EXPERIENTIAL LEARNING (EL) FUNDS PROPOSAL
REGULAR (NON-CONDITIONAL) FUNDING REQUEST

GROUP / TEAM NAME, OR PROJECT TITLE:	Large Format 3D Printer Project

PREVIOUS FUNDING:	☐ We received EL funding last year	☒ We did *not* receive EL funding last year	
OUR TEAM HAS __ "FULL DURATION" MEMBERS:*	5	*... OF WHOM _5__ ARE SEAS MAJORS:*	
OUR GROUP IS A (check only one)	☐ Competitive club†	☐ Service or Learning club‡	☒ other form of project group
OUR TEAM INCLUDES (check all that apply):	☒ Undergraduates ☐ Graduate students	*WE ARE REQUESTING FUNDING FOR THESE TERMS:*	☐ Fall ☐ Summer ☒ Spring

FUNDING REQUEST

Only include here the amount being requested of the EL Fund, not your total funding need.

NON-CONDITIONAL REQUEST§	*PREDICTED CONDITIONAL FUNDS NEEDED***	*TOTAL*
$1000	$0	$1000

* "Full duration" members are those who you anticipate to be actively involved with the group by the end of the term. Do not count group members who are likely to be involved early, but not to persist.

† "Competitive clubs" complete an engineering project with the explicit goal of competing against other teams. An example of this is a club that builds a robot with the goal of competing in combat against robots built by other schools.

‡ An example of a "service or learning club" is one that builds devices, and/or teaches others to build devices, for the interest of doing so, but without there being a competition in which they engage.

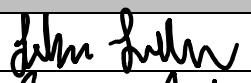
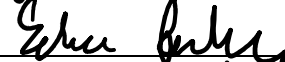
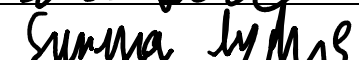
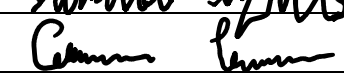
§ Non-conditional requests are for funds that are needed for the execution of the engineering project itself. These expenses typically include, but are not limited to, parts and supplies.

** "Conditional funds" are those that would be needed upon successful completion of the engineering project, or some other critical milestone. For example, travel to a competition is contingent upon successful completion of some or all of the generative project. Conditional funds must be requested upon or near completion of the engineering project, but must be estimated here so that we can plan for them as an expense if your project is funded.

SIGNATURES

STUDENT PARTICIPANTS
Who must sign? For groups of 5 or fewer, all students on the team. For groups of greater than 5, appointed or elected captains and all other officers.

What does my signature mean? I have read and approve of this proposal. If funded, I commit to undertake the activities described herein and to fulfill the group's obligations as described in the Policies Governing the Experiential Learning Fund. *(Note: All signatures must appear on this page; separate emailed acknowledgements are not acceptable.)*

TYPED or PRINTED NAME	COMPUTING ID	ROLE IN THE GROUP		SIGNATURE
John Link	Jwl9vq	Leader	Primary point of contact	
Sean Donley	Sd8bg	Member		
Sunniva Nyhus	Smn6ez	Member		
Caroline Peterson	Ckp5kk	Member		

The additive manufacturing process known as three-dimensional (3D) printing is garnering popularity throughout the global community and, increasingly so, across UVA grounds. Such attention facilitates student exploration, yielding the development of our project “Large Format 3D Printers.” Indeed, this project aims to explore how 3D printing can be revamped into large desk-sized machines that maintain the accuracy and precision of their small-scale desktop predecessors. This student-led experiential learning project began as a way for us to learn more about 3D coordinate systems that are obscured in the average 3D printer. Thus, we were inspired to build a version 1 prototype earlier last year. The prototype functioned as a proof-of-concept; enabling us to create large-scale products that would otherwise be impossible on a commercial 3D printer. The design relies on compactly integrating all three axes (x,y, and z) into one continuous motion system. With the completion of the prototype, all that remains is working to improve the quality and speed of the “Large Format 3D Printer.” To do so, we need help and a greater supply of resources. Therefore, our group seeks funding from organizations willing to collaborate with UVA Engineering Undergraduate students. The investment will provide us with opportunities to learn and further pursue robotic design. With the prototype of the “Large Format 3D Printer” complete, we began working on CAD (Computer-Aided Designs) for upgrades and parts necessary for a more reliable and functional version two. This project is the cumulation of months of CAD, prototyping, and manufacturing of parts. Funding will support this project, allowing us to continue our work and supplement our education at blaUVA. The “Large Format 3D Printer” will be located at Lacy Hall and will be available for student use while it resides there. If applicable, photographs and design files are available for updates and press releases. Ultimately, our goal is to publish a concise paper of our findings and open source all related designs for others to replicate our success.

Our goal is to modify an existing prototype 3D printer to increase print size, speed, reliability, and usability. The original printer was originally designed four years ago with parts readily available to high school students. In the time since this idea was conceived, technology has advanced and our engineering skills have matured. We aim to use these advantages to build version two of the Large Format 3D Printer which is more reliable, efficient, and prints at a higher quality. The end goal is to complete construction of a 3D printer for large, complicated parts.

It is necessary to iterate on the printer with the latest technology to retain the benefits of our innovative design. Newer 32bit electronic controller boards will allow the printer to operate at higher speeds and torques while maintaining high precision. Higher-strength materials and a more efficient mechanical design will retain rigidity in the frame and a better print surface will make high-quality prints possible. With state-of-the-art equipment, students are more exposed to

the benefits and growing industry-standard of 3d printing. This printer is another tool for students to grow as engineers and become accustomed to industry standards of 3d printing.

The first step is to modify the current CAD to accept the new electrical components. The designs have already been started and are in preliminary prototyping stages awaiting approval for funding to purchase parts. Once the CAD is done, the manufacturing will begin. All the manufacturing and building will be done in the Lacy Hall experiential learning center. Multiple engineering students will be exposed to CAD and manufacturing skills while parts are being made. We are open to input from engineering students working at Lacy Hall and everyone who will be involved in the project to build the best possible machine.

We will provide pictures of our CAD if additional information is needed.

Large Format 3D Printer Grant Budget

Item	Estimated Cost	Description	Source
Control Electronics	$ 500.00	32bit ARM 3D Printer controller and associated electronics	To be funded by Jefferson Trust
Thermal Control	$ 300.00	Bed heater, hotend, and electronics cooling	To be funded by ELF
Stepper Motors	$ 200.00	High torque, high speed NEMA 23 and 34 Stepper Motors	To be funded by ELF
Misclaneous Parts	$ 200.00	Misclaneous nuts and bolts	To be funded by ELF
Raw Materials	$ 500.00	Raw stock material for machining and 3D printing parts	To be funded by Jefferson Trust
3D Printer Bed Material	$ 300.00	Garolite bed material for adhesion and strength	To be funded by ELF
Total	$ 2,000.00		