# DELI-BOT FOR CONTACTLESS DELIVERY

Deli-Bot is a delivery service robot that operates flawlessly for those who desire a contactless, safe, and smooth delivery method. Unlike conventional vehicles, Deli-Bot can function at any time and with consistent quality autonomously.


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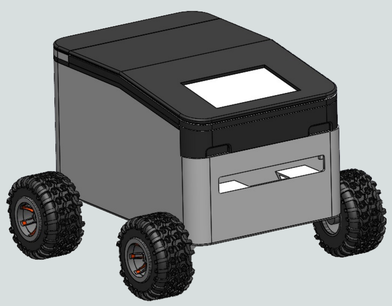
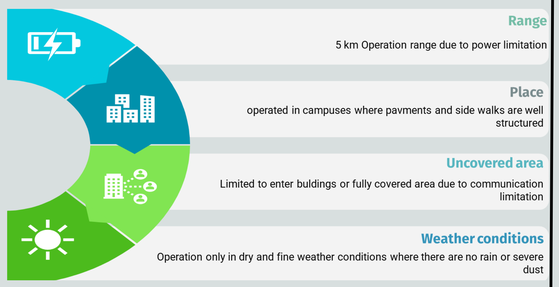


## BACKGROUND

- Necessity of delivery
- Supply chain setbacks
- 2030 vision toward clean energy

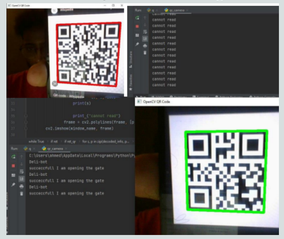
### Target specifications :


### Constrains :



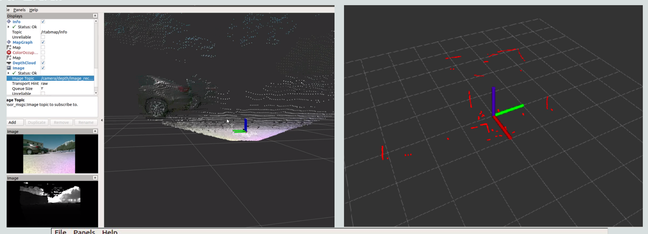

## DELIVERY MECHANISIM AND REAL TIME SIMULATION

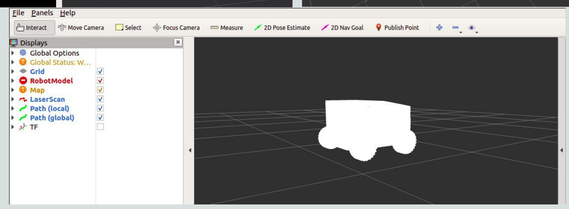
Deli-Bot employs a QR code security system that allows customers to scan and authenticate. After a successful scan, the robot uses a magnetic lock and a linear actuator to open the storage tank autonomously.



ROS

Del-iBot utilizes a real-time simulation using RVIZ and Gazebo for safety concerns using depth and RGB image through, with laser scanning of RPLidar

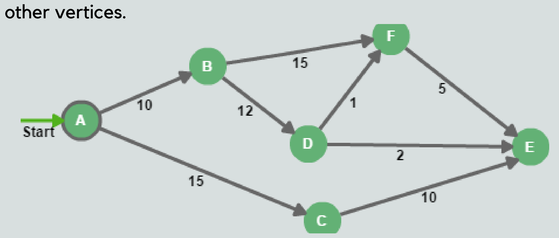





## OBSTACLE CLASSIFICATION AND AVOIDANCE

Deli-Bot can recognize up to 20 different objects using the YOLOv3 model, such as cars, humans, birds, and chairs, for safety concerns and operation efficiency.

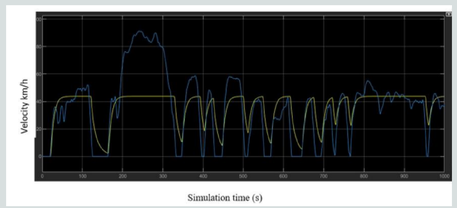

Deli-Bot uses for avoidance obstacle an algorithim called Dijkstra', Dijkstra is a breadth-first-search (BFS) algorithm for finding the shortest paths from a single source vertex to all other vertices.

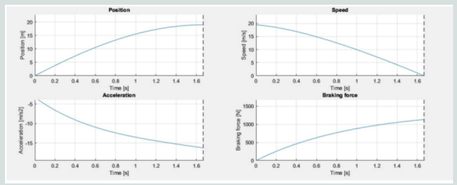



## SYSTEM FLOW

## BRAKING SYSTEM & DYNAMIC ANALYSIS

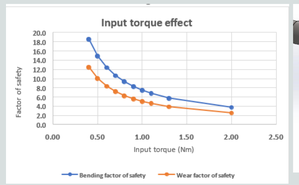
We have developed a MATLAB model that incorporates the driving cycles as an input to get a more realistic answer regarding the system itself and how it will behave. It also considers how the vehicle's dynamics would affect the temperature as a result of the motor's heat. Now, the result is of the model except for the speed, which is 4 km/h. We got in the model around 40 km/h.

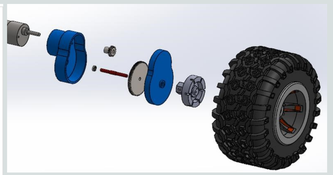


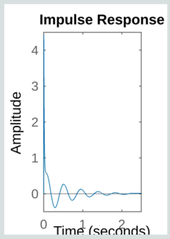

## GEARBOX & SUSPENSION

The selected pinion has a gear ratio of 5.35, with an intended range of operation below 0.5 Nm, with an operational wear factor of safety of 10-13 and bending factor of safety of 15-19.



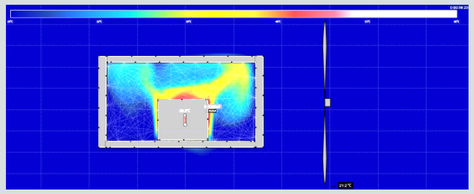



the ideal damping ratio for ensuring the comfort and safety of the equipment within an automobile is 0.3. This will result in a lower damping value and a longer time for the suspension system to reach a steady state, but the impact will be less. This will result in a lower damping value and a longer time for the suspension system to reach a steady state.

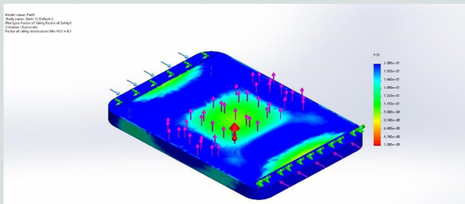



## THERMAL INSULATION BOX

A 2d simulation was performed to verify the findings in calculations and visualize the thermal effects. Similar conditions were set in the Energy 2D software, which models all three modes of heat transfer. The object was initially at 70 C and its temperature dropped by 11 C at a heat loss rate of 3.5 kW/m2. An airflow at a 5 km/hr speed was imposed to simulate the convective effects.



## DESIGN ANALYSES



## CONCLUSION

In conclusion, this project provides a comprehensive overview of the design and development of a pedestrian delivery robot for last-mile delivery that aims to provide autonomous last-mile delivery services by providing contactless, safe, and smooth solutions. By carefully considering the technical specifications and constraints and utilizing advanced design techniques, a delivery robot that is safe, efficient, and effective in delivering products to customers has been developed. The successful completion of this project has resulted in a delivery robot that meets all required specifications and is safe for operation in pedestrian areas.