Secure and Remote 3D Printing
Milestone Progression

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Sponsored by

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Client

Mike C Newton

Progress of current Milestone (progress matrix)

Task	Completion %	Tiffanie	Carl	Isaiah	Nick	To do
1. Https implementation	80%	0%	0%	0%	80%	Fix the errors on the pi. Works without docker image.
2. Begin MitM of 3D printer	60%	0%	30%	30%	0%	Fix errors with the Greatfet.
3. Create the poster for the project	75%	75%	0%	0%	0%	Add evaluation results.
4. Compile Evaluation Results	100%	100%	0%	0%	0%	
5. Create the e-book page for the project	100%	5%	0%	95%	0%	

1. Discussion (at least a few sentences, ie a paragraph) of each accomplished task (and obstacles) for the current Milestone:

    - Task 1: To further increase security between the end user and the website we decided to implement the HTTPS protocol. Nick generated a SSL certificate, imported Django's extended library allowing for execution with additional security measures, and changed the startup command of the site's docker container to include the newly created certificate.

    - Task 2: The GreatFET device used to MitM the Ender-3 has several dependencies which we first had to familiarize ourselves with. These dependencies included the Facedancer library for USB proxying and the GreatFET library which manages the MitM traffic and its handling. Despite successfully intercepting traffic with other USB devices, current implementation is not intercepting 3D printer traffic. Problem is identified as GreatFET isn't connecting to the CH340 USB to Serial Converter chip inside the Ender-3.

- Task 3: The poster for the senior project showcase was created during this milestone. The goal, motivation, design, and features were completed first. Then once we received evaluation responses from the form we have sent out, then the addition or the graphs were added. Once the website was finalized, the screenshots were added to the poster as well as future work ideas and acknowledgements for the faculty that led us during this project.
- Task 4: The compilation of results was based on when students returned the results from the google form that was sent out. We created one that focused on the efficiency of the queue and printer in general and the other was based on user interaction on the web application. The results were then compiled into graphs to shed light on issues present in the project and what needs improvement.
- Task 5: For the e-book page we filled out the template first then waited till the end of the milestone to finish up the rest. We waited because we wanted to ensure that we could compile the key points of the project, major challenges that occurred, the solutions to our challenges, and our analysis of the data provided by the google forms. Since most of our challenges took quite some time to solve, we had to wait till the end of the milestone to be able to write about them.

- Discussion (at least a few sentences, ie a paragraph) of contribution of each team member to the current Milestone:
  - Tiffanie Petersen: Tiffanie created the poster for the team and compiled all of the evaluation results. She also took the lead on making sure the documents were in order as well as filling out all the required forms for junior design students and the upcoming showcase. She also took the lead on filling out the milestone progress report and helped the team with the Mitm research for the project. She also helped with the e-book page writing to keep the word count limited.
  - Carl Mann: Carl worked primarily with the GreatFET and library FaceDancer, becoming familiarized with the tool and support. Man in the middle proof of concepts were generated of various USB devices (keyboards, mice, etc). As of now, has been unable to successfully proxy the traffic between the Ender-3 and the Raspberry Pi (see Task #2). Additionally, has collaborated with teammates on website deployment and various bug fixes.
  - Isaiah Thomas: Isaiah focused on deploying the new addition of HTTPS onto the pi and created the ebook page for the senior design showcase. A demo directing users on how to register and upload files to the website was recorded and small changes were made based on user feedback of the video. Isaiah also assisted Carl with the GreatFET, researching how to use the device to proxy a usb interface and gathering examples of the device in use.

- Nick Contrell: Set up nginx container to proxy https within the container network. Made changes to the docker-compose file in order to implement the HTTPS protocol on the local development Django server.

2. Plan for the next Milestone (task matrix) or [skip if this is for Milestone 6]

Task	Tiffanie	Carl	Isaiah	Nick
1. Test/demo of the entire system	25%	25%	25%	25%
2. Evaluation results	25%	25%	25%	25%
3. Create user/developer manual	25%	25%	25%	25%
4. Create demo video	25%	25%	25%	25%
5. Finish MitM of printer	25%	25%	25%	25%

3. Discussion (at least a few sentences, ie a paragraph) of each planned task for the next Milestone or "Lessons Learned" if this is for Milestone 6

- Task 1: To test/demo the entire system, we plan to record user upload all the way through to starting to print a design. We don't believe that the printer would be able to finish a whole print because of the issues we have encountered with the printer itself. We also will record the traffic that is sent between the printer and Octoprint to show the security features in place.
- Task 2: We plan to accept more evaluation results for the final version of the project which would allow us to update the poster before the design showcase so show the most recent feedback possible. It would also allow us to compile a list of features that users believe need to be added which could be passed down to other teams.

- Task 3: For the final steps of the project we need to create a user manual to walk through how to use our web application and how to test each of the features as well as the security of the connections. We will also state how to set up a raspberry pi with a docker image will all the software needed and how to ssh into a raspberry pi. The connection to the printer seems to be trivial but a design document may be added depending on feedback.
- Task 4: For the senior design showcase an optional video is listed. The team was planning to create a demo video to allow visitors to review the project while the team is not physically present. If issues arise we may not get around to filming the video to meet the required guidelines.
- Task 5: Currently the GreatFET will not capture the traffic from the Ender 3. We have it working on keyboards and other connected devices, but unfortunately the Ender 3 does not maintain a simple USB connection with the pi but instead translates the incoming data to serial before processing. Other methods to MitM the connection are being investigated alongside the GreatFET.

4. Date(s) of meeting(s) with Client during the current milestone:
   - None (Dr. Siddhartha Bhattacharyya acts as an intermediary between our team and the client until further notice)
5. Client feedback on the current milestone
   - The client will be met once the project proceeds further. Depends on when Dr. Siddhartha Bhattacharyya decides the product is ready.
6. Date(s) of meeting(s) with Faculty Advisor during the current milestone:
   - 3/21
7. Faculty Advisor feedback on each task for the current Milestone
   - Task 1:
   - Task 2:
   - Task 3: Limit the number of the user features and focus on the security side of things. Add security features (design, architecture / containers) and conclusion. Decrease the number of acknowledgements.
   - Task 4:
   - Task 5:

Faculty Advisor Signature: _____ Date: _____

Evaluation by Faculty Advisor

- **Faculty Advisor: detach and return this page to Dr. Chan (HC 214) or email the scores to pkc@cs.fit.edu**

- Score (0-10) for each member: circle a score (or circle two adjacent scores for .25 or write down a real number between 0 and 10)

Tiffanie Petersen	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Carl Mann	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Isaiah Thomas	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Nick Contrell	0	1	2	3	4	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10

Faculty Advisor Signature: _____ Date: _____