



University
of Regina

FACULTY OF
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Modular Cube Farm

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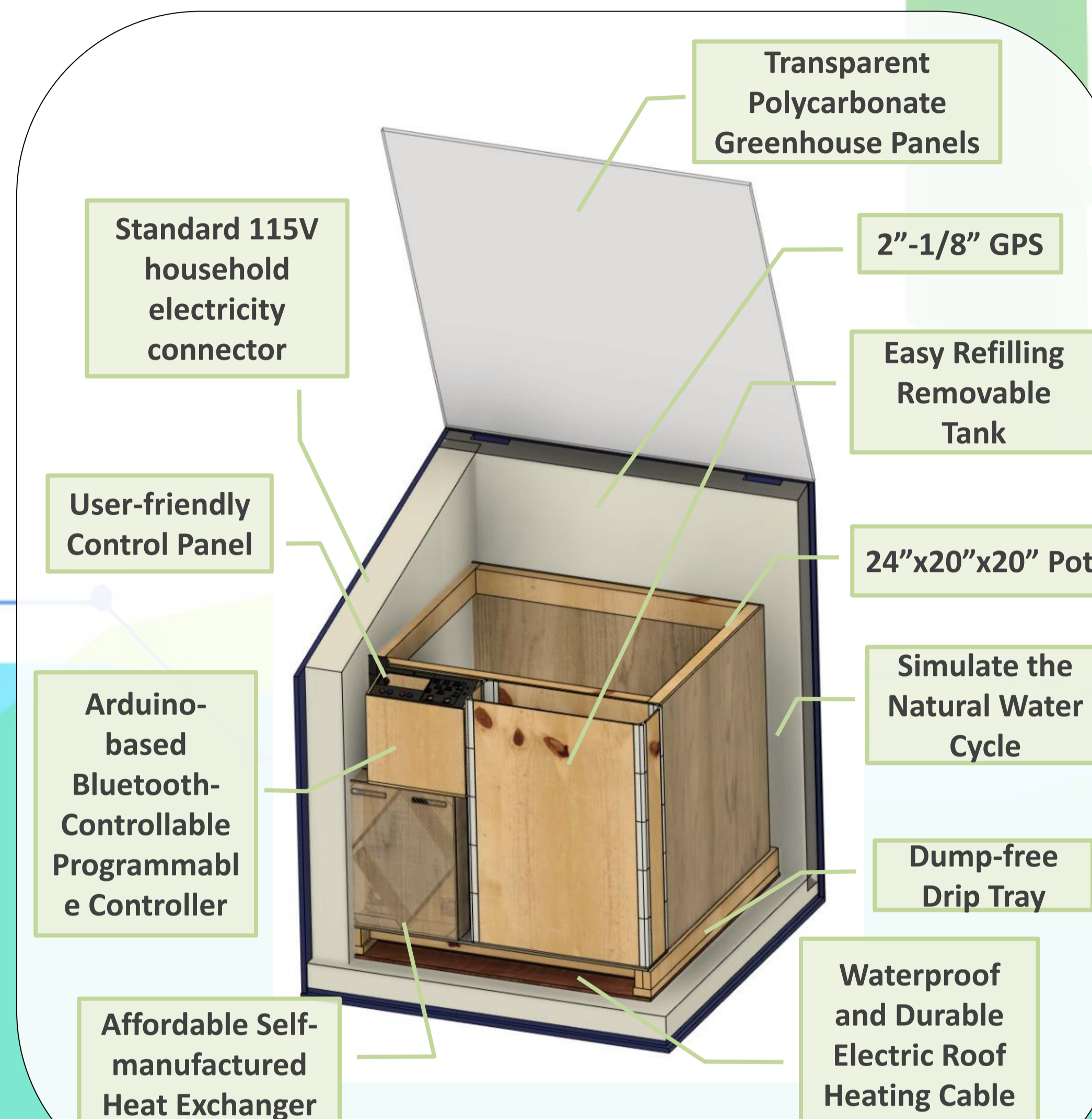


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Abstract

The Modular Cube Farm is an affordable and easy to use garden tool for the average Saskatchewan user. Plants can grow while the temperature dips to -45°C (-49°F). The angled polycarbonate top panel absorbs a significant amount of sunlight to reduce the consumption of electric light. Remotely controllable Arduinos are used to monitor the temperature and humidity while maintaining a user set temperature and soil moisture inside. The plywood frame is treated with epoxy with a 2-inch Durospan R10 insulation to ensure the heat loss is minimized when exposed to cruel weather. A heated water tray underneath the soil collects the excess water after watering and evaporates the water till it condenses at the top panel and is recollected by the water tanks. A plate crossflow heat exchanger is also present to introduce fresh airflow into the system while recovering some part of the heat loss.

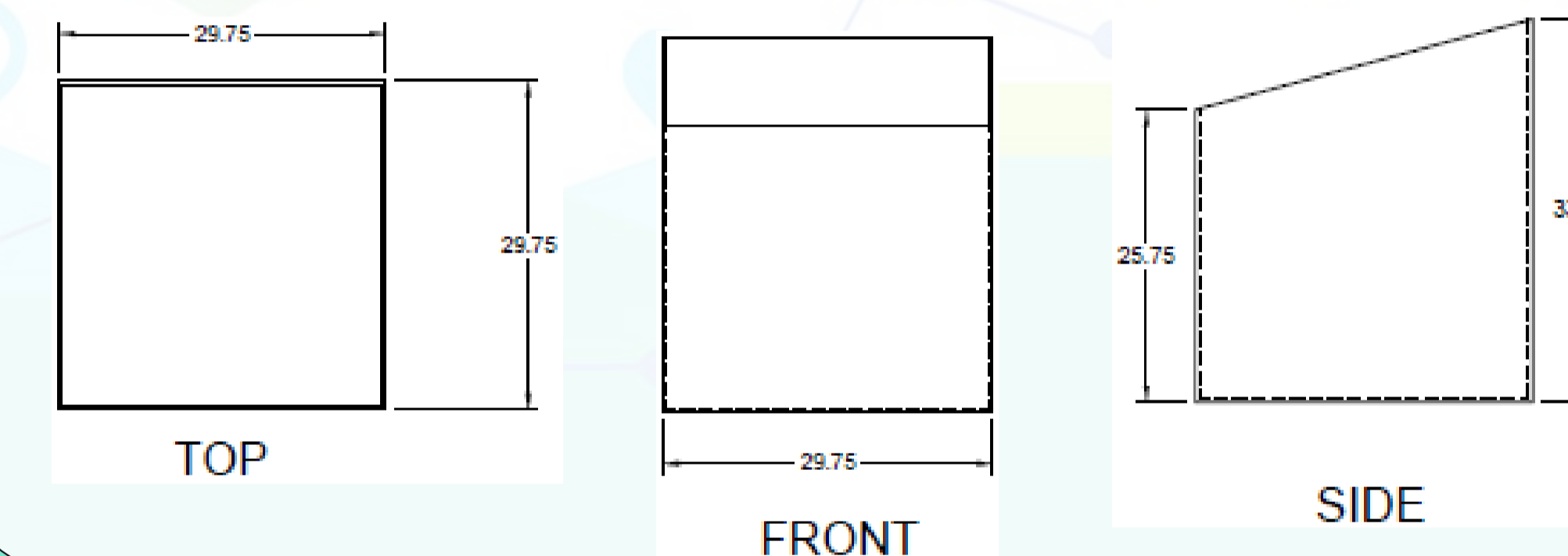


Objectives

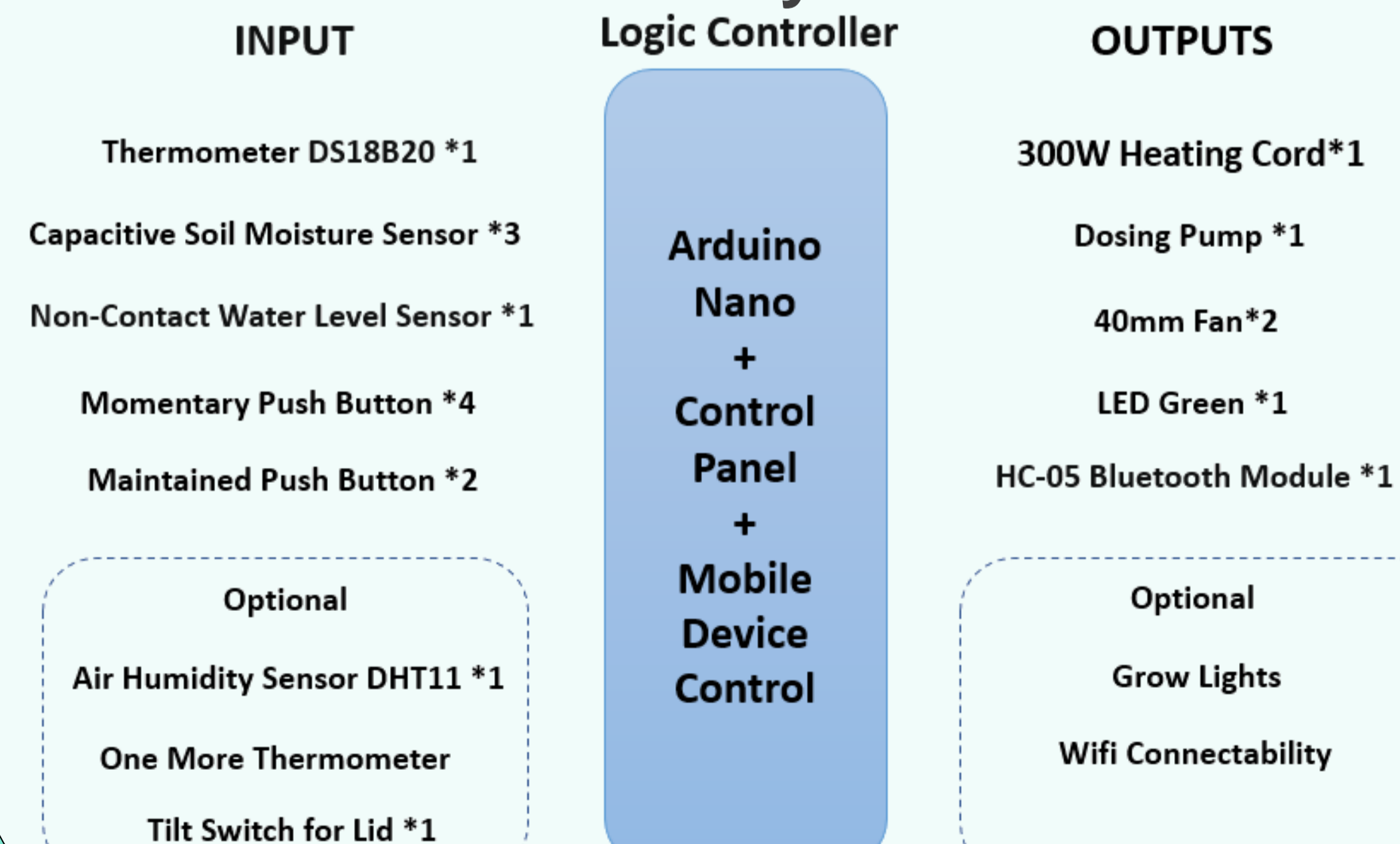
Design & fabricate a semi-automated greenhouse that:

- Extensible, Customizable and Affordable
- Environmentally friendly & Weather resistance
- Operates under -45°C (-49°F) outdoor
- Easy to build, Durable and Easy to maintain

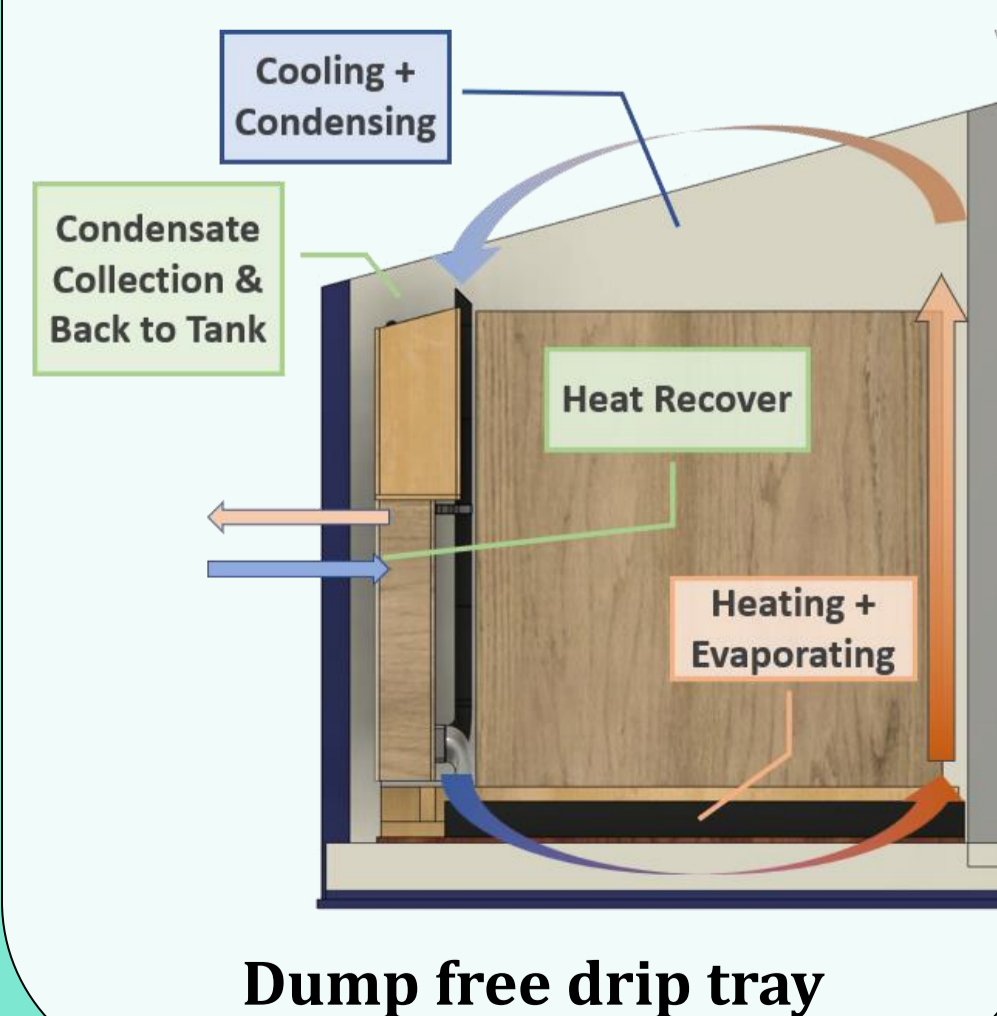
Dimension



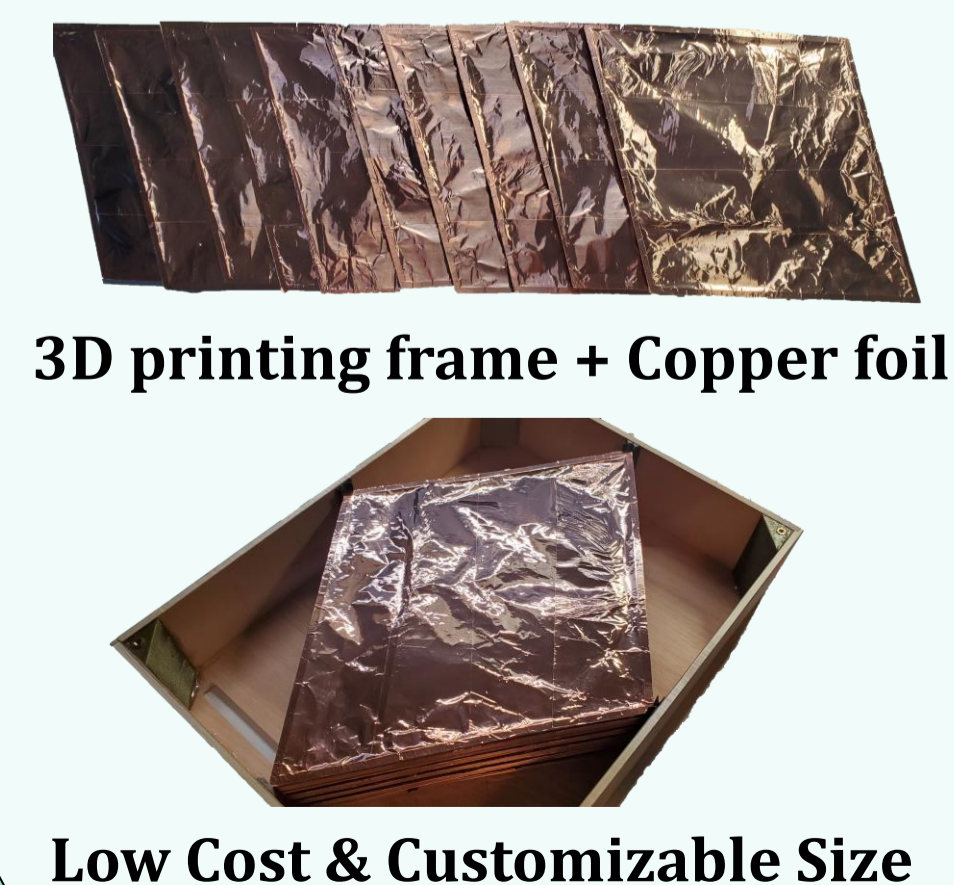
Control System



Thermodynamics



Heat Recovery Ventilator



Conclusion

- A finished self-operating prototype
- Consumes 245W @ -45°C (-49°F) windy outdoor
- Functions expandable & Controller reprogrammed
- Recommend to build larger scale to reduce applied cost and energy consumption



Acknowledgments

Special thanks to:

- SaskPower Technical Services and Research
- Daniel Molder
- Dr. P.T.