

Cleanroom Roomba



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Visible Particle Inspection DSLR Feasibility Test

- Commercial cameras are relatively inexpensive
- The price of industrial cameras is driven up partially due to usability.
- ATS SmartVision's grab tool may allow DSLR cameras to be used for image processing
- Macro lenses may provide the necessary focus for a DSLR to capture 40micron particles
- The specifications of DSLR cameras are comparable to industrial cameras.
- DSLR cameras can be remotely triggered.



Macro lenses allow DSLR cameras to capture fine detail.

Third Party Software Allows cameras to be remotely triggered



Design Goals

Modify Existing Roomba to:

- Spray sanitization solutions on the floor of a cleanroom
- Scrub floor clean
- Use UV lighting to aid in the sanitization process
- Automatically return to charging/refill station when needed



Existing Technology

iRobot Roomba 780

- Smart Mapping
- Scheduling
- Charging Station
- Remote Control
- Custom Commands



Pump/ Spray System

- After looking at small dc pumps we decided the Swiffer Wet Jet spraying system is cost effective and will provide an appropriate flow rate
- Testing and modifications will insure safe use with Decon-Spore and LpH cleaners
- Modifications to power the sprayer with existing Roomba battery (Currently runs on AA batteries)
- Fluid will be pumped from a custom tank



Scrubbing Modifications

- Currently the Roomba has soft bristles like your typical vacuum cleaner
- We will swap those bristles out with bristles that will be able to scrub the floor



UV Lighting

- We plan to have UV lights mounted around the back side of the Roomba



Electronics

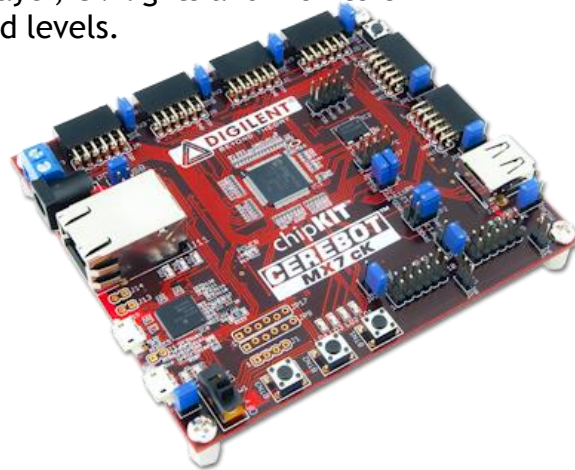
Liquid Level Sensor

This monitors fluid levels and reports to the microcontroller.



Microcontroller

This is the second brain of the Roomba. It controls the sprayer, UV lights and monitors fluid levels.



Buck Converter

This will be used to power the microcontroller off of Roomba's battery.



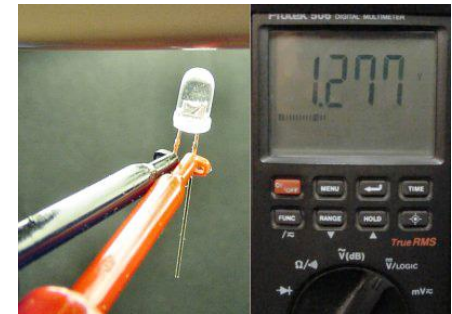
Serial Cable

This will be used by the microcontroller to control the Roomba.



Photo Diode

The Roomba will use this to tell the dock when its tank is full so that it doesn't overflow.

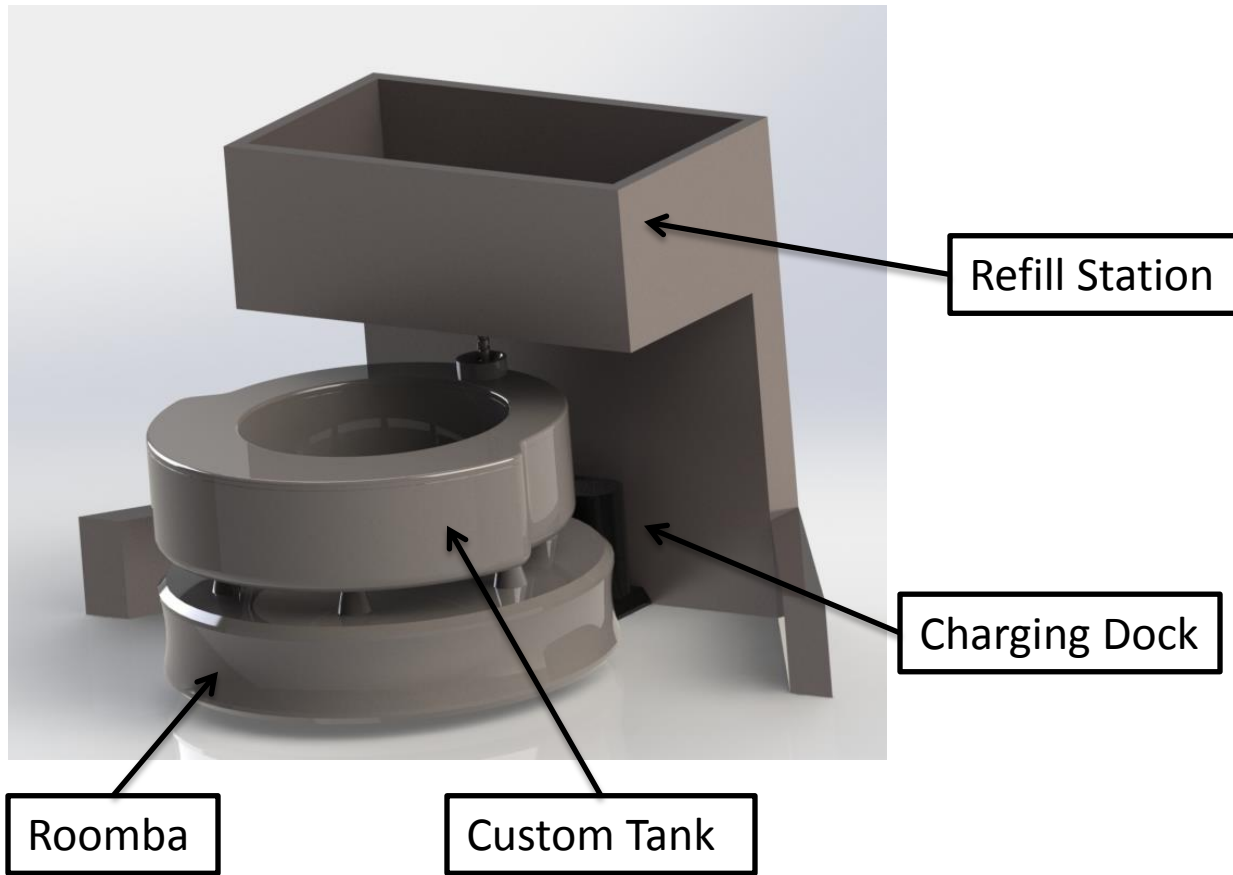


Fluid Pick-up..?

- We were considering integrating a mini Wet-Vac to the back of the Roomba to suck up excess fluid
- Other ideas include a blower to blow dry the floor or a cloth to soak up excess fluid



Our Vision



Costs Estimates

Items	Prices (high end)
iRobot Roomba 780	\$699.99
Swiffer Wet Jet	\$20.00
Materials for Roomba Tank	\$500.00
Materials for Filling Station	\$1,000.00
Fluid Level Sensor	\$200.00
Electronic Controller	\$150.00
Fill Station Sensor	\$50.00
UV Lighting	\$200.00
Miscellaneous Parts	\$300.00
Miscellaneous Electronics	\$400.00
Serial Cable for Programming	\$25.00
Graduate Student Fees	\$1,500.00
Shop Fees	\$500.00
Total for Single Device	\$5,544.99
Total for Two Devices (Time Permitting)	\$9,089.98



Questions?

