

- <u>Fun Marketing Strats</u>

    - Collaborate with science/STEM creators and get them to test our product and review it → constructive feedback should be allowed as long as it's explained educationally to appeal to audience
    - Pop-ups around the city where they host images that give customers a chance to identify images of black ice

        - Give them mini prizes that relate to thermal sensing

            - Cheap thermal sensing toys, flashlights, etc.

Pricing:
- $325 cost
- $370 sale price ($45 profit per item sold)

Retailing:
- Online sales (websites like amazon, and on our own website)
- In-person sales (Canadian tire, MEC, Costco, Home Depot, Best Buy)
- Product packaging and presentation yet to be done

MA Compressed

Target Audience:

Demographic:
- 25-60 (perfect range for stable/disposable income, while having the need to drive/commute)

Geographic:
- Major cities

  🟡 Major cities play a major role in burning fossil fuels through additional time spent on the road thanks to congestion and accidents. By targeting a largely condensed demographic, ICELERT will be able to increase efficiency and decrease unsustainable energy.
- Rural areas

  🟡 Road conditions are especially treacherous in rural areas as road maintenance is scarce and may take time to arrive
    - Therefore, rural communities would make for a great target audience

Behavioral:
- Occupation-based (truck drivers, taxi drivers, carpoolers, chauffeurs, etc.)

  🟡 Would benefit from additional safety measures and peace of mind
- Institutions/organizations that would pay for data (ex. Government, insurance companies, AV companies, etc.)

Psychographic:
- Customers who value safety
- Customers who may have anxiety about driving/insurance and would pay for peace of mind

Differentiation (why we're better):
- Vehicle-based (not installed on the roads)

  🟡 Mobile (unlike our competitors)
- App-based communication network

  🟡 Allows information to be transmitted between users, preventing future crashes
- Sustainability and price

  🟡 Recycled materials

  🟡 Cheaper

Competitors:
- Prylada (Installed on roads, not vehicles)
- Intelligent Vision Systems (Doesn't have an app)
- Trafficalm (Installed on roads, not vehicles)
- Lufft (Installed on roads, not vehicles)
- Vaisala (Measures temperature of surroundings for uses that allows humans and plants to grow rather than stay safe)

Data/Stats:

Marketing Strategy:
- Billboards on roads
    - 🌑 October/November → February (December and January are the worst months for snow)
- Online advertising
    - 🌕 ???

Pricing:
- $325 cost
- $370 sale price ($45 profit per item sold)

Retailing:
- Online sales (websites like amazon, and on our own website)
- In-person sales (Canadian tire, MEC, Costco, Home Depot, Best Buy)
- Product packaging and presentation yet to be done

Citations

Marketing Statistics:

Billboards - https://www.bmediagroup.com/news/statistics-on-billboard-advertising/

- Study done by BMedia

    - 71% of respondents claimed they have seen a billboard at least once while driving → even more impactful since our product is related to driving and enhancing safety

        - 89% of those surveyed agreed that billboards were an effective way of marketing]

Billboards in Toronto:
https://www.goodkids.ca/news/how-much-does-a-billboard-cost-in-toronto-in-2024
https://www.billboardsin.com/ontario/toronto/

- Billboards recommended to run for 8 weeks

Colour Theory:
https://www.trustsignals.com/blog/color-psychology-and-trust-why-the-colors-your-brand-uses-matters
https://www.goodkids.ca/news/why-are-pop-up-shops-successful

What Next?

What Next . . . ?
- ~~Define problem and assumptions~~
- ~~Conduct problem interviews (30-50 users)~~
- ~~Analyse existing market data~~
- Test solution via MVP, landing pages, pre-orders
- Observe user interaction and refine

_ NOT OUR FINALIZED THING WHEN WE CREATE OUR FINAL BUSINESS PLAN MAKE SURE TO REVISE HOW THINGS ARE SAID*_*

Problem:
Canadians all over the country face problems stemming from the harsh winters and build up of snow and ice. As a result, drivers face unexpected congestion due to added materials on the road (e.g. ice, snow, sleet, etc.), resulting in more fossil fuels and unsustainable energy being burnt in order to try and maintain efficiency.

Mission
Our mission is to try and reduce the factors contributing to congestion, by finding solutions that are sustainable and inform the user of possible problems they could run into. Specifically, through the use of thermal sensing, a universal app, and other technologies connected to a user's vehicle, our product will caution the user of their surroundings when they're on the road, giving them more time to react and change their driving behaviour accordingly, ultimately reducing the chances of an accident and road blocks. In the end, we want our product to provide a safe driving environment to a large number of people in a manner that is effective and innovative.

Assumptions:
* Answer who, what, where, when, why so we can cater our product surrounding customer needs *

- Tricky driving conditions affect a lot of Canadians in different parts of Canada **(Who/Where)**
- Not being aware of driving conditions leads to a significant portion of crashes in Canada (and by extension a lot of congestion and traffic) (**Why)**
- All vehicles are impacted similarly by ice/winter conditions (**What**)
- AI + sensors + LiDAR + automation fully resolves the issue of vehicle/passenger risk (**What)**
- Human error is a primary cause for why driving accidents occur during the winter **(Who/Why)**

- Temperature patterns may change in the future, impacting adaptability/overall effectiveness of this technology (**When**)
- Users WILL care about notifications and change their driving behaviour accordingly **(Who)**
    - Market things that appeal to pathos, logos, and ethos
        - Pathos: talk about the amount of accidents that occur to appeal to a user's emotions
            - Convince them of the importance of reducing accidents and "guilt" them by presenting consequences
                - E.g. loss of lives due to reckless driving, they had a choice, etc.

Analyze Existing Market Data

Possible audience:
- Government
    - Road maintenance will cut costs by focusing on areas with severe black ice, instead of covering the entire highway with road salt.
    - Increases both road safety and de-icing efficiency
    - The temptation of cost reduction will lure the government.
    - Transport agencies such as GoTrain, Viva and TTC can purchase these devices to reduce delays by avoiding accidents. The efficiency increment is one that is much demanded by the public, which makes it a tempting option.
- Insurance Companies
    - Can use infrared devices to expose insurance scams.
    - Can prevent such companies from getting scammed and losing money, which means they will seek the product.
- Driver Commuters
    - Commuters who drive long distances to work (or other errands) may wish to buy this device to ensure their personal safety. Although, there is not really an incentive to buy these products unless the driver is hardcore.
- Self-driving Cars Companies
    - AV companies can mount infrared devices to increase safety of autonomous vehicles who may have trouble braking while skidding. When the device detects black ice, the self-driving car can automatically slow and proceed.
    - Helps build public confidence in AV, possibly increasing the popularity of AVs.

Current Market/Companies:
- The Automotive Thermal Imaging market is worth about $1.2 billion in 2024, and has a projected compounded annual growth rate of ~8.5% per year until 2033, where it will reach $2.3 billion
- Most current companies use Uncooled Microbolometer sensors which are the cheapest, but most basic variant. This type compensates for ~60% of the market.
- As of now, only luxury vehicles are mounted with thermal cameras as a driving aid. Thermal sensors are not widely available for people in lower tax brackets.
- Current Automotive Thermal Imaging market structure:
  - ~48% share in 2026, 12.6% CAGR
  - ~52% in electric vehicles, government/transport vehicles, and other utility vehicles.
- Electric vehicles have a CAGR of 16.8% in this market (highest of all vehicle categories).

Observe user interaction and refine
gather qualitative + quantitative data on how people interact with your product, even before you build a full version

Final Business Idea

1. **Company/Product**
   a. Who are you and what are your company values/mission?
   To reduce collision frequency on roads impacted by ice, snow, or other hazards caused by winter weather.
   b. What is the product or service that your company hopes to deliver?
   Our mission is to develop an attachable thermal camera kit that can detect black ice, and warn the driver in real time. Data collected using these devices can be uploaded into mapping services such as "Waze" to reduce risk for all drivers. Furthermore, this data can be exported to government services for faster road maintenance. All the aforementioned processes will minimize both the frequency and impact of car collisions.
   c. What is the big vision behind your company?
   To solve excessive energy consumption in cars in winter, which is caused by delays due to road accidents, which in turn is due to the inability of drivers to distinguish clean pavement from dangerous black ice.

2. **Market Research**
   a. Opportunity or Problem Identification: What market need is currently being unmet and thus, justifies the opportunity for your company to exist and thrive?
   Low latency and high fps thermal cameras are still not commercially available due to high cost to manufacture. Furthermore, detection systems that use AI to identify terrain are not widely developed.
   b. How do you know this is a market problem or market opportunity? Back up your findings with research. Are there current consumer trends, economic/social/political factors that influence your business?
   Thermal cameras are only used on high-end cars as a night driving aid. Those are often slow and are not specialized to detect surface properties (Like Specific surface textures, or heat signatures.) These are also not integrated with emergency reporting or road condition alert systems.

      - Transport Canada states that nearly 30% of cat accidents occur on snowy or ice roads, and obviously will lead to a higher rate of multi-car collisions and vehicle pileups.

      - There is a large growing consumer demand for advanced driver-assistance systems (ADAS) and affordable safety teach in non-luxury vehicles for safety.

      - The global ADAS market is expected to grow to 84$ billion by 2030, especially in technologies that enhance safety in all-weather conditions.

      - According to McKinsey & Company (2023) 72% of Car buyers globally prioritize safety tech over luxury features.

      - As the market of vehicles/car market are growing towards smart

vehicles/EVs and connectivity markets there is a high demand for more innovative roads safety technology for their cars, especially in the winter season in cities/towns across Canada.

- A CAA survey (2022) revealed that over 60% of Canadian drivers feel unsafe during winter driving, citing lack of visibility and sudden black ice, ice, and snow blocks are key stressors.
- Younger drivers and elderly drivers are also especially likely to seek help from tech that improves confidence and road awareness by preventing collisions from the weather.
  - It can prove a system of peace of mind especially for those who are drivers with EVs on bad weather.
-

3. Market Analysis
   a. Target Market: Define the consumer you're trying to reach with your product. What demographic do you want to reach? Why would they want to use your product? What are these consumers currently doing?

   b. Be specific when describing your target market. Include demographics (age, sex, geographic location, education background) and relevant psychographics.
   c. Competitors: Describe the nature of the industry and your current competitors. Make sure you highlight here how you're different from them. What are the strengths and weaknesses of your competitors? Why are you better than your competitors and how do you intend to compete against them?

4. Sales/Marketing
   a. Advertising and Promotion: How do you intend to reach your target audience and communicate with them?
      i. How will they find out about your product? (I.e. through social media, newspaper print ads, TV ads, billboards, etc.)
      ii. Make sure you outline each of these communication channels clearly and how specifically you would use them
      iii. Include any ideas for creative marketing campaigns and what they would look like
   ● Pricing: What will be the price of your product? Why is this reasonable with respect to your costs, competitor's prices, and expectations of your consumers?
   ● Retailing: If it's a consumer product, where do you want your product to be sold? Which stores and aisles would a consumer find your product? How do you want your product to look on the shelf?

5. **Finances**
   a. Crunch the numbers and show that your business model is feasible! What are your expected revenues and costs? How soon can you expect to be turning a profit?
   b. Revenues: Price x quantity you expect to sell
   c. State your major costs - wherever possible, state your assumptions for each cost and be able to justify them
      i. Major costs could include: general & administrative, rent, marketing expenses, cost to purchase inventory or raw materials, shipping, labor costs

6. **Appendix**
   a. It is not for putting in content that you could not find space for elsewhere. Don't pad your appendix for the sake of adding more information and make sure each bit of content you put into your business plan adds value to the reader (or investor).
   b. Keep it simple! Label any diagrams, charts, spreadsheets properly. What is the long-term growth plan for your company? (i.e. expanding to other products, expanding to other countries or different target audiences, etc.)
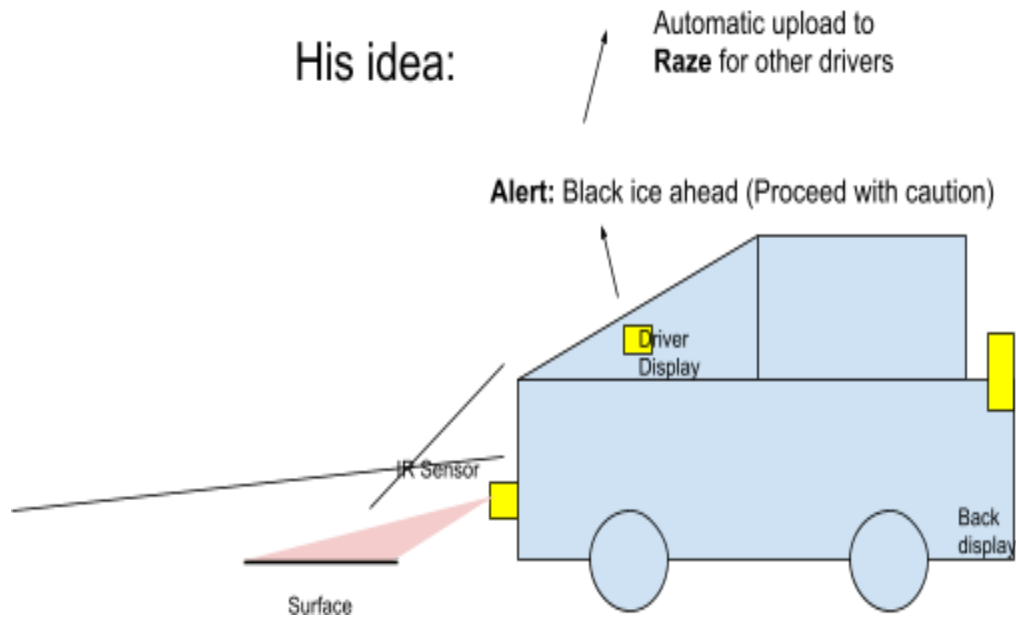
Notes from meeting

Roorda Notes

Notes:

- Car has an outdoor temp sensor on it - no alert/warning system if on road having ice on it
- Believes having a sensor would be useful - if alert comes on saying {you are driving on black ice/similar weather conditions' (one function)
- Windshield sensors that can sense if there is water/precipitation

- Thermal sensor pointing forward from car because driver needs time to react
  - Do research on whether or not tech has been used for that application
    - Already used on very high-end cars - not widely available
      - Proposing add-on (or modification kit) - stick on side of window
      - Black ice alert device
      - Info can be transmitted to cars behind - earlier warning that allows other cars to be safer (Ex. Waze)
      - Idea has effectively never been done before (specifically for black ice)
      - Could be done in collaboration with "Waze"

His idea:

Automatic upload to **Raze** for other drivers

Alert: Black ice ahead (Proceed with caution)

Driver Display

IR Sensor

Back display

Surface

- **How provinces/cities are impacted:**

    - Any small difference to collisions is huge impact for 2 reasons

        - People who are not injured in the accident

            - Vision Zero (reduce collisions down to zero)

        - Huge congestion impact from accidents and stopped vehicles

            - 30 - 50% of traffic congestion has to do with stalled vehicles and accidents

    - Human impact + congestion impact (small difference is enough)

        - 5 accidents per year allows for quantification of impact and importance of solution

    - **Can also be important information for road maintenance**

        - Info from sensors was posted on broader systems that people could access

        - Cities and ministry of transportation when they dispatch ice/salting/sanding crews have better info on where to apply safety

measures (where the black ice is)

- **Can solution have impact on pollution: (Secondary impact)**

    - Agrees that there will be

    - If congestion is reduced due to incidents - vehicles require less travel time

    - Primary impact is people safety

    - Small pollution reduction (GHG reduction)

- **Boundaries/Limits:**

    - How well tech works

    - Is info precise enough/accurate enough

    - Challenging to see far enough ahead on the road and to get accurate info in time to get a vehicle to adjust

    - Do not get drivers to overadjust (Drivers should not be alarmed too early/put into a bad position due to how info is displayed to them)
        - Eg. alert, alert, BLACK ICE! Please take foot off of gas

    - Physical part in that how can this tech be attached to the vehicle - have to make sure that add-on does not have safety impacts (impact other systems at play in vehicle)

Miller Notes

- Autonomous vehicles → you need a lot of sensors, what's going on, looking out for pedestrians, etc.
- **Big challenge is black ice**
- Drivers already have a visual sense of car control in winter
- Look into what is the technology for detecting precipitation and snow on the roads and what is going on in the autonomous vehicle world
- All new cars are connected onboard computer and onboard sensors (even not autonomous) → so we can send signals somewhere because the information is already collected but not much is being done with the information rn
- Could put sensors behind a vehicle so that the cars are anticipating it and slow down
- Problem with trying to solve black ice is that drivers don't know how to respond
- Build intelligence into the car so that when it senses certain conditions it can notify driver but also take control in times example of driving over black ice
- Limitation is the manufacturer specific - if u have a mercedes benz the information is going back to mercedes and if you have a toyota then its going to go back to toyota
- It's not his field to know whether our database collection is feasible or not
- He had an idea of like Google maps - not fastest route but the safest route for winters
- Other problems on the road:
    - Unexpected congestion
    - Not enough gas stations → when road trip from one city to another
    - Electric vehicle charging
    - Parking guidance app → On-street parking is misused and takes up a lane
    - Express bus lanes that TTC wants to put in
    - Offstream parking?
- Talk to Aleon Garcia who's in electrical and computer engineering (Eric will send us his email)
- China and Norway are countries more advanced with roads and EV

- Route guidance (avoiding tricky conditions or accidents)

Lindsey Notes

Lindsey Notes:

- Professor is familiar with the issue
- Canada has over 1 mil km of road - most unpaved

    - Cost needs to be high

    - Devices need to be spaced far apart

- Autonomous vehicles relay info to infrastructure/to each other

    - In principle, the idea sounds promising

- In case of trains, biggest issue is high temps - causes rails to expand and buckle
- What has already been done in some countries - Europe - is install sensors (when sensors indicate temps are high, danger of buckling is big, companies will stop trains from using that track until things cool down or reduce the weight of the trains - somewhat inconvenient)
- Installing sensors on large networks of rails would be quite extensive

    - Weather forecasts - localized (can be inferred what the temp of the rails will be)

        - Limitations - weather is finicky (same limitations can be applied to roads)

    - Temps can change in very short distances

        - Suggestion to make camera/sensors mobile would overcome the issue of temp changes

- In principal, the government should be ok with funding this product - which level of government should have responsibility for such things (mainly provincial and on the level of the cities, it is quite limited in how much money they can raise - lack power)

    - Technology suggested is more on the ==provincial==/federal scale

        - The people who use the system should be the ones who pay for it (one perspective)

    - Question to be considered: How will the costs be allocated between shareholders

- Major costs that could possibly be included:

    - Installation cost - major factor

        - If stationary (maintenance costs - fairly costly)
            - Inductor loops - can be quite unreliable (leads to gaps in data and inefficiency in operations)

                - If mounted on vehicles, problems can be overcome -

                    incentive required in installing them?

🌕 Question of population placement (Alberta/BC - big provinces with smaller populations)

- Ultimately, decision making should be made primarily <mark>provincial</mark>

Profit:

- Government revenue and costs matter

    - May not be able to fully support the cost

- Regular people driving on road are safer from black ice - we are beneficiaries but it will not pay a lot

- May not be profitable despite the fact that the service is worthwhile

Common reasons new transportation tech does not catch on:

- Many ideas fail to be successful despite well designed engineering

- Marketing is crucial in making something worthwhile

    - Informing people and connecting them to the system is important

Lindsey questions

Professor #3: Robin Linsey

Description:

Robin Lindsey is a deeply respected transportation economist at UBC, recognized for his academic rigor, leadership in transport policy, and active role in public discourse. His work bridging theoretical models with real-world congestion solutions continues to influence urban mobility planning in Vancouver and beyond.

Let me know if you'd like specifics—like his most cited papers, current projects, or student experiences!

Shad: month long program where high school students across Canada come together to work on various projects. One of the projects is our design entrepreneurship on transportation. We have to find a problem in transportation and find a solution.
Our pitch
    Thermal sensors that sense ice on roads.
Solution:

- Attachable thermal camera kit that can detect black ice, and warn the driver in real time. Data collected using these devices can be uploaded into mapping services such as "ways" to reduce risk for all drivers. Furthermore, this data can be exported to government services for faster road maintenance. All the aforementioned processes will minimize both the frequency and impact of car collisions.

Questions:
1. What costs do you believe that we need to assume while making this business/product?
   a. How soon would you want us to expect profit from our business in order to be considered successful in our plans/designs
   b. What are the major costs: general & administrative, rent, marketing expenses, cost to purchase inventory or raw materials, shipping, labor costs
2. How would you figure out if spending money on thermal sensors is actually worth it, compared to the benefits like fewer car crashes or better road maintenance?

3. Do you think the government would help pay for or support this kind of technology in places with really bad winter roads? Why or why not?

4. When a new technology makes driving safer, how can we tell if it's a smart investment for cities or companies?

5. What are some common reasons why new transportation technology doesn't catch on, and how could we deal with those challenges for our idea?

Finance

Finance
- ~~Expected costs and revenue to show how our project would be possible → how soon to expect profit~~
- ~~Revenue → price x quantity~~
- ~~State major costs → include assumptions and justifications for costs~~
    - ~~Major costs: general & administrative, rent, marketing expenses, cost to purchase inventory or raw materials, shipping, labor costs~~

Contribution margin is the selling price per unit minus the variable cost per unit.

$350 CAD raw materials
Selling price = $500
<mark>Year 1 target → 400 units sold</mark>

500 x 500 = $250 000 CAD
Fixed cost = $66 000

Variable cost per unit is $230 ($220 inventory cost and $10 shipping)

Contribution margin = Sales - Variable = 500 - 230 = $270
Fixed costs/profit per unit = $66 000/270 = APPROX. 245 units to breakeven (244.44)

CM is directly proportional to the number of units sold. So lesser number of units sold means lower gross profit and higher number of units sold means higher gross profit.

*Gross profit minus Fixed Cost will be your Net Profit*

need to sell at least 245 units in order to cover your fixed and variable costs. Anything lower means you will not be able to cover your fixed costs and will have a net loss

Cost Category	Estimated Cost (CAD)	Notes
General & Administrative	$25, 000 / year	Salaries for management, accounting, office expenses
Rent	$36,000 / year	Small office or shared workspace, depending on city
Marketing Expenses	$5 000 / year	Online ads, events, PR, website development
Cost of Inventory / Raw Materials	$200 / unit	Based on updated raw material cost per device
Shipping	$10 / unit	Depends on shipping method and distance

Units Sold	Total Revenue	Variable Costs (230 × Units)	Total Cost (Fixed + Variable)	Gross Profit (Revenue – Cost)
100	$50,000	$23,000	$89,000.00	-$39,000.00
200	$100,000	$46,000	$112,000.00	-$12,000.00
Approx. 245	$122,500	$56,350	$122,350	$150
300	$150,000	$69,000	$135,000.00	$24,000.00
400	$200,000	$92,000	$158,000.00	$42,000.00
500	$250,000	$115,000	$181,000.00	$69,000.00
600	$300,000	$138,000	$204,000.00	$96,000.00
700	$350,000	$161,000	$227,000.00	$123,000.00
800	$400,000	$184,000	$250,000.00	$150,000.00
900	$450,000	$207,000	$273,000.00	$177,000.00
1,000	$500,000	$230,000	$296,000.00	$204,000.00

Profit Chart
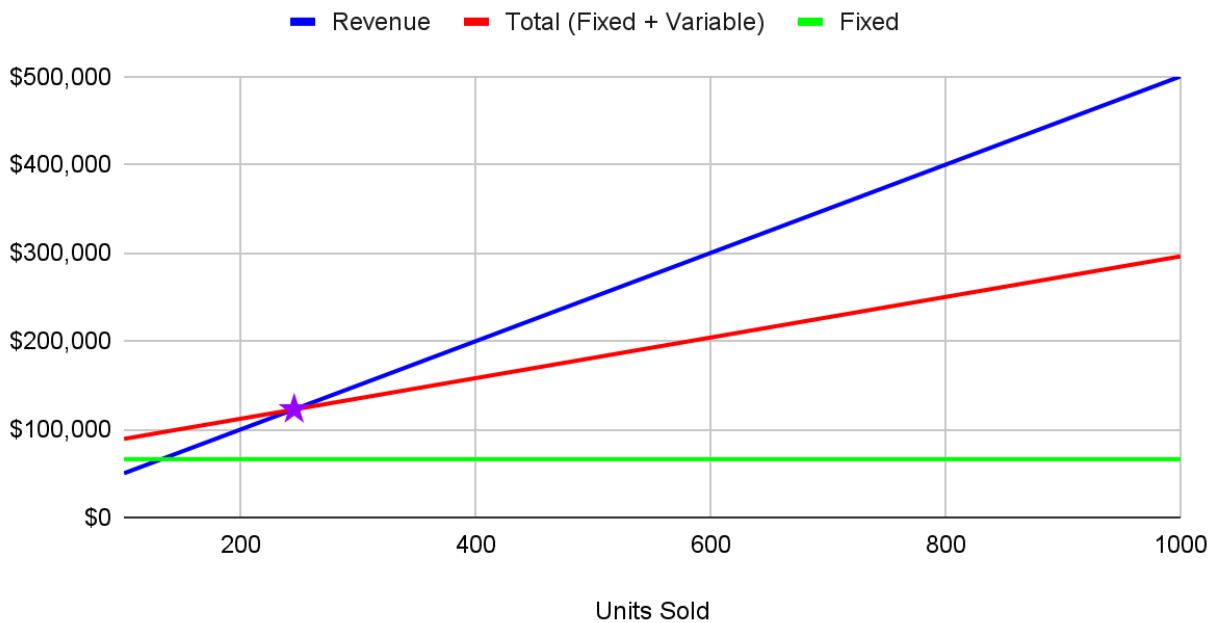
Purple star is the breakeven point

Market Problem and Opportunity

1. **Opportunity/Problem Identification and Market Research** → Tiffany

Market Problem vs Opportunity

Market Problem: specific pain point or challenge faced by a group of people (your target market). It's the gap, frustration, or inefficiency your product or service aims to solve.
Market Opportunity: potential for your business to grow by offering a solution to that problem. It reflects unmet needs, trends, or gaps in the current market.

- Use the gathered data from the form and explain what we can extract from it → CONVINCE the judges that our problem is one worth solving by explaining how our problem is one faced by people all over the country
- Identify whether our problem is a market problem or opportunity →include research and current trends: consumer trends, economic/social/political factors that influence your business
- Analyze strongly

SWOT ANALYSIS

Research:

a. Opportunity or Problem Identification: What market need is currently being unmet and thus, justifies the opportunity for your company to exist and thrive?

- Low latency and high fps thermal cameras are still not commercially available due to high cost to manufacture. Furthermore, detection systems that use AI to identify terrain are not widely developed.

- Thermal cameras are only used on high-end cars as a night driving aid. Those are often slow and are not specialized to detect surface properties (Like Specific surface textures, or heat signatures.) These are also not integrated with emergency reporting or road condition alert systems.

2. Transport Canada states that nearly 30% of car accidents occur on snowy or ice roads, and obviously will lead to a higher rate of multi-car collisions and vehicle pileups.

a. A single winter storm in winter in the GTA, resulted over 330 traffic

collisions, which even resulted in police alerts urging drivers to "See snow, Go slow"

    b. Toronto-data shows pedestrian/motor vehicle collisions peak during winter months, especially November-February suggesting a large seasonal spike in risk on the road.

    c. Average annual snowfall in Toronto is around 130 cm,

3. There is a large growing consumer demand for advanced driver-assistance systems (ADAS) and affordable safety tech in non-luxury vehicles for safety.

4. The global ADAS market is expected to grow to 84$ billion by 2030, especially in technologies that enhance safety in all-weather conditions.

5. According to McKinsey & Company (2023) 72% of Car buyers globally prioritize safety tech over luxury features.

6. As the market of vehicles/car market are growing towards smart vehicles/EVs and connectivity markets there is a high demand for more innovative roads safety technology for their cars, especially in the winter season in cities/towns across Canada.

    a. A CAA survey (2022) revealed that over 60% of Canadian drivers feel unsafe during winter driving, citing lack of visibility and sudden black ice, ice, and snow blocks are key stressors.

    b. Younger drivers and elderly drivers are also especially likely to seek help from tech that improves confidence and road awareness by preventing collisions from the weather.

        i. It can prove a system of peace of mind especially for those who are drivers with EVs on bad weather.

        ii. Or those who's not confident with driving on extreme roads.

7. Consumers are more open to technology that helps them with lowering insurance, or help them prove to their insurances.

    a. Car insurance is expensive especially in major provinces like Ontario and Alberta, according to the Bureau of Canada, the average premium in Ontario is over 1600$/year

    b. Drivers already have incentives to attach technological "Add ons" onto their cars like dash cams, which makes them more keen on purchasing our products (TBC)

        i. 73% of Canadian drivers said they'd be willing to share driving data with insurers if it meant saving on premiums or prevent accidents and have real-time evidence if any collisions exist.

8. Mass-Market vehicles:

    - Most everyday vehicles do not come with thermal road detections or surface detection for winter, even though these drivers are the most vulnerable during winter.

- Current winter safety features react after dangers start, they don't warn the driver before sliding occurs.
- Even current ADAS systems on mid-range vehicles don't detect icy condition on the road ahead.
  - We fill that gap by bringing predictive safety tech to affordable, non-luxury vehicles where demand is high.

a. How do you know this is a market problem or market opportunity? Back up your findings with research. Are there current consumer trends, economic/social/political factors that influence your business?

Market Problem: The current market lacks an effective, real-time, sustainable technological system for detecting and warning drivers about severe weather conditions on roads especially about black

ice, snow buildup on roads and other slippery road conditions. (Winter road hazards leading to increase in car collisions and congestion)

- Current technologies are more expensive, has limited features and usually only available on specific luxury vehicles (Thermal night vision in BMV, Cadillac), but even so, those technologies are very limited and do not have the technologies to be able to detect specific materials on the road like ours.
- Usually they also rely on static weather stations (RWIS)

  - Monitors and predicts road weather conditions to enhance safety and efficient in winter maintenance operations on the roads.
  - Field-based components that measure various weather parameters like air temperature, humidity, wind speed and direction, precipitation type + rate, pavement temperature + conditions, which the ESS data is later transmitted to a central system for processing and analysis.
  - However, these are often large sensors across roads which are not practical for individual cars and don't exactly help drivers as they don't warn drivers of the road conditions as they only analyze for a larger population not for individuals like our sensors.

  Real-World Impact:

- Black ice is one of the most dangerous driving conditions due to its invisibility.
  Leading cause of single-chicle spinouts and multi-car pileups, especially on bridges, and large city roads.

- A 2023 CAA survey found 60% of Canadian drivers feel unsafe in winter due to road condition unpredictability.
    - Traditional solutions (Snow plows, road salting, static sensors) cannot detect black ice in real time or communicate localized risks to individual drivers.

Market Opportunity: With the growth of ADAS (advanced driver assistance systems) and connected vehicle infrastructure as well as EV cars. Consumers now expect more intelligent technological tools for cars especially ones related to weather safety and overall car safety sensors, and because of these changes and expectations in the current market, consumers are more willing to purchase our products which is our market opportunity.

- Our sensors can be installed on existing non-autonomous vehicles and EV vehicles, making it very accessible.
- The connected vehicle market is expected to reach $215 billion by 2027, which is related to the real-time data and driver assistance system markets. (Opportunity)
- Which can provide real-time road surface data

- Enhance winter driving safety (When our thermal technology detects hazardous conditions, it warns the driver immediately, like warning black ice on road before the tires lose traction)
- Also, after detection our data will be applied and fixed into our app which can also warn other drivers about the road conditions
    - New drivers or less experienced winter drivers can really benefit from our technology,
- Integrate into smart vehicle ecosystems (We are taking advantage of the current growing economy of EVs and smart technology for car weather safety to appeal to the driving community)
- Supports consumers insurance claim and validations by offering our data that we collect in order to prove insurance claims.

Governmental factors:

- Canada is actively working to reduce road fatalities and injuries especially in Urban areas.
    - Vision Zero, which is an initiative adopted by the major cities like Toronto, Edmonton, and Vancouver aiming to eliminate traffic deaths through technology, education, and better infrastructure.

- Our technology aligns directly with Vision Zero's goals, which can help us gain more customer base as well as governmental support such as funding.
- Programs like Ontario's Autonomous Vehicle Innovation Network (OVIN) can help us with the financial problems of our technology. Which they supports R&Ds and startups building connecting vehicles and better safety technologies like our sensors.
    - These programs help fund sensor development, smarter infrastructure pilots, and other EV-related innovation for smaller developing companies like ours.
    - offers various funding opportunities, including up to $500,000 for the Regional Future Workforce Program and up to $100,000 for the R&D Partnership Fund, Electric Vehicle (EV) Stream 1.
- Transport Canada is increasingly open to safety innovation in the automotive sector.
- Many Canadian cities and provinces are investing in climate adaptation stratifies, including better winter road maintenance and hazard detection systems.
    - Our system can support public safety in the face of increasingly unpredictable winter weather for which many current Canadian cities are investing in and are fond of.

Weaknesses:

Threats:

60 Second video

60 Second video — put descriptions of each clip

ALL IN REAL LIFE (no cartoon)

Clip 1: do a first person POV (From the drivers POV) of driving a car in the harsh winter and after 3 seconds the car swerves and then it goes to a bird's eye view of the road and the car continuing to swerve as the ICELERT text reveals as the car moves down the road.

Clip 2: police come in to inspect the crash, zoom in to someone on their phone, the person opens an app called ICELERT (puts the logo on the phone). They report the incident on the ICELERT app. It flashes to a car getting a notification on their dashboard that there is black ice and to proceed with caution. MAKE SURE ITS REAL LIFE, NOT CARTOON. Make sure everything is spelt correctly.

Clip 3: Realistic full-screen view of the ICELERT mobile app interface. The app shows a detailed live map of a city covered in light snow. Multiple black ice alert notifications begin to appear on roads — marked with red warning icons or flashing areas. Unsafe roads are highlighted in red, safe detour routes in green. The camera pans slightly or zooms to follow new alerts appearing in real time. The interface is clean, modern, and highly responsive — no physical phone shown, just the app screen as if screen-shared.

Clip 4: driving a CLOSED black car (dont specifically show any driver in the car) in the harsh winter BUT NOW the car has the ICELERT thermal sensor attached at the CENTER FRONT under the hood of the bottom of the car (with a red light scanning the ground to visually show how it kinda works in theory but in practice it would not actually show a red light) so the driver could slow down before the black ice on the road so the car does NOT swerve and then it goes to a bird's eye view of the road and the car being safe.

Clip 5: CAMERA AND MODEL

Clip 6: maybe we should do a "interview" with some of our members about why we created it too? Like they can just talk about their experiences and stuff? Just an idea so we don't have to use 100% AI

Clip 7: We can show stats about crashes (maybe put this after the crash instead idk)

Clip 8?: Put the logo again and we can discuss what we want

SCRIPT for Voiceover

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One second, thats all it takes to lose control

Thats why we created ICELERT, to make sure you are not the next headline

With real-time ice detection, community reporting, and location-based alerts, ICELERT keeps you informed before the danger hits

We're not just building an app. We're building a safer network for every road, every driver.

Our thermal imaging system analyzes road temperatures in real time — detecting black ice before you even know it's there.

ICELERT helps prevent accidents... before the drive even begins.

10 Min Question Prep

1. Why hasn't it been done before (what are the issues with our solution)?
   a. Thermal technology used to cost hundreds of thousands of dollars each, which is why they were only put in luxury cars (BMW, Cadillac) for pedestrian/animal detection.
      i. These night-vision technologies use wide-angle thermal cameras to capture entire sciences which requires larger lenses, more advanced sensors which increase it's price per unit.
      ii. Ours is more compact which focuses only on road temperatures and patterns directly under/near the car, not it's whole environment. Which makes the costs of our sensors much cheaper.
      iii. Now that EV cars are more prominent, and technology has improved, the prices of these technologies have significantly dropped.
      iv. Other startups have tried using basic sensors (like infrared thermometers are much earlier AI models.)
         a. Which in this case, struggles to distinguish black ice from wet roads or snow.
         b. They also lacked enough data to train AI models for real-world conditions.

2. Is your product a viable and scalable solution:
   a. Thermal sensors are already widely used in drones and security, meaning the tech itself is mature and reliable.
   b. Using well pre-trained AI-powered image and pattern recognition is standard in safety tech (Dash cams, and ADAS)
   c. By focusing only on road-surface hazard, we can save cost on making smaller, cheaper thermal sensors which keeps our prices affordable for everyday drivers.
   d. Scalability: Our sensors works on any vehicles, not just newer models which means we are able to touch into the larger addressable market without the need to depend on the type of automobile (easy to install and connects to a simple app which can be utilized by any person and any vehicle.)
   e. Other than Hardware sales, we will also be able to have recurring revenue potential thorough data partnerships where we will be able to sell our collected data to other companies for use.
   f. Economies of Scale:
      i. As our production scales higher due to advertisement, certifications and increase in sales. The costs of our sensor costs will drop significantly, which means that our per unit costs will drop and our profit per unit will increase. (Meaning we will be able to increase our sales and lower costs)
   g. New features.
      i. We will keep improving our products, we will have on our app and other reviewing/improvement a "feedback section" which helps us gain insight of what

improvements/ features our products should have or what our customers want. Not only does this feedback helps us train our AI faster and roll our newer features like Dash cam integration, and road traffic route predictions in the future.

ii. By constantly adding what our customers want, we increase satisfaction, retention of sales, and increase our revenue, while making our system the go-to standard for winter road safety.

3. How are we going to train the AI, and how much will that cost?

Using VR simulations for promotion and as an opportunity to train our AI system without actually having real life crashes.

- We use the VR driving simulator to recreate varied winter roads conditions (black ice, wet roads) Integrate thermal behavior models (how different surfaces reflect/absorb heat so the AI can "see" realistic temperature maps.)

- Let users "drive" in the simulator Track how they respond to hazards when the system warns them, which gives data for AI hazard recognition and human alert timing, which we can use this synthetic dataset to pre-train our AI system, then later apply with real-world data after getting sales and testing data. (Saves cost of acquiring another separate data set for training, reduces safety risks during development.)

    - We build or rent a VR driving simulator to replicate winter road conditions:

        - Black ice, wet roads, slush, compacted snow, etc.

        - Varying speeds, temperatures and vehicle types.

    - We allow users to utilize VR simulations to experience driving through simulated hazards with our systems.

        - We will then collect that data on:

            - How the AI recognizes hazards

            - how fast drivers react

            - When alerts are the most effective

            - System errors.

    - We use this synthetic dataset to pre-train our AI system, so that it can classify and recognize hazards before we collect thousands of real-world samples after launch and sales.

        - After our initial sales, we use those data along with our simulated ones to

refine our AI systems, which prevents unnecessary crashes during testing phases, while keeping development fast and safe.

- Our tactic avoids liability from testing on actual black ice or dangerous conditions.

- Our simulators trains and provides customer marketing.

- Partner with Universities and VR labs to reduce the costs of the technology like commercial-grade simulators and VR headsets.

4. Insurance and installation? (who is paying if something goes wrong)
    a. Typically the driver is the one paying for the product, however installations will be done by certified technicians
        i. Which means if something breaks during installation, our insurance will cover repairs.
        ii. Our system is nearly a driver-assist tool, not an automated control system, so the drivers are still responsible for driving decisions.
        iii. Should there be an error or problem with our product, each person will have warranty to fix our sensors.
    b. Insurers will likely endorse or subsidize our product because it saves them money by reducing collisions and claims saving them money and effort.

Response:

Installation will be handled by certified technicians so it doesn't void warranties, and the cost can be covered by the driver, fleets, or insurers who want fewer winter claims. We'll carry product liability insurance for any installation issues or rare malfunctions, but because this is a driver-assist tool — not an autopilot — the driver remains in control. Our goal is to work with insurers, not against them, so they help subsidize or discount the system for drivers, since it ultimately saves them money.

5. Would insurance companies approve of car modifications?
    - Insurance companies can accept car modifications but it depends:
        🌕 The installation of the product depends on how it is installed
        🌕 The products safety/testing certifications
        🌕 They don't interfere with critical systems in the car
        🌕 And the modifications are properly disclosed

6. Would car manufacturers approve of car modifications?
    - Car modifications are allowed as long as they comply with the Motor Vehicle Safety Regulations and provincial and territorial traffic laws

- We mount it to non-critical, pre-existing mounting points (Like frame brackets) and not into sensitive parts like the frame rails, fuel tank areas, or crash structures.
  - 🌕 We use standard bolt sizing and hardware so the mount can be removed without permanent damage.
- Many cars companies/warranties already allow underbody accessories (tow hitches, skid plates, underbody lighting) when installed to approved mounting points.
- We can also work with the insurers and car companies to partner with them in testing phases to provide prove that our sensors are safe, and doesn't affect any of the original parts and performance of the cars.
  - 🌕 We will also offer data showing it reduces accidents, giving them incentive to endorse it.

Response:

Our sensors will use a secure bolted mounting system, similar to how tow hitches or skid plates are attached, using non-critical underbody points — not drilling into the frame or safety systems. We'll have the system impact-tested and certified so insurers and automakers know it's safe, removable, and won't void warranties. Plus, by involving insurers in testing, we can show how it actually reduces accidents and claims, turning them into supporters, not opponents."

Notes from the Business Meeting

- For the camera kit, give the user a stand that allows them to attach the app on their phone to the camera rather than make a separate screen

Cost:
- Decide on a specific demographic of people to sell the product to as it will be too messy in order for the solution to be beneficial for multiple types of consumers (truck and car drivers both) - it is easier to market/sell the idea of our product towards one market first
    - 🌑 Start with cars because the main problem being targeted is congestion

Adoption:
- How will the product be installed - if the user messes up in installation who pays for it
- How will the product be delivered
- How will we partner with car companies/with whoever we partner with - see if car dealers are ok, if cars are ok, if insurance companies are ok with this (insurance companies might not validate claims if the cars are modified) → Stakeholders
- Who is easier to educate in terms of the solution - a Tesla driver or a truck driver

- If we are going to truck dealerships, how are we going to convince them

Problem is for:
- Road

- Cars

- People who can pay

One Page Precis

Sources:

https://wscc.nt.ca/WinterDriving#:~:text=Driving%20in%20winter%20weather%20%2D%20snow.to%20decreased%20productivity%20at%20work.

- Around 30% of road accidents that occur in Canada happen on snowy and icy roads

https://simplyalignrehab.com/toronto-car-accident-statistics/#:~:text=Car%20Accidents%20in%20Canada.%20Did%20you%20know,year%20after%20drivers%20are%20given%20the%20license.

- Canada faces around 160 000 car accidents a year

- Approximately 22% of 6 000 000 car accidents that occur in the US are due to weather conditions