Milestone 1 - Group 33

Adarsh Patel, Jay Patel, Kaween Peiris, Mit Patel, Siddharth Dhanasekar

McMaster University

Innovate 1X03: The World of Entrepreneurship

Dr. Kenneth Owen

February 14, 2021

The problem we are addressing

Waking up early in winter mornings to shovel snow is a laborious task for working homeowners and the elderly who are not physically capable of the task. An article from Mondaq states that in the province of Ontario that "within 12 hours after any fall of snow, rain or hail has ceased", property owners must "clear away and completely remove snow and ice" (Shaw, 2020). Other provinces and countries that experience snow have similar regulations regarding snow. Furthermore, the "best time to shovel snow is in the morning" (Harris, 2020), explaining the need to shovel frequently, as "if it hasn't snowed again, the snow on your driveway and in your yard will melt slightly, causing the surface to be more slippery" (Harris, 2020). The need to wake up early in the morning to shovel properly can be detrimental to health, as those who work may not be receiving enough sleep, and those who have disabilities or are elderly, may not be able to manage the physical strain of shoveling. An article by Harvard states that "snow shoveling is a known trigger for heart attacks" (Harvard Health, 2020), in addition to other physical worries like back pain, knee pain, and minor injuries related to slipping. Due to the tedious labour required for shoveling snow, as well as the health risks and time constraints that it causes to those who own property in places where winter comes with snowfall, our team decided to tackle this problem to save those affected by these issues with our automated snowplow.

Description of the product/ service

The product is an autonomous snow cleaner that shovels snow. The main chassis of the machine will be made of metal. It will have the same size factor as a small snow blower. The chassis will have a rectangular prism shape, similar to a miniature zamboni, and will have four tires made of studded rubber to provide friction on snowy/icy terrain. There will be a wide metallic shovel attached to the front to push the snow aside. The robot will be running on a gasoline powered

engine to get sufficient power. Since the robot will be autonomous, there will be three main sensors at work: camera, radar, lidar. The camera will provide a clear image of surroundings and detection, the radar is for low visibility situations and lidar for distance calculations. The robot will be controlled by a small on-board Raspberry Pi which is a computer that will run the automation and data sending/receiving. To control the robot there will be an app. The app can be accessed through a phone or tablet. There will be an option to manually control the robot as a security feature and as an additional method of functioning the robot. The robot will map out the area using its sensors via computer vision software coupled with pre-set boundary points via short rods. It will be water-proof to ensure the electronics are protected from the snow. Users can set shoevelling times or the machine will sync with weather updates to recommend shovelling times.

Our Value Proposition Statement

Enjoy winter without the hassle of shoveling snow. AutoPlower comes with unique features including a compact size, improved mobility and safety technology that eliminates the need for you to use a shovel or snow blower ever again. The AutoPlower shovels driveways autonomously unlike traditional methods such as shovels and snowblowers. At Winterly, we enable homeowners to enjoy the satisfaction of having a clean driveway without moving a muscle.

Feasibility and Desirability

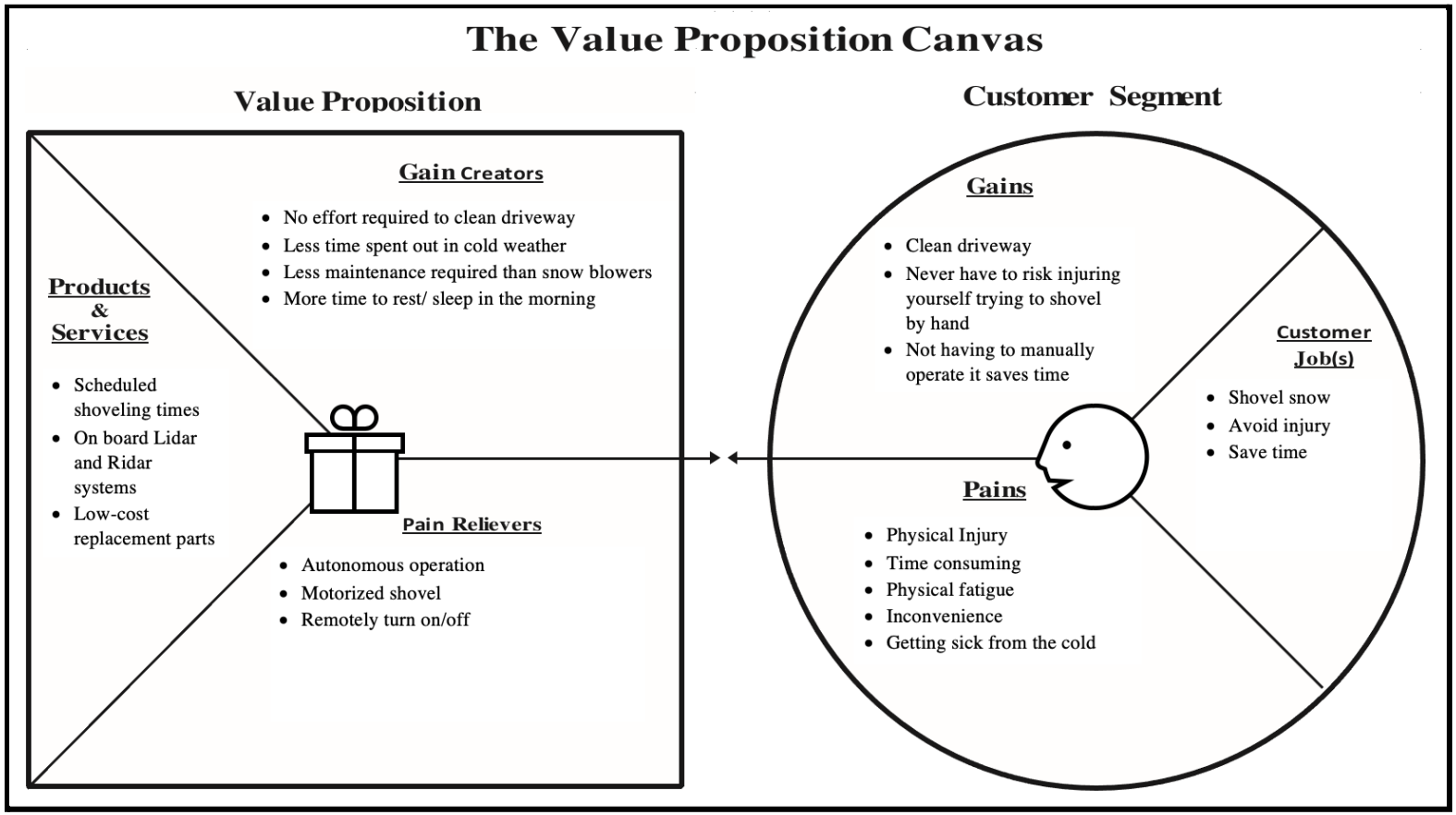
Feasibility

Our product is currently projected to operate using Lidar, and unfortunately, this technology is not fully without flaws. The biggest issue facing Lidar is that it is still a relatively new form of technology, so it is somewhat expensive and may not be able to handle extreme weather conditions. Fortunately, the solution to this is a combination of Lidar, radar, and camera tech

which can provide the necessary safety features that can prevent dangerous accidents. In addition, the cost to manufacture our product is a potential threat to the business. Due to the size of the AutoPlower, and the small area it covers, we would only need a small Lidar radar that can detect up to 100 meters, which can cost upwards of about $100 (Lidar, 2020). Considering the cost of traditional snow blowers this is a more than fair price. Not to mention this is a one time investment compared to hiring someone to shovel your snow. The average homeowner may find the price high but will come to understand that this is a worthy investment.

Desirability

There are dozens of countries around the world that receive snowfall throughout the year. This means that there are thousands of citizens globally that need a sufficient and effective method of removing this snow. The market for snow removal is massive, as global warming causes more irregular snow patterns and thus causing more snow in the northern hemisphere. In 2017, the North American and European market size for snowblowers alone was over $22 billion. This figure is expected to rise to $30 billion in 2024. Despite these massive revenues, many potential buyers were bothered that snow blowers were too expensive and did not have the mobility that they desired (Pulidindi & Pandey, 2018). Our product makes it much easier for homeowners to clear their driveways of snow compared to shoveling and snow blowing. This should allow us to capture much of the market and impress them even further thanks to our autonomous innovations. Not to mention, the thousands of snow shoveling related deaths and injuries that can be prevented thanks to our product. Our product can meet this demand, while also providing our customers the much-needed safety features that are provided through autonomous innovations.


The Value Proposition Canvas
Value Proposition
Customer Segment
Gain Creators
No effort required to clean driveway
Less time spent out in cold weather
Less maintenance required than snow blowers
More time to rest/ sleep in the morning
Products & Services
Scheduled shoveling times
On board Lidar and Ridar systems
Low-cost replacement parts
Pain Relievers
Autonomous operation
Motorized shovel
Remotely turn on/off
Gains
Clean driveway
Never have to risk injuring yourself trying to shovel by hand
Not having to manually operate it saves time
Customer Job(s)
Shovel snow
Avoid injury
Save time
Pains
Physical Injury
Time consuming
Physical fatigue
Inconvenience
Getting sick from the cold

Lean Canvas			**Date: Feb 14, 2021**	**Version 1**
Problem Snow removal using shovels • Trigger of heart attacks and other injuries (ex: back-injury, slip and fall) • Time consuming and an energy draining activity • Lack of time in busy workday schedules to shovel	**Solution** Autonomous snow removal robot • Compact in size • Gasoline powered engine • Sensors: camera, lidar, and ridar • Computer system that tracks and controls automation the shovelling process	**Unique Value Proposition** Enjoy winter without the hassle of shoveling snow. AutoPlower comes with unique features including a compact size, improved mobility and safety technology that eliminates the need for you to use a shovel or snow blower ever again. At Winterly we enable homeowners to enjoy the satisfaction of having a clean driveway without moving a muscle.	**Unfair Advantage** • Valuable networks - McMaster staffs, alums, McMaster AI Society • Location (North America) – ability to test in real environment	**Customer Segments** Home Owners • Working Individuals • Senior Citizens • Physically disabled
Existing Alternatives • Hire snow removal labourers • Heated driveway systems • Snow Blowers	**Key Metrics** • Sales Revenue (Income and Profit) • Reducing customer acquisition costs • Reach of the product on social media platforms (analyzing trends) • Customer satisfaction score (CSAT)	**High-Level Concept** • A robot that removes snow efficiently and effectively	**Channels** • CPC digital marketing (ads) • Newspaper/Magazines •TV ads • Social Media marketing - Facebook	**Early Adopters** • Workers who have a long commute to work (leave early and return home late) • Individuals with physical disabilities and health conditions
Cost Structure • Materials and manufacturing • Salaries • Marketing Expense • R&D expense of autonomous snow removal robot • Paying retailers			**Revenue Streams** • Selling autonomous snow cleaner - On company website - In retail stores (Walmart, The Home Depot, etc)	

References

Harris, A. (2020, November 14). When's the best time to start Shoveling Snow? - a Complete Guide. Retrieved February 06, 2021, from https://klaffs.com/best-time-for-shoveling-snow/

Harvard Health. (2020, February 28). Protect your heart when shoveling snow. Retrieved February 06, 2021, from https://www.health.harvard.edu/blog/protect-your-heart-when-shoveling-snow-201101151153

Lidar, V. (2020, January 7). *Velodyne Lidar Introduces Velabit™*. Velodyne Lidar Introduces Velabit. https://velodynelidar.com/press-release/velodyne-lidar-introduces-velabit/.

Pulidindi, K., & Pandey, H. (2018, September). North America And Europe snow BLOWERS market share report 2024. Retrieved February 06, 2021, from https://www.gminsights.com/industry-analysis/north-america-and-europe-snow-blowers-market

Shaw, S. (2020, February 20). Snow removal and the law in ontario - government, public sector - canada. Retrieved February 06, 2021, from https://www.mondaq.com/canada/government-contracts-procurement-ppp/895600/snow-removal-and-the-law-in-ontario

Social Media Usage Statistics By Age: Marketing to Adults Aged 50. (2020, February 20). Retrieved February 11, 2021, from https://www.synthesio.com/blog/social-media-usage-statistics-by-age/