

8. SUMMARY

The purpose of this theses was to develop a mechanical prototype of a next generation autonomous snow-plowing robot. Firstly both the current market situation and similar products were analysed in order to find out what kind of solutions are being used and what kind of problems need to be solved. Although automated snow-plowing services don't exist at the moment, and the same goes for similar services outside of the winter months, there's obviously a distinct interest to automate everyday chores.

Secondly, an overview and analysis of an earlier robot, which was the basis for the new prototype, were given. This was done in order to find critical aspects which needed to be improved upon. The fourth chapter of the theses contains the necessary calculations for the operation of the robot and the corresponding component selection. The fifth chapter explains how the vehicle, which consists of a frame, drivetrain, cover and a plow assembly, was designed. It also became evident that at the end of the project LumeBot's specifications in all areas differ quite a bit from the initial prototype.

As a result, 150 kg wheeled prototype was developed that uses four 500W motors. The bottom frame is made of sheet metal steel and reinforced with a tube frame. The maximum speed of the robot is 9,5 km/h

Lastly, an overview of the estimated and actual production costs is given. Although a lot went according to plan, there were unexpected expenses and the robots cost was 11% higher than planned. The next steps will be towards lowering the manufacturing costs by improving the robots design to better align with available manufacturing capabilities.

The robot was developed and manufactured by 15th of May 2019 and was presented at the Latitude 59 start-up conference which took place from 16th to 17th of May. The week before the printing of this theses LumeBot received an award from the Enterprise Office of Tallinn and also got extra funding from the Prototron competition to further develop the autonomous snow removal concept.

The plan for 2019 is to make the necessary revisions and to build 3 additional vehicles. Additional developments besides lowering the price of already developed solutions are a charging station and a remotely controlled plow.