Project Report

1. Description of the design process

We applied an iterative design process with 3 main pillars in each iteration: Interviews, Market Research and Client Validation. Using this methodology, we achieve delimiting such a broad challenge as spot a valuable solution of a current problem using the technology assigned. As for the first iteration, it was also important to understand both the technology and the company working on it, so further work was done in order to better choose the interviewers.

Interviews

In this step, we retrieve all possible information from people specialized in the topics we wanted to get into depth. We interviewed experts in different areas, including architecture, Industry 4.0, robotics, environment, VFX, Big data and sensors and 3D design.

Market Research

Once the information is gathered, potential markets are studied to split and categorize the domains of research in order to see the more suitable ones to present to the clients. We focused on architecture and engineering, mobility and automotive, security, content creation and healthcare.

Client Validation

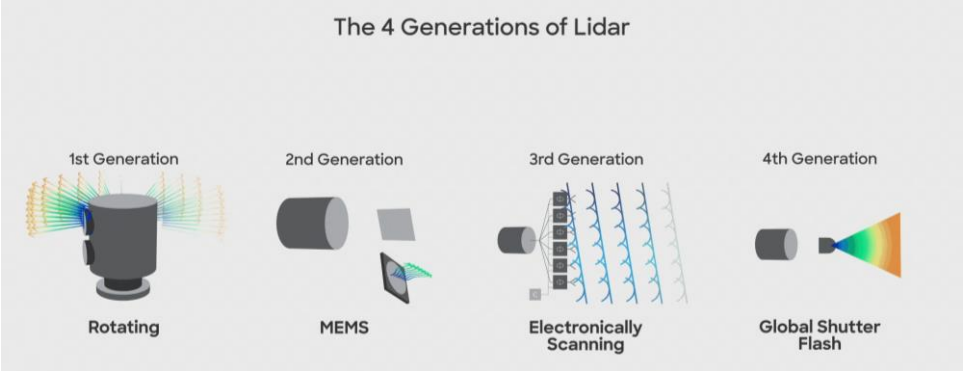
Once the information is gathered, categorized, and analyzed, a formal presentation is shared to the company to delimit together the scope of the problem based on a business perspective and the enterprise goals.

2. Key insights on the topic

SPADs LiDAR Technology

The technology assigned is Light Detection and Ranging (LiDAR), which measures the distance of objects by emitting a set of light frequencies. In order to achieve this goal, the emitted light has to be captured and the time it took to return calculated in order to compute the distance. As for the light sensor, a Single-Photon Avalanche Diode (SPAD) photodetector is used, which allows to not only capture the light but theoretically determine which light is from the set of lights emitted as well as retrieve the change of wavelength frequency. This additional information is valuable to know the properties of the objects in space, such as color, material, among others.

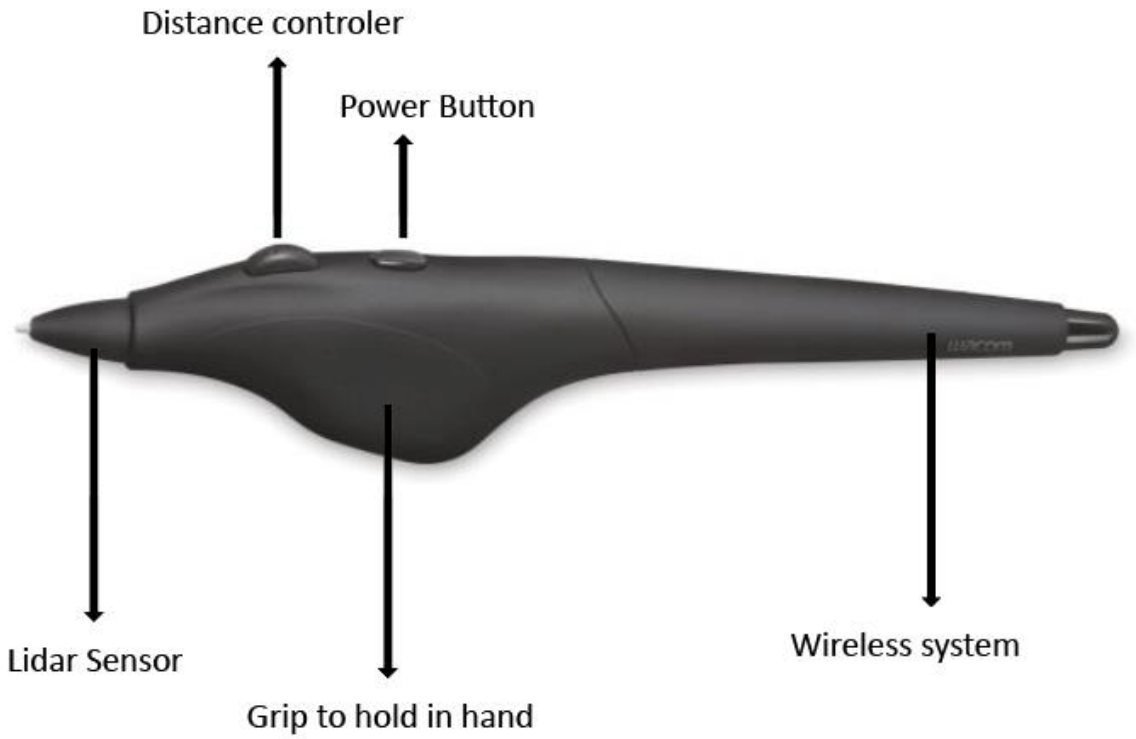
This LiDAR sensor corresponds to the 4^{th} generation of this technology, exploiting the advantages of avoiding mechanical movement gears which leads to constant maintenance and jittering in the results, as well as replacing linear detection to a full area in space.



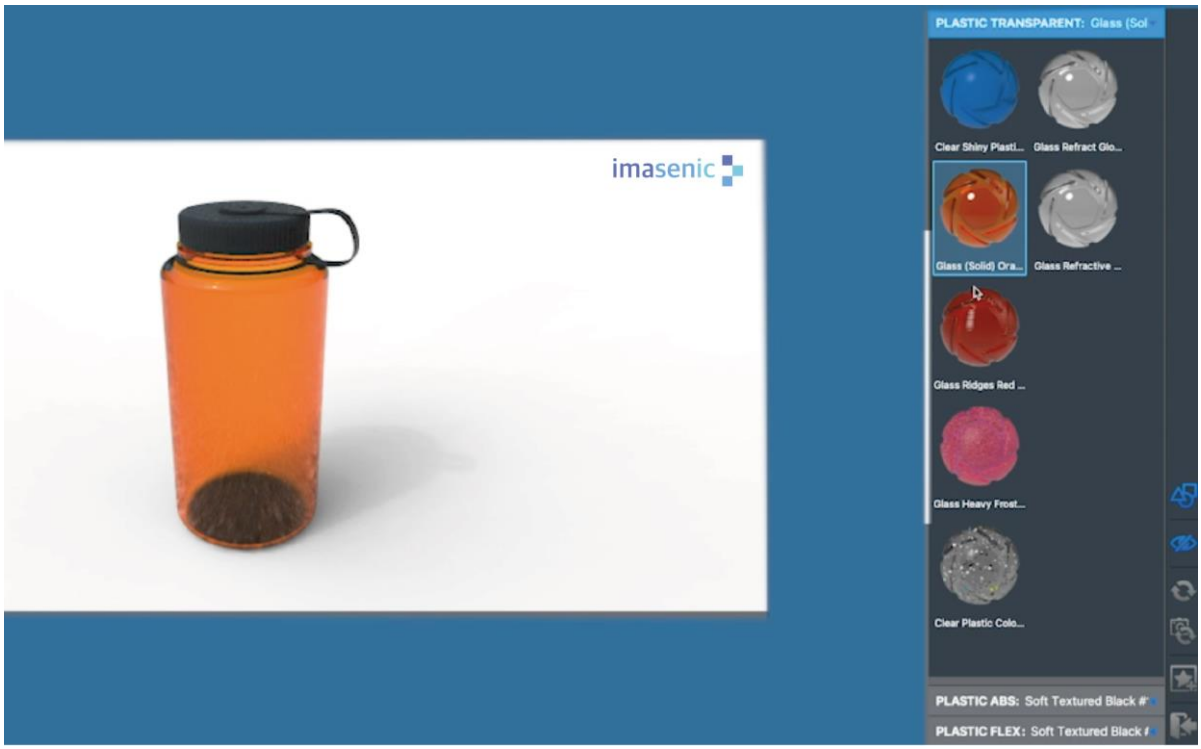
Market Research

It was also of high importance to find a market that is attractive and at the same time not saturated. We identified three possible markets to go into, namely 3D mapping, Speed detection, and Motion detection. We evaluated these three based on the features market size in 2020 and 2027 (CAGR), key areas, drivers, opportunities, main obstacles and challenges. We selected the 3D mapping market, especially due to its range of areas to tap into and its attractive market size in 2027 (USD 10.11 billion). The main areas in the 3D mapping market are autonomous vehicles, architecture, space equipment, VFX and film and bathymetric applications. Drivers are technological advancements in 3D scanners, sensors and devices. The emergence of AI and ML will also boost 3D content accuracy. However, there are high installation costs attached to it and the challenge of a lack of skilled workforce must be overcome. To determine the best positioning for the company, we placed the competition on a matrix with the axis being personal versus industrial usage and high accuracy versus low accuracy. Based on this, we saw that the most attractive market to tap into is the personal usage market with high accuracy, also since the customer needs are slowly moving into the same direction. Taking a closer look at the personal usage market for XR, we identified the consumer segment to be most attractive in terms of market size compared to healthcare, commercial, and others. The consumer segments include augmented reality which superimposes computer-generated data such as text, video, images, GPS data, and other multimedia formats on top of a real-world view acquired by a computer, smartphone, or other device's camera. With this in mind, we created our prototype.

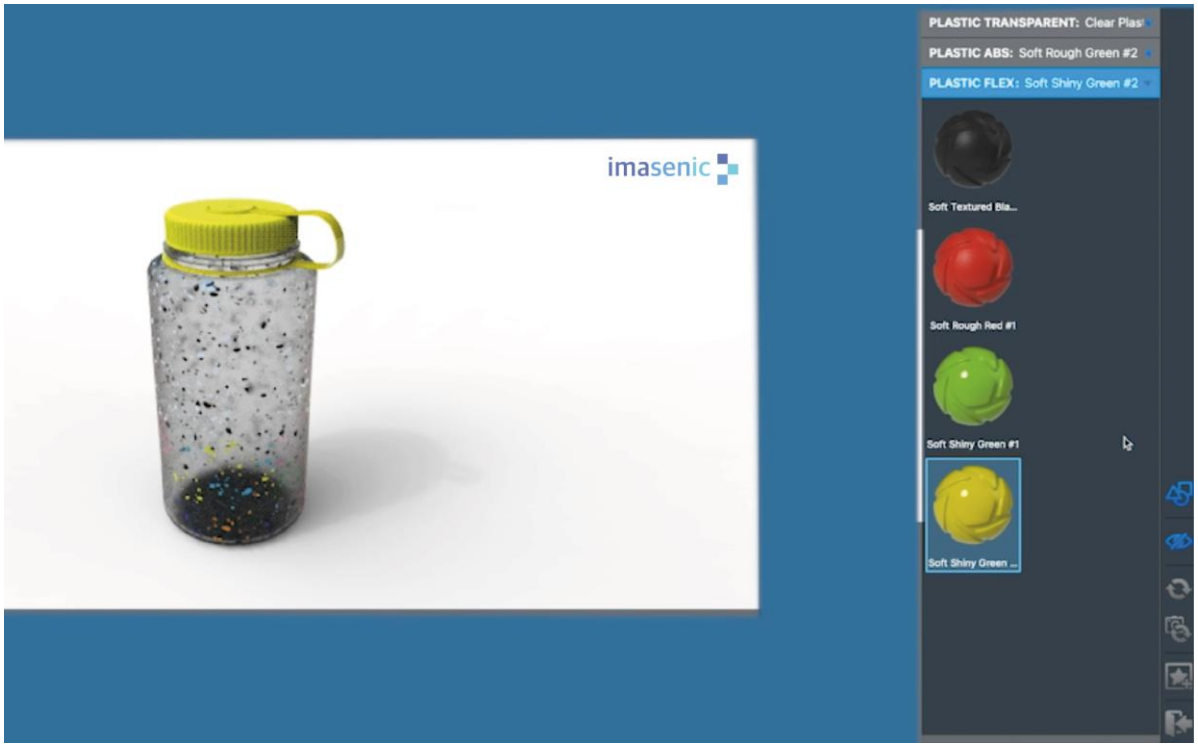
3. Introduction of the final prototype



This handheld Lidar system can be used to scan any objects that need to be shifted into a digital media. This process cuts down days of work in few minutes. Our Lidar can be used for Engineering, Architecture, Design, Metaverse, and 3D Artist.



Professionals can now scan and edit data after importing the information from the Imasenic software. Data points, Color, Texture and Material detections are some of the meta data that can be used and modified over deferent platforms.



Imasenic, needs to have a collaborative interface with software companies like Autodesk, Dassault, Safran, Adobe, Unity, Meta so that all professions can seamlessly use this technology. There should be away to compress all this data and upload to the cloud for optimized use.

4. Reflection of the student learning

From a project-based perspective, first and foremost, it was vital to understand what Imasenic had to offer. Especially for the business and design students in the team, the technology of LiDAR was relatively new. It helped to make sense of it by looking at how the technology is used in everyday applications and trying to explain it in easy terms. Once we understood what we were dealing with, it was time to come up with the idea that we wanted to recommend to Imasenic. We soon realised that coming up with an idea was not a straight-line process. Different factors come into play, such as technical requirements set by the company, inputs from mentors and experts in the field, and lastly, and most importantly, changing and not clearly defined customer needs. A technology is great and all, but in the end, it comes down what the customers need. We learned that it is crucial to figure out what exactly these are, because people themselves do not always know.

From a teamwork perspective, the first lesson we learned was that issues will always arise. Especially with us coming from diverse backgrounds, not just in cultural terms but also in educational terms, we knew that agreeing on everything from the beginning on will not be simple. However, with the common objective in mind of finding a suitable solution for Imasenic and being able to apply our specific skills to the project brought us together and made teamwork easier. Obviously, working on project-related things was time consuming, but managing the dynamics of the team is equally time consuming - and frequently more difficult than job work. To maintain healthy and effective connections, the team dynamic was prioritized. Our team members were more driven to perform when they valued their place in the team. We learned how to improve our group cohesiveness by addressing the requirement for improved sense of commitment and attractiveness to a team.