

SAMEER JAIN

MECHANICAL ENGINEERING AT ONTARIO TECH UNIVERSITY



sameerj5252@gmail.com
 linkedin.com/in/sameerjain0841/
 (647)865-2168

CyberMower - SMART ELECTRIC LAWNMOWER (WIP)



Subsystem	Requirements
Mechanical	The mower must have a durable chassis and weather-resistant materials for outdoor use (at least IPX4 Weather Resistance).
Mechanical	Adjustable Blade Height (Manual or automatic?)
Mechanical	The mower should have a robust wheel system capable of handling uneven terrain.
Electrical	The mower must use a brushless DC motor for efficient, quiet operation and variable speed control.
Electrical	The battery should be replaceable, supporting at least 60 minutes of continuous operation. (~ 2- 4 Ah Capacity)
Electrical	The mower should be equipped with obstacle detection and automatic shutdown features for safety.
Electrical	Returning to the base station (manual charging/battery swap)
Electrical	Avoiding drops and slopes
Electrical	Physical controls on chassis/emergency stop, ON/OFF button etc.
Software	Real-time status monitoring and control via a web app, with a user-friendly interface.
Software	Web app must allow users to create mowing schedules and provide manual override controls (start/stop)
Software	Area mapping, path finding, obstacle avoidance
Software	Ability to set exclusion zones

What is it?

- A fully automated lawnmower capable of autonomously cutting grass

How?

- Powered by Raspberry Pi for communication and control
- Equipped with sensors for obstacle detection and GPS for navigation and mapping.
- Uses custom software to autonomously mow the lawn

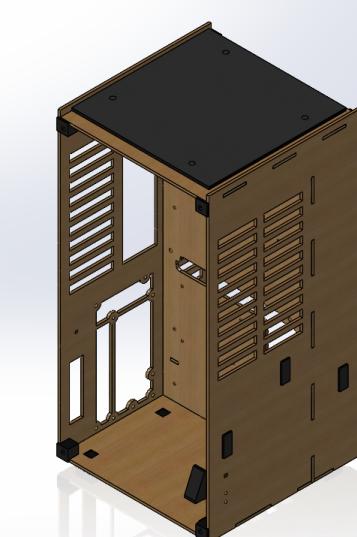
Features:

- Uses GPS and sensor data to mow the lawn autonomously with defined boundaries.
- Programmable mowing boundaries to ensure only the intended area is cut.
- Adjustable blade height
- Sophisticated Web App

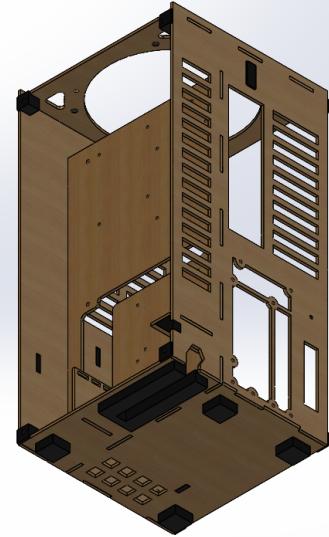
CUSTOM ITX PC CASE



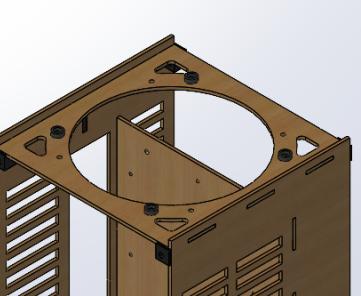
Top Left Isometric



Top Left Isometric (minus outer casing)



Bottom Right Isometric (minus outer casing)



Focus on Top Magnetic Mechanism

What is it?

- Custom ITX computer case designed in SolidWorks

How?

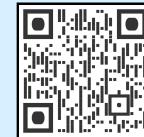
- Assembled using laser-cut and 3D printed parts
- Features a magnetically attached top cover with options for 140mm or 160mm exhaust fans, meticulously engineered for optimal airflow and heat dissipation.

Features:

- Supports any standard ITX motherboard
- Supports any power supply up to full sized ATX
- Supports any GPUs up to 250mm triple slot
- Supports up to 3 additional 2.5" SATA Storage Drives
- 17.6 Litres in volume (205mm x 205mm x 420mm)

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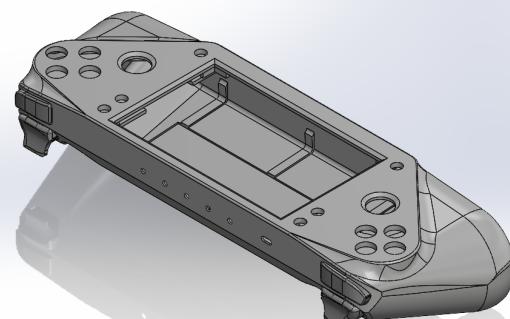
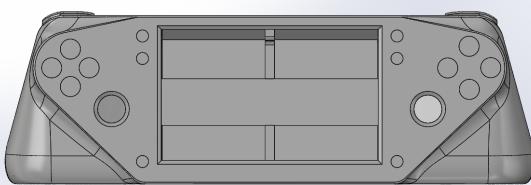


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RETRO EMULATION HANDHELD CONSOLE



What is it?

- A Raspberry Pi-powered handheld gaming console designed to support retro game emulation.

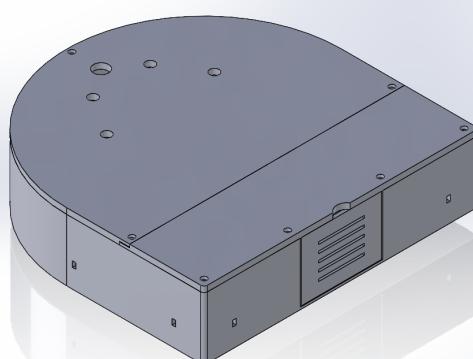
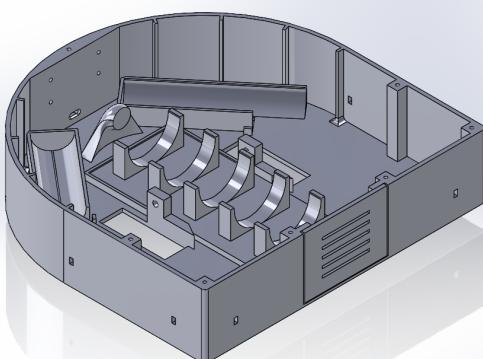
How?

- 3D modeled with precise dimensions for ergonomic handling in SolidWorks, housing all internal components.
- Designed for manufacturing with 3D printing in mind, optimized for assembly and durability.

Features:

- Comfortable to hold for extended gaming sessions, with intuitive button placements.
- Designed to accommodate standard gaming buttons and joysticks for a retro feel.
- The chassis is designed for easy assembly and disassembly, allowing for maintenance or upgrades.
- Secure space for a screen, aligned perfectly for the best gaming experience.

ARDUINO FLOOR CLEANING ROBOT



What is it?

- An Arduino-powered, smart robot designed to autonomously clean floors, similar to a Roomba.

How?

- Uses an Arduino microcontroller to control movement, sensors, and cleaning functions.
- The chassis and mechanical components were 3D modeled for an optimized layout and ease of assembly.
- The chassis and parts were designed to accommodate an off-the-shelf cordless, handheld vacuum unit

Features:

- Equipped with sensors to detect obstacles and map out the cleaning area.
- Programmable cleaning patterns for optimal coverage of the floor space.
- Uses sensors to avoid obstacles, adjust the path, and prevent collisions.
- Includes a rechargeable battery system, allowing for cordless operation and recharging between cleaning cycles.
- Easily disassembled for maintenance, part replacements, or upgrades.
- Designed to be compact for maneuvering in tight spaces, while being durable enough for daily cleaning tasks.