

Team #51 Living Air Filter for Urban Environments

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BACKGROUND

Premature mortality has been increased by 300-1000 deaths per year in the United States alone due to carbon dioxide emissions [1].

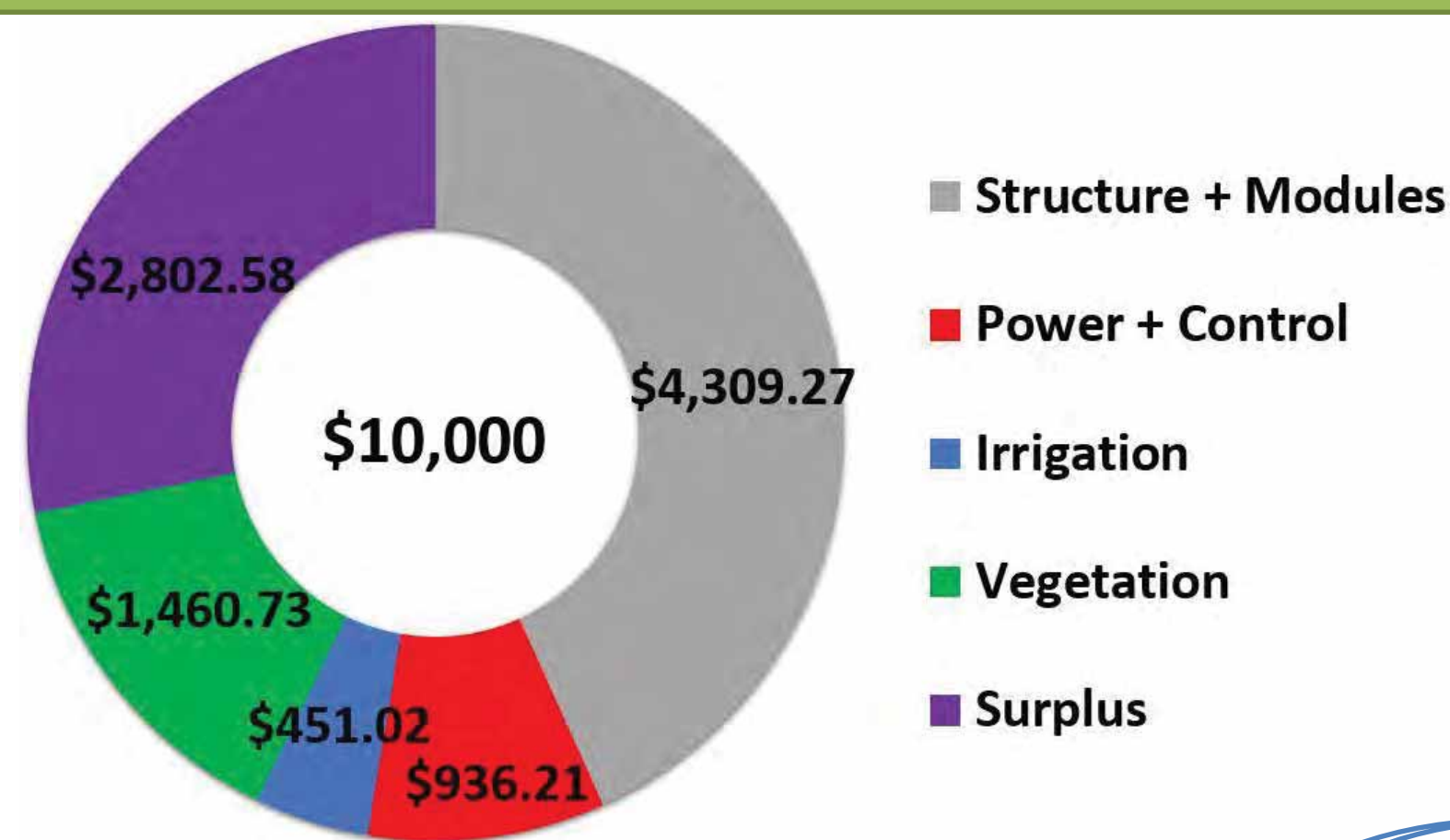
OBJECTIVE

- Foster plant life
- Filters carbon dioxide and particulates out of air
- 35% of the structure made using additive manufacturing
- Adapting to the space available in urban environments
- Spending less than \$10,000

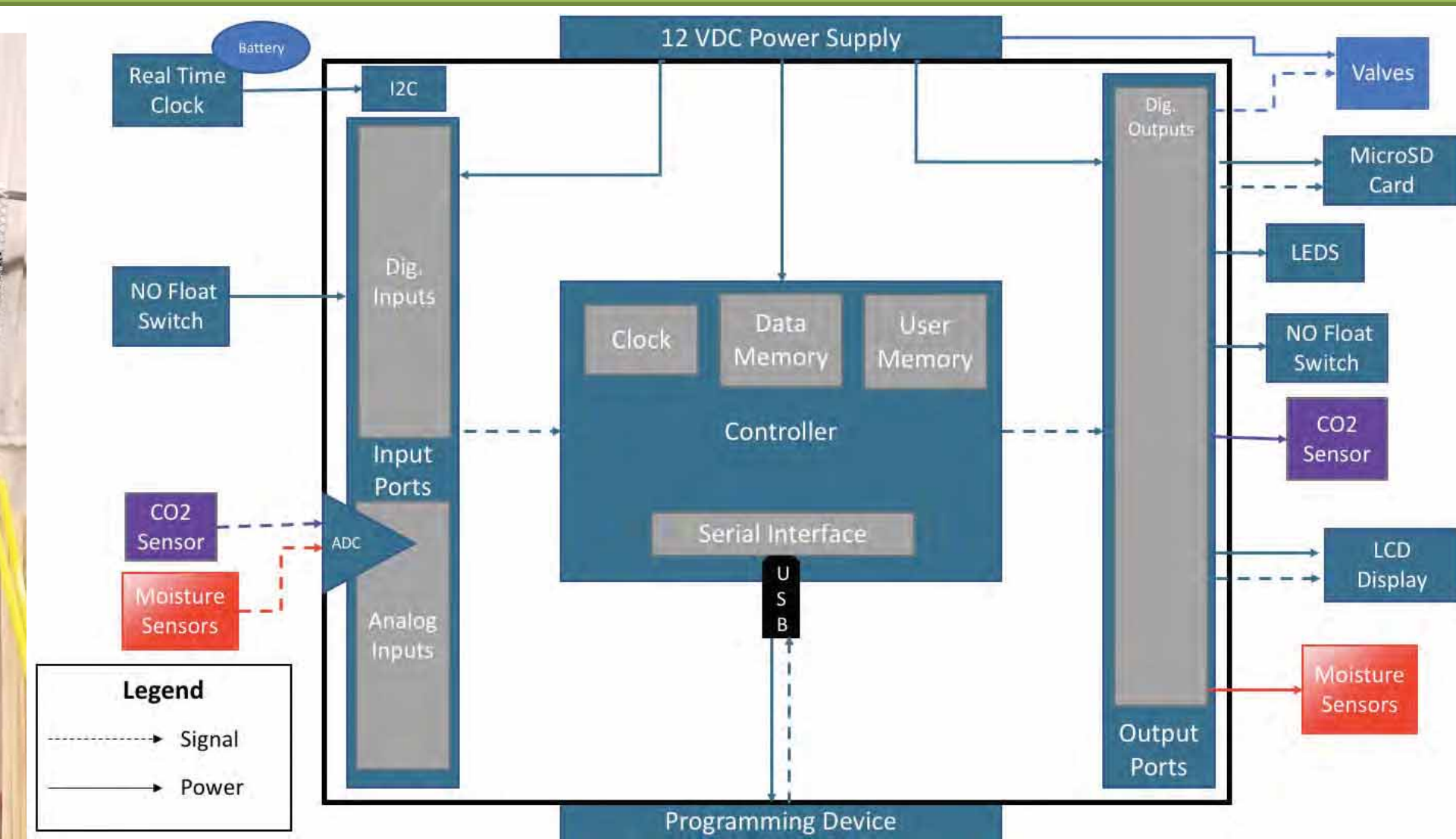
ENGINEERING SPECIFICATIONS

Specification	Target Value	Resulting Value	Units
Number of Trees Replaced	1	3.1	trees
Carbon Dioxide Removed	3.52	10.85	g/day
Module Size	< 343	268.13	in ³
Water Required	16.17	15.96	gallons/week
Structure manufactured using additive manufacturing	35	85	%

EXPENSES



SYSTEM DESCRIPTION

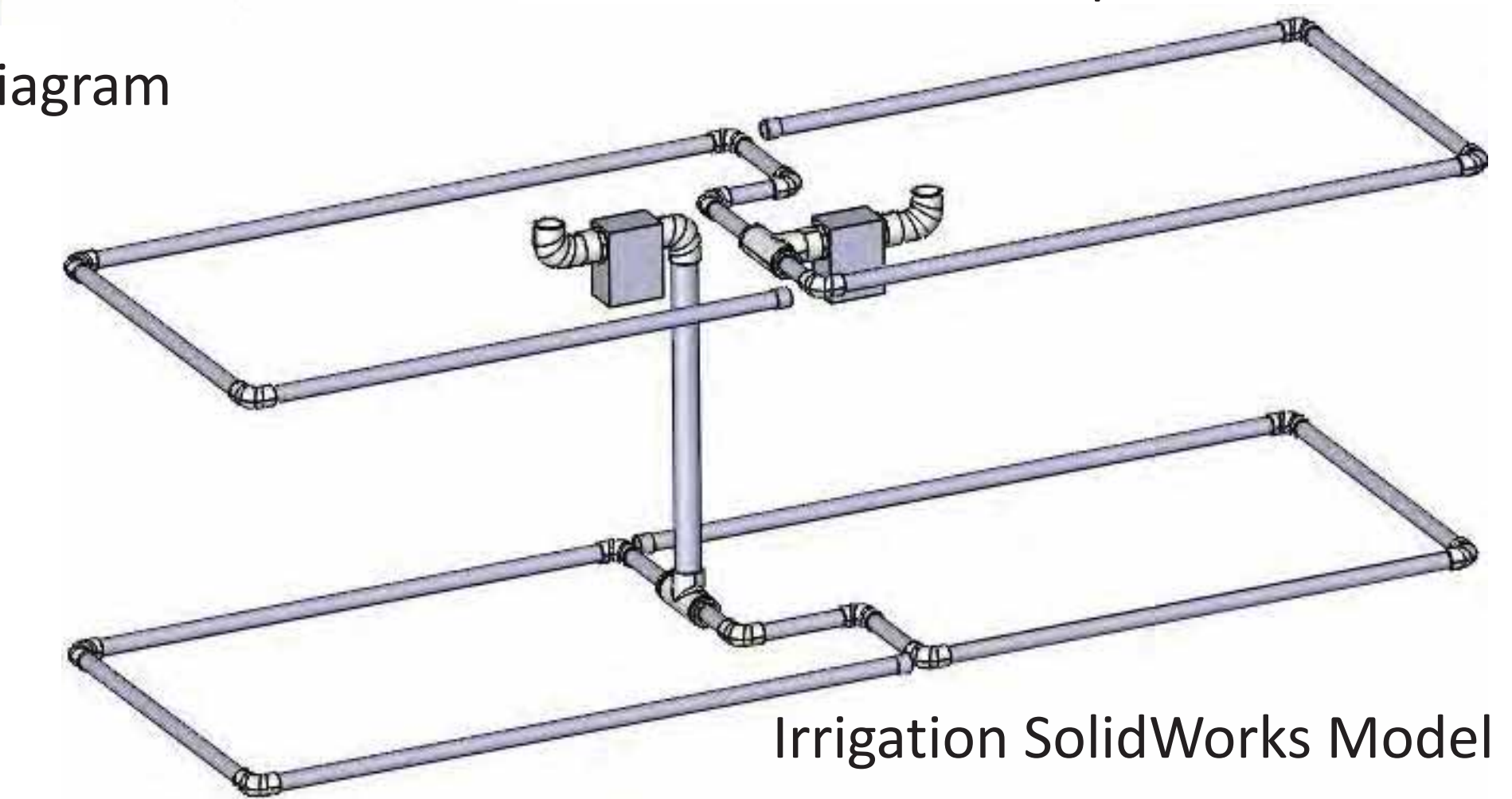


Module with Spikemoss

Control System Behavior Diagram

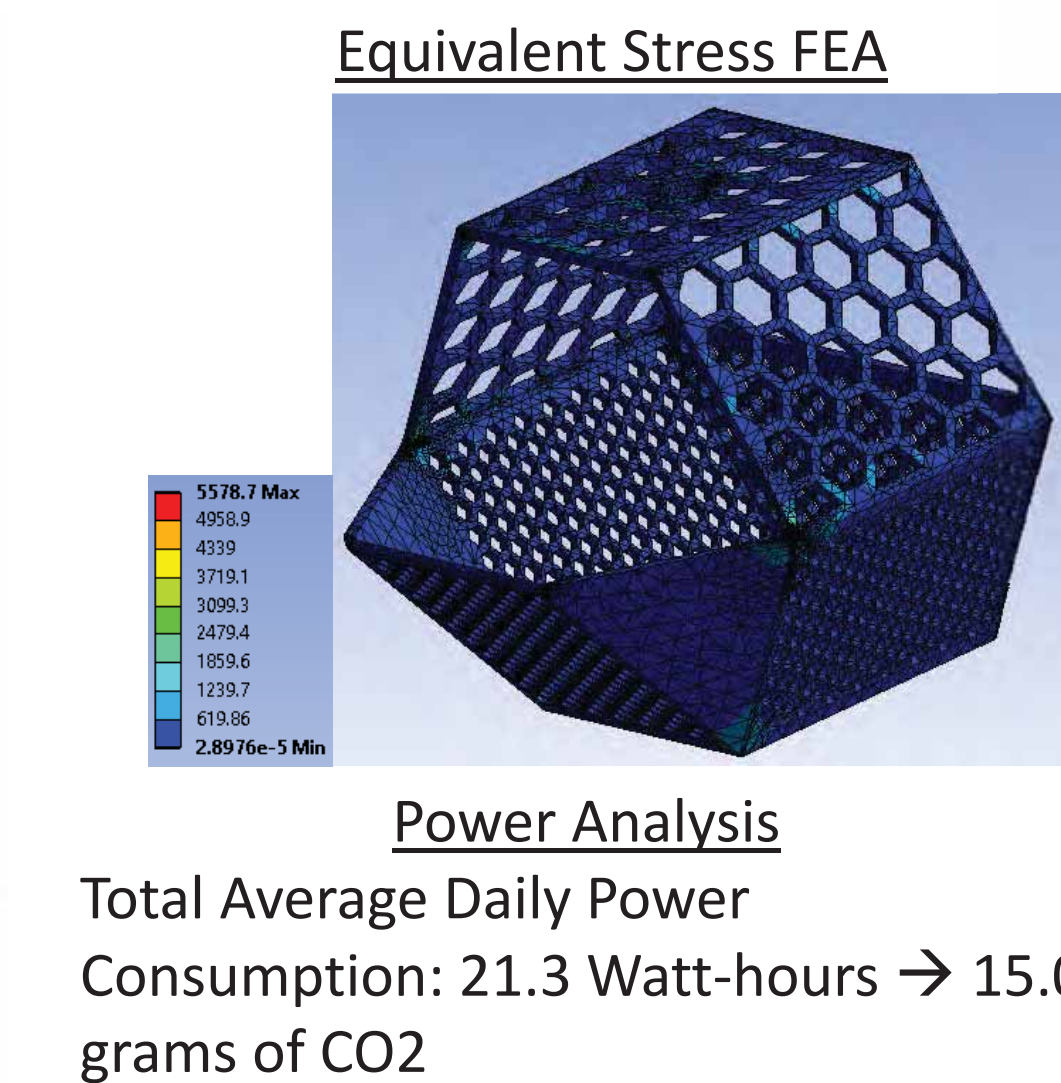
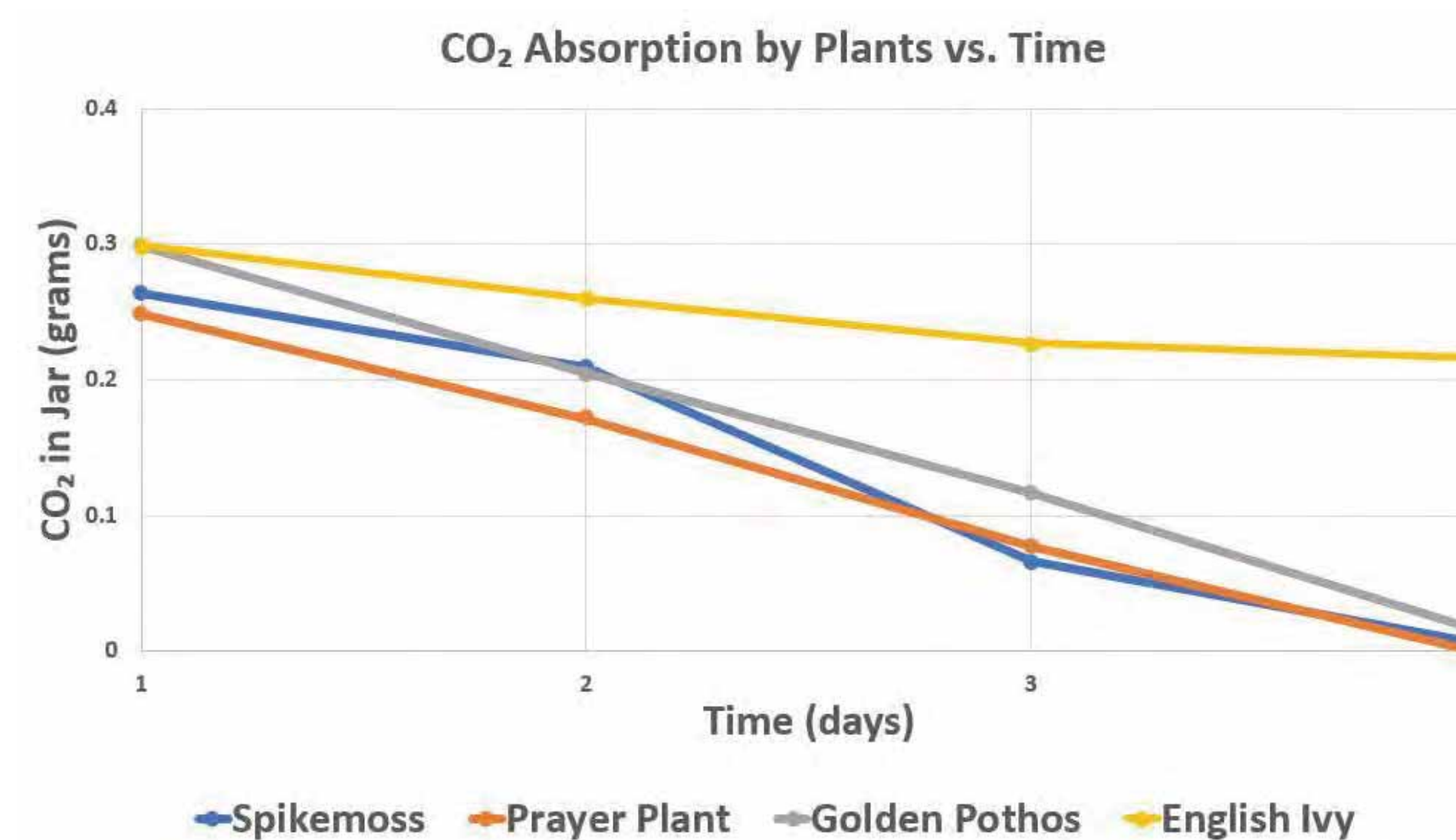


Control Panel



Irrigation SolidWorks Model

ANALYSES & TESTING



SAFETY



- Epoxy in screw holes and openings
- Water tight conduit and conduit fitting



Control Panel

Kill Switch

CONCLUSION

By using 94 modules of Prayer Plant, 70 modules of Spikemoss, and 4 modules of Ivy, allowed to grow up and cover 2592 in² of surface area, the prototype absorbs a net 10.85 grams of Carbon Dioxide, replacing more than 3 urban trees.

September: Concept Generation

October: Part Selection

November: Analysis and Simulation

December: Safety & Testing Planning

January: Manufacturing Planning

February: Manufacturing and Assembly

March: Testing

April: Documentation

Sponsors: Entrescan, Mr. Andrew Mallow

Advisers: Professor David Constant

[1] Jacobson, Mark Z. "Enhancement of Local Air Pollution by Urban CO₂ Domes." *Environmental Science & Technology*, vol. 44, no. 7, 10 Mar. 2010, pp. 2497–2502., doi:10.1021/es903018m.