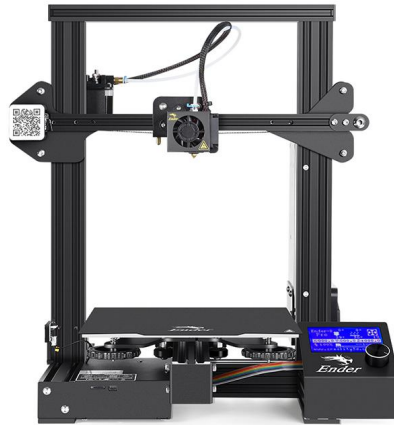


# Secure and Remote 3D Printing Requirements Document



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## 1. Introduction

### 1.1 Objective

The objective of this requirements document is to record and describe the functionality and interface the client needs for the web application. All features of the web application are listed and described in tables following. The requirements are subject to change based on the requests of the client and results of testing. Features below are organized into tables relating to various overarching requirements. Each table has a label which describes the general theme or product of the various functionalities listed working together.

### 1.2 Purpose

The purpose of this project is to provide students and faculty outside of the printer lab an ability to request their 3-D model be printed while ensuring protection of the lab's Ender-3 printer and its network. This will be accomplished by deploying a secure web application that allows authenticated users to upload GCODE files that are placed in a print queue by administrators. Throughout development, our team will maintain regular communication with the client and faculty in order to keep fulfilling expectations and stay on track with their vision. Our implementation should provide a user all of the functionality necessary to upload and request a model to be printed and reduce security risks to the best of our ability. When it comes to the importance of our client's work we are looking to mitigate situations in which injection or exfiltration may occur.

### 1.3 Scope

The scope of this project is to create remote printing capability for the printer via a web application and ensuring security of the 3D-printer from cyber threats. While our application is tailored to the specific infrastructure in the lab, we aim to design a platform and defensive protocol that can be scaled up should demand for printing services require it. Our first goal is to provide a functioning web application with which normal users can upload files, view their jobs' statuses in a queue, and login or logout. For administrative users we want to ensure the ability to display the status of printing requests, accept/decline printing requests, and allow for profile bans.

## Security

Features	Description
SQL Query Parameterization	Protect web server's database from SQL injection attacks by a hostile user
Cross Site Request Forgery Protection	Prevent malicious actor from executing actions using the credentials of a victimized user
DoS / heavy traffic protection	Traffic monitoring and throttling to prevent the exhaustion of server resources.
Cross Site Scripting Protection	Escaping HTML tags in user input that could be leveraged for a XSS attack
Directory Separation	Uploaded files are kept separate from the web application's source folder to prevent an attacker pivoting into the back-end code.
Exterior file storage	Storage location is separate to the web server's source code, reducing risk of debilitating attacks.
File hashing	Hashing of uploaded files for information assurance.
User Privileges	Static privileges for each set of users that follows least privilege paradigm
Access restriction based on login	Specific pages and features of the web application will be restricted to users based on their account privileges
Protect User Information	Encrypt traffic between web application and user with a Transport Layer Security certificate.
Authenticate Website Identity	Validate the identity of the web application with a TLS certificate.

## User Interface

Features	Description
Home page	Main page of the website which displays general information as well as directs users to other pages.
User Registration	A webpage that will allow a user to request an account on the website.
Admin approval of registrant	Upon registration with valid credentials send off user information for admin approval.
Saving user information	To finalize account creation user information is saved in the database.
Florida Tech styling	Modeling user interface off of Florida Tech's general styling
Mobile friendly interface	Webpages are readable and clean on browsers in mobile devices
Email already been used	If a user attempts to register with an email address that has already been used to create an account, reply with an error response.
User Acknowledgement	The web application will display a greeting message based on the signed in user's information.
Navbar	A navigation bar displaying links to various pages on the site. Used for traversal of the website.
Login page	Page for user authentication. Functional for all user types
Logout	Option provided along navbar after successful sign-in that allows user to logout
Submit button	Button which sends user input using post request.

## File Uploading

Upload title	User field for inputting file title.
Upload description	User field for inputting description of file.
Max number of uploaded files per user	Limit user uploads in order to prevent storage attacks and greedy use of the queue.
Max number of uploaded files in queue	Used to prevent the exhaustion of a limited amount of storage for the server.
File Extension Check	Web server prevents uploading of files that don't have the correct file extension
Max File Size	Prevent malicious users from uploading extremely large files as an attack on our web server.
Min File Size	Minimum accepted size of gcode files to ensure printing jobs are substantial.
Upload Directory	Uploaded files are stored in dedicated directory

## File Queue

Queue viewing page	Page for users to view the queue of current print jobs.
Queue requests page	Page in which administrators can accept or reject user print requests.
Admin print request approval button	Button for moving a request to the printing queue.
Admin print request rejection button	Button for removing a request.
User removal of own print job	Users may remove their own requested print jobs from the queue
Retrieval of user requested print jobs	Retrieves user specific print jobs from the queue to be displayed.
Display of user requested print jobs	Formats user requested prints and displays them in table form.
User view of queue	Users may only see their personal printing jobs and their positions in the queue.
Admin view of queue	Administrators may see all items in the queue.

## Administration

Access to administration page	Page contains
Deletion of users	
Deletion of stored models	
Print job removal from queue	Ability to remove a project when requested from the user. May also remove the project if it does not follow guidelines and it slipped passed during the first check.
Access to administration page	



## Backend &amp; Site Deployment

Robots.txt	Specify to search engine crawlers what URL's on our web application they can visit
Domain Registration	Purchasing of a domain name through Google Domains
Deploying web server	Employing Apache to serve our web application outside of development environment
Forward requests to web server	Configuring Web Server Gateway Interface (WSGI) to have web server send requests to the application
Enable SSL/HTTPS	Install necessary libraries and configure appropriate settings to have site deploy behind HTTPS