“Solar Team 6”

Multidisciplinary Senior Design
Project Readiness Package

Prepared by [Insert name] on [Insert date]

Project Title	Solar Powered 3D Printer - Phase II
Project Number	P19462
Primary Customer	Marcos Esterman
Sponsor	Marcos Esterman
Faculty Champion	Marcos Esterman
Other Support	Bill Hard Fund; RIT Global
Project Guide	William Nowak
IP Considerations	[Finalized by MSD]

Project Information

Overview

Last year a Solar Powered 3D printer was developed. The main subsystem that was developed was the power management system that included a battery, solar cells and grid power to allow the system to be powered in variety of circumstances. This product was delivered to an NGO in Colombia by the MSD students.

This year it is expected that the students would work on the reliability of the power management systems and will integrate a better user interface as well as the ability to accept pellets instead of a bead. Lastly, we would like to ask the team to explore the integration of additional functionality (e.g. drilling), to enable increased utility for the NGO.

The teams will collaborate with students in Colombia, travel to Colombia to implement their solution and take an entrepreneurship and commercialization workshop to assess the product solutions that have been developed. The specific improvements are still be evaluated.

P18462 Solar Powered FDM 3D Printer - https://edge.rit.edu/edge/P18462/public/Home

Preliminary Customer Requirements (CR)

Portable
Compact
Reliable
Easy to Use
Seamless Switching Between Solar and Grid Powered
Added functionality to allow for some secondary processing
Easy to disassemble and transport
Easy Packaging for Transport to Colombia
Consumes Plastic Pellets (not a Filament)
Fails gracefully when power runs out in the middle of the print job

Preliminary Engineering Requirements (ER)

Total Solution Volume Envelope (61cm x 61 cm x 122 cm)
Packaged Shipping Solution (L+W+H < 158 cm)
Packaged Solution Weight (< 23 kg)
Final Solution Teardown + Packaging Time (< 1day)
Final Solution Assembly and Set-Up Time (< 1 day)
Number of Power Failure Condition that Prevents Device to Stop at a Completed Layer (0)
Functions to Be Added (TBD)
Pellet Attributes to be Accepted (TBD)
Time to Learn to Use the Device (TBD)
Rudimentary Shock and Vibration Testing (TBD)

Constraints

While this will most like be a one-off solution, keeping in mind its ability to be replicated in the spirit of an open-source solution that locally available materials can be used is a nice to have, but not a need to have.

Project Deliverables

Minimum requirements:

- *All design documents (e.g., concepts, analysis, detailed drawings/schematics, BOM, test results)*
- *Working prototype*
- *Technical paper*
- *Poster*
- *All teams finishing during the spring term are expected to participate in ImagineRIT*

Additional required deliverables:

- *User Manual*
- *Tear-Down and Set-Up Instructions*
- *In-Country Field Test Plan*

Budget Information

Bill Hard Fund to provide funding. MSD funding TBD.

Intellectual Property

Describe any IP concerns or limitations. According to RIT policy, students have the right to retain any IP they generate during a course, but some students voluntarily agree to be placed on projects where they will be asked to assign their IP. If a sponsor wishes to have a team assign their IP, we need to know ahead of time so that we can place appropriate students on the team.

To ensure that students can discuss their projects openly during presentations and job interviews, we ask that no more than ~20% of the project be considered confidential.

None – In fact, an open-source solution that is easily replicated by others is desirable

U.S. Citizenship

Describe any U.S. Citizenship concerns or limitations. - None

Project Resources

Anticipated Student Staffing by Discipline

Please provide a brief explanation of the expected activities for each required discipline. "Other" includes students from any department on campus besides those explicitly listed. For example, we have done projects with students from Industrial Design, Business, Software Engineering, Civil Engineering Technology, and Information Technology.

Department	**Expected Activities**
Biomedical Engineering	
Computer Engineering	
Electrical Engineering	
Industrial & Systems Engineering	
Mechanical Engineering	
Other	packaging engineer possible? TBD

Required Resources

Describe the resources necessary for successful project completion. When the resource is secured, the responsible person should initial and date to acknowledge that they have agreed to provide this support. We assume that all teams with ME/ISE students will have access to the ME Machine Shop and all teams with EE students will have access to the EE Senior Design Lab, so it is not necessary to list these. Limit this list to specialized expertise, space, equipment, and materials.

Faculty	Marcos Esterman, some EE support
Environment	The PRISM Lab has been converted to a design lab. Teams can have meetings there, but build activities will need a different space. I am working to find space.
Equipment	May want to do some shock and vibration testing in the CET (formerly known as CAST) packaging labs
Materials	The team will need to source and modify a 3D printer so this will need to be one of the early decisions made. We will help narrow down the selection of pellets that the machine can take and the additional functionality. The Solar Panels will also be a key early decision to be made
Other	