Dibby: Your Digital Printer Assistant

Hack Dibner Group: Clicksters

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Introduction

Remember the relief you felt as a student when you finally finished that 10-page essay? The last thing you would want to face is a printer breakdown before class. On top of the many challenges of college life, students should not have to deal with printing problems!

Dibner Library at New York University (NYU) serves as a central hub for studying and group work. With the largest number of printers in a room at NYU Tandon, Dibner is the go-to spot for students' printing needs. However, 72% of students are often left dissatisfied and confused after facing jams, error messages, and uncooperative printers.

We facilitated discussions with the Dibner IT team, revealing that this issue stems from two factors: lack of communication and stressed engineering students. Surveys highlighted the absence of an easy way for students to report printer issues, resulting in their attempts to troubleshoot independently, posing a risk to the printer. We decided to tackle these issues and establish support and effective communication channels.

Introducing Dibby, an artificial intelligence (AI) powered chatbot that helps students with all their printing needs! Dibby will keep students updated on which Dibner printers are working, and it will help students troubleshoot printer issues, providing much-needed guidance. To minimize platform usage and maximize accessibility, the chatbot will sit on top of NYU Mobile Print, the website students already use to print. Reported printing problems will be displayed on NYU Mobile Print's Admin portal to streamline Dibner IT staff's print refund process and then documented in the Dibner IT Trello board, the project management workspace currently used by staff. The data collected from reported printing problems will be analyzed and visualized on the NYU Mobile Print Admin portal to aid the Dibner IT staff's understanding of overarching trends in the printing experience at Dibner Library.

Dibby is not any old chatbot—it is a game changer that will revolutionize the printing experience for both students and IT staff at Dibner. Imagine a campus where printing is seamless, frustration-free, and efficient. With Dibby, this vision is within reach.

Literature Review

Our team of design and development researchers conducted surveys and interviews to identify common pain points among Dibner Library patrons and IT staff. Our team met with Kanishk Pandey, Dibner Library IT Services Administrator, to further our understanding of these problems. Kanishk explained that the limited IT staff makes it difficult for the team to identify and address issues with the various Dibner printers promptly. Dibner Library has four printers, three black and white printers (printers ‘A’, ‘C’, and ‘D’), and one color printer (Printer ‘E’). The printers are spread across the third floor of 5 Metrotech. A significant portion of printing problems can be attributed to the fact that most students use the first printer they see, and are unaware of other available printers. This problem is exacerbated by the lack of a streamlined process for students to report issues with a printer. Currently, students are expected to go to Dibner’s library service desk, at which point they are directed to an IT staff member if one is available. Then, the IT staff member will accompany the student back to the printer and assist in fixing the issue. Additionally, an astounding 54% of students surveyed in Dibner were not even aware of the existence of this help desk. There is a clear need for improved communication between students and staff about printing-related problems.

In the past, NYU has implemented systems to streamline how IT staff learns about printing issues. Specifically, Bobst Library’s IT staff previously created and utilized a service called Izumi, which gave them real-time feedback about the status of their printers. This information was collected by pulling data from the printer’s IP address, which cannot be

accomplished with the specific printers used in Dibner. However, Izumi's existence validates the feasibility of creating and maintaining a system that simplifies the process through which IT staff become aware of printing problems. It also demonstrates a need for systems like Izumi in NYU's other libraries, including Dibner Library.

Initial surveys of Dibner patrons were conducted to address the urgent need for an intuitive and accessible solution to the communication gap between students and staff. The surveys revealed that many students attempt to troubleshoot when faced with a broken printer, but a lack of proper instruction can cause them only to worsen the issue. We found that 37% of students attempted to troubleshoot the issue when faced with printer issues. The troubleshooting methods ranged from strategically looking for the printer's status to just randomly pressing buttons on the printer and hoping for the best. Generally, the attempts were fruitless, indicating students' difficulty when troubleshooting with no guidance. With this data, our team concluded that there is a need for proper guidance for students wishing to troubleshoot printer issues at Dibner.

After deciding which problems we wanted to tackle, our team conducted in-depth user interviews with several NYU Tandon students who use the Dibner printers to identify the best approach to solving these issues. Note that the major and class year of the students selected for interviews were intentionally varied to minimize bias in the survey. During meetings with these students, we discussed the specific pain points they experience when printing at Dibner. Overwhelmingly, interviewees discussed the frustration of trying to print only to be met with some error. We also asked interviewees if they would be willing to troubleshoot these printer issues. The consensus was that if the students had time, they would be willing to try to solve printer problems. If they were running late, they would rather be redirected to a nearby working

printer or Dibner IT. Finally, we discussed how students would want to be helped. We proposed three options for them: step-by-step troubleshooting guides, video tutorials, or a chatbot. Every student identified the chatbot as one of the ways they would like to be helped. In a follow-up survey of students printing at Dibner, we found that 75% of students would be willing to use a chatbot to help solve printing issues. Thus, our team decided a chatbot would be the best way to help students manage printer issues.

A research paper published in ScienceDirect explores the role of chatbots in the customer service space. The paper "demonstrate[s] the importance of such chatbots to efficiently provide adequate answers in response to simple inquiries", proving the efficacy of chatbots when it comes to fielding questions from users and outputting an accurate response (Følstad and Marita, 1). Additionally, the paper concluded that even if a chatbot cannot accurately answer a user's inquiry, the user will be satisfied with the bot so long as it redirects it to a representative who can field this question. This demonstrates that chatbots do not need to solve every problem to improve the user experience. The findings of this paper confirm that a chatbot would be an effective solution to the problem at hand.

There were many concerns to address after our team decided to create a chatbot for this project. First, we needed to ensure the chatbot met NYU's expectations for cybersecurity measures. Since the chatbot will be a part of the larger NYU system, it must maintain at least the same level of security, or it could become an entry point for an attacker to access this larger system. According to Winson Ye and Qun Li, computer science researchers specializing in cybersecurity, someone could launch several attacks against a chatbot (Ye and Li). Attackers could inject hostile code into the chatbot's input or output to drastically change the chatbot's behavior for malicious purposes. They could also intercept messages between the user and the

chatbot to steal sensitive user information. We must implement adequate security measures to mitigate the chances of attacks like these. The researchers also emphasized the importance of user privacy when creating chatbots. Chatbots often collect and process large amounts of personal data. If the data is not adequately secure, unauthorized parties could access it and use it for nefarious reasons. When designing this chatbot, our team prioritized privacy for legal and ethical reasons.

Finally, we needed to ensure our chatbot was accessible to all users. Early in the research process, our team met with the Director of Dibner Library, Sam Putnam, to discuss best practices for creating a safe and accessible chatbot. According to a chapter in *W4A '20: Proceedings of the 17th International Web for All Conference*, "the accessibility of a chatbot to different audiences will, in significant part, be determined by the channel. For example, a mobile app for a specific messaging platform may already be accessible to screen reader users, or the app may constitute a significant barrier to screen reader users" (Lister p.2). The general accessibility of a chatbot is dependent on the accessibility of the platform it is hosted on, so we considered what features of NYU Mobile Print are already accessible when discussing our chatbot. At the moment, aspects of the NYU Mobile Print Website are inaccessible, as some of their graphic interfaces fail to meet the standards set by the World Wide Web Consortium's Web Content Accessibility Guidelines (WCAG). WCAG states that visually accessible websites must display color for text interfaces of at least a 4.5:1 contrast ratio to ensure that content is accessible for people with disabilities. According to the Web AIM Contrast Checker, the selection interface on NYU Mobile Print has a contrast ratio of 1.39 to 1, making it extremely low contrast (see here). By creating a chatbot that meets the standards set by WCAG, we hope to encourage accessible design across the NYU Mobile Print website.

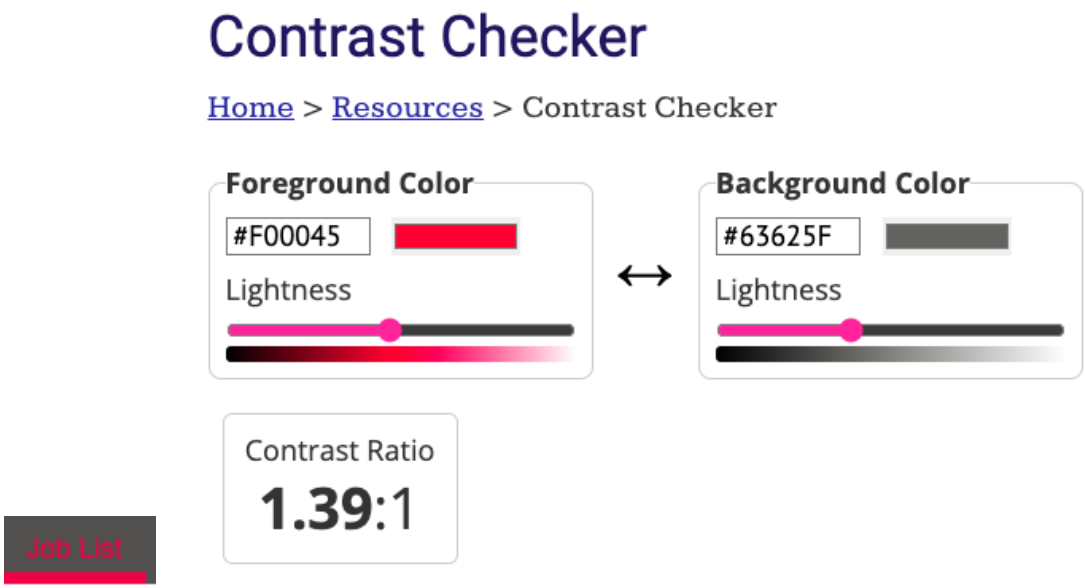


Figure 1: NYU Mobile Print Figure & Corresponding Contrast Checker

Methodology and Analysis

I. Research Methodology

The research methodology for this project used quantitative and qualitative research methods, such as surveys, user interviews, personas, and journey maps. The surveys aided our team in identifying and quantifying common behaviors in users, while user interviews helped us uncover users' pain points. Our team's initial survey, conducted on twenty-seven students who were using a Dibner printer, illustrated the frequency of printer usage in student's day-to-day life and subsequent errors. A follow-up survey of eleven individuals demonstrated the general frustrations that come with printing at Dibner. To further understand the needs of students utilizing Dibner library printers, we conducted ten thirty-minute user interviews. Through these user interviews, it was clear that a lack of consistent communication between staff and students was partially to blame for students' printing problems.

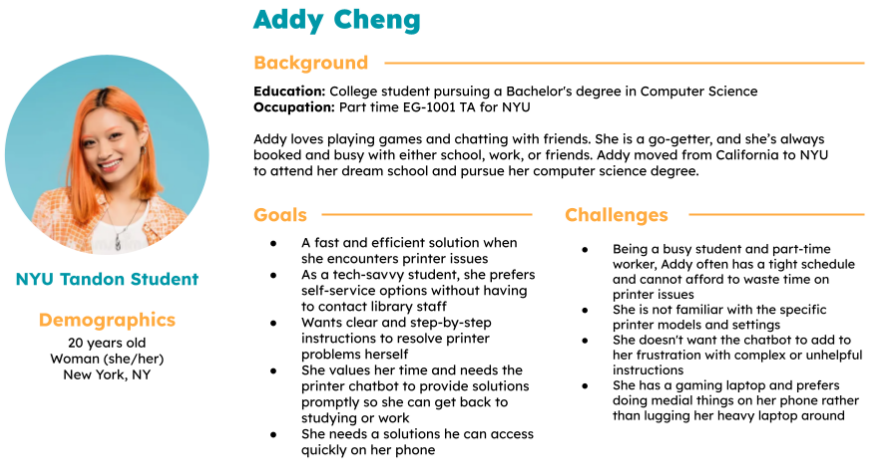


Figure 2: Example of a Persona Guide Pinpointing Goals/Challenges

II. Project Description

After compiling and analyzing initial research, our team came up with the idea for Dibby, an AI-powered chatbot that assists students with troubleshooting printer problems. Students can describe an issue they are experiencing when printing to Dibby. To echo the sentiments of IT staff, only certain issues can be troubleshot by non-staff. If the input issue falls under this category, Dibby will talk students through fixing the print. At any point during the interaction, the student can ask Dibby to redirect them to a nearby working printer or the Dibner Service desk, given that it's open.

Additionally, Dibby will have a display of all printers in Dibner, indicating in real-time whether or not they are experiencing issues. This information will come from the chatbot's user input– if a student reports an issue with a printer and is not able to solve it, the display will show that the printer is experiencing errors. During meetings with these students, we discussed the specific pain points they experienced when printing at Dibner. Overwhelmingly, interviewees discussed the frustration of trying to print only to be met with some error.

Reported issues will be sent to a Trello board shared with the Dibner IT staff. Trello was chosen because interviews with Dibner IT staff revealed it's the primary tool they use for tracking to-do items. Within the board, there will be sections for each Dibner printer, labeled 'A', 'E', 'C', and 'D' respectively. Each section will contain Trello cards, displaying printer issues reported by students via the chatbot for that specific printer. This will create a centralized log of all reports of printer issues, making it easier for Dibner IT staff to identify and solve problems.

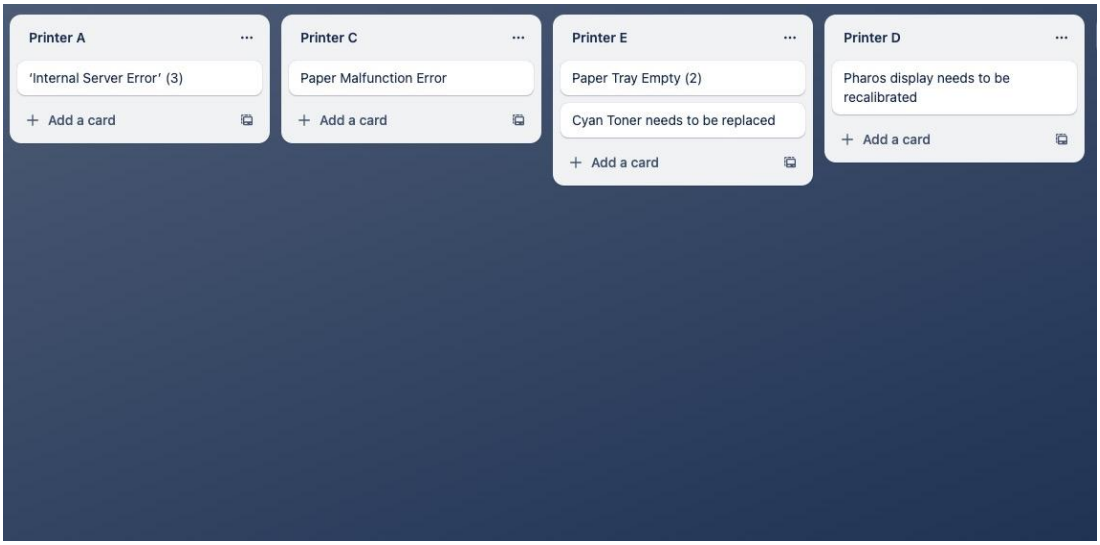
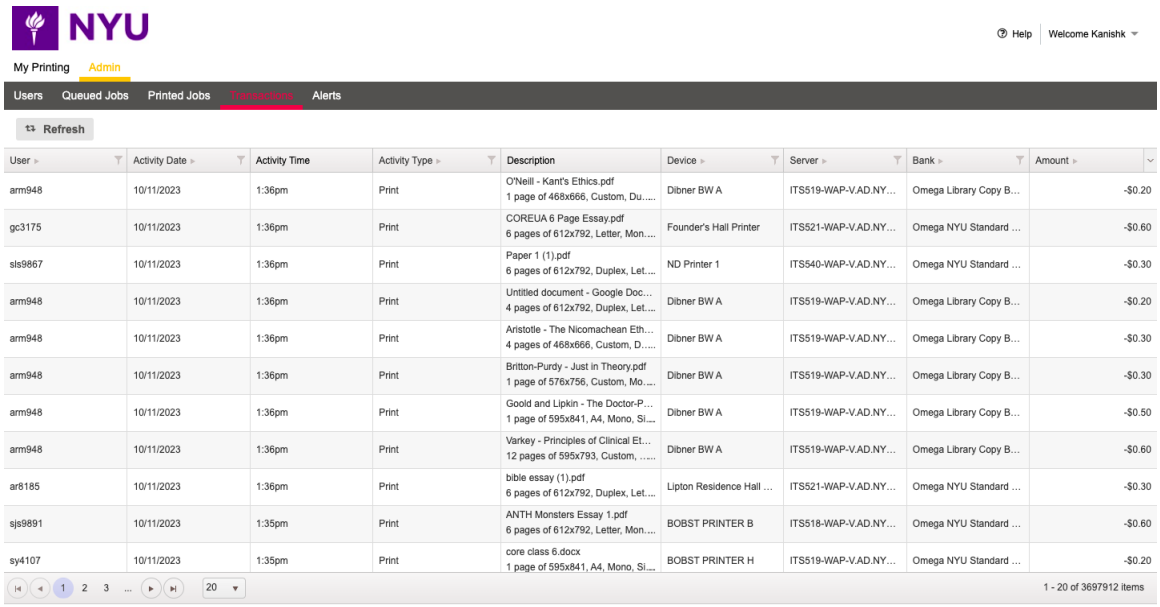


Figure 3: Trello Board

Once a Dibner IT staff member solves an issue reported by a Trello card, they will delete that card. This action will be logged, and if all reported issues for the respective printer have been resolved, the chatbot's printer display will change to show the printer is no longer experiencing issues.

Additionally, we will take the user input fed to Dibby about the issues students are experiencing when printing and send it to NYU Mobile Print Admin. Dibner's IT staff uses NYU Mobile Print Admin's Transaction page to review students' failed prints and issue refunds for them. During an interview with Kanishk Pandey, he expressed it can be difficult to issue these refunds when there is no way to specify the cause of the failure. This additional information from

students will help the staff identify what went wrong with a specific print when going through this process.



User	Activity Date	Activity Time	Activity Type	Description	Device	Server	Bank	Amount
arm948	10/11/2023	1:36pm	Print	O'Neill - Kant's Ethics.pdf 1 page of 468x666, Custom, Du....	Dibner BW A	ITS519-WAP-V.AD.NY...	Omega Library Copy B...	-$0.20
gc3175	10/11/2023	1:36pm	Print	COREUA 6 Page Essay.pdf 6 pages of 612x792, Letter, Mon....	Founder's Hall Printer	ITS521-WAP-V.AD.NY...	Omega NYU Standard ...	-$0.60
sls9867	10/11/2023	1:36pm	Print	Paper 1 (1).pdf 6 pages of 612x792, Duplex, Let....	ND Printer 1	ITS540-WAP-V.AD.NY...	Omega NYU Standard ...	-$0.30
arm948	10/11/2023	1:36pm	Print	Untitled document - Google Doc... 4 pages of 612x792, Duplex, Let....	Dibner BW A	ITS519-WAP-V.AD.NY...	Omega Library Copy B...	-$0.20
arm948	10/11/2023	1:36pm	Print	Aristotle - The Nicomachean Eth... 4 pages of 468x666, Custom, D.....	Dibner BW A	ITS519-WAP-V.AD.NY...	Omega Library Copy B...	-$0.30
arm948	10/11/2023	1:36pm	Print	Britton-Purdy - Just in Theory.pdf 1 page of 576x756, Custom, Mo....	Dibner BW A	ITS519-WAP-V.AD.NY...	Omega Library Copy B...	-$0.30
arm948	10/11/2023	1:36pm	Print	Goold and Lipkin - The Doctor-P... 1 page of 595x841, A4, Mono, Si....	Dibner BW A	ITS519-WAP-V.AD.NY...	Omega Library Copy B...	-$0.50
arm948	10/11/2023	1:36pm	Print	Varkey - Principles of Clinical Et... 12 pages of 595x793, Custom, ...	Dibner BW A	ITS519-WAP-V.AD.NY...	Omega Library Copy B...	-$0.60
ar8185	10/11/2023	1:36pm	Print	bible essay (1).pdf 6 pages of 612x792, Duplex, Let....	Lipton Residence Hall ...	ITS521-WAP-V.AD.NY...	Omega NYU Standard ...	-$0.30
sjs9891	10/11/2023	1:35pm	Print	ANTH Monsters Essay 1.pdf 6 pages of 612x792, Letter, Mon....	BOBST PRINTER B	ITS518-WAP-V.AD.NY...	Omega NYU Standard ...	-$0.60
sy4107	10/11/2023	1:35pm	Print	core class 6.docx 1 page of 595x841, A4, Mono, Si....	BOBST PRINTER H	ITS519-WAP-V.AD.NY...	Omega NYU Standard ...	-$0.20

1 2 3 ... 20 1 - 20 of 3697912 items

Figure 4: NYU Mobile Print Admin Transaction Page

Finally, we will collect and analyze data about printer issues over time. By aggregating this information, we will identify recurring problems and printers which frequently experience issues. This will be displayed via charts and graphs on a new page, Printer Analysis, on NYU Mobile Print Admin. This page will provide Dibner IT staff with valuable insights into the most common printer issues, helping them address these issues and fostering a proactive approach to printer maintenance.

III. Back-end Description

Dibby will be built using intent-based AI. It will interpret the intention of a student's request and deliver the appropriate pre-written instructions. These instructions were created in conjunction with Dibner IT staff. We asked staff members which common printer issues they believed an average student could fix with minimal risk of the student causing damage to the printer. Then, we asked how a student could fix said problem and used this information to create

easy-to-follow instructions for Dibby to share with users. We chose not to make this AI chatbot using generative AI, a process through which the chatbot continually adapts to student responses and generates appropriate answers, to ensure the chatbot never gives misleading or inaccurate advice to students.

Before creating Dibby's backend, we outlined the desired responses Dibby could give users in a flowchart. In addition to helping users troubleshoot common printer problems, we wanted Dibby to be able to answer simple questions about printing in Dibner. We then conducted user interviews, walking interviewees through a potential conversation with Dibby. At the end, we asked if there were any points of confusion during the interaction and if they had any general feedback on the experience. Some suggestions were shortening the interaction and allowing users to leave feedback on Dibby's performance. We implemented changes based on this feedback to create our final flowchart, shown below. In the flowchart, note that two of Dibby's responses include underlined blanks. Based on the user's input, such as the specific printer issue they report, these blanks will be filled in with appropriate information.

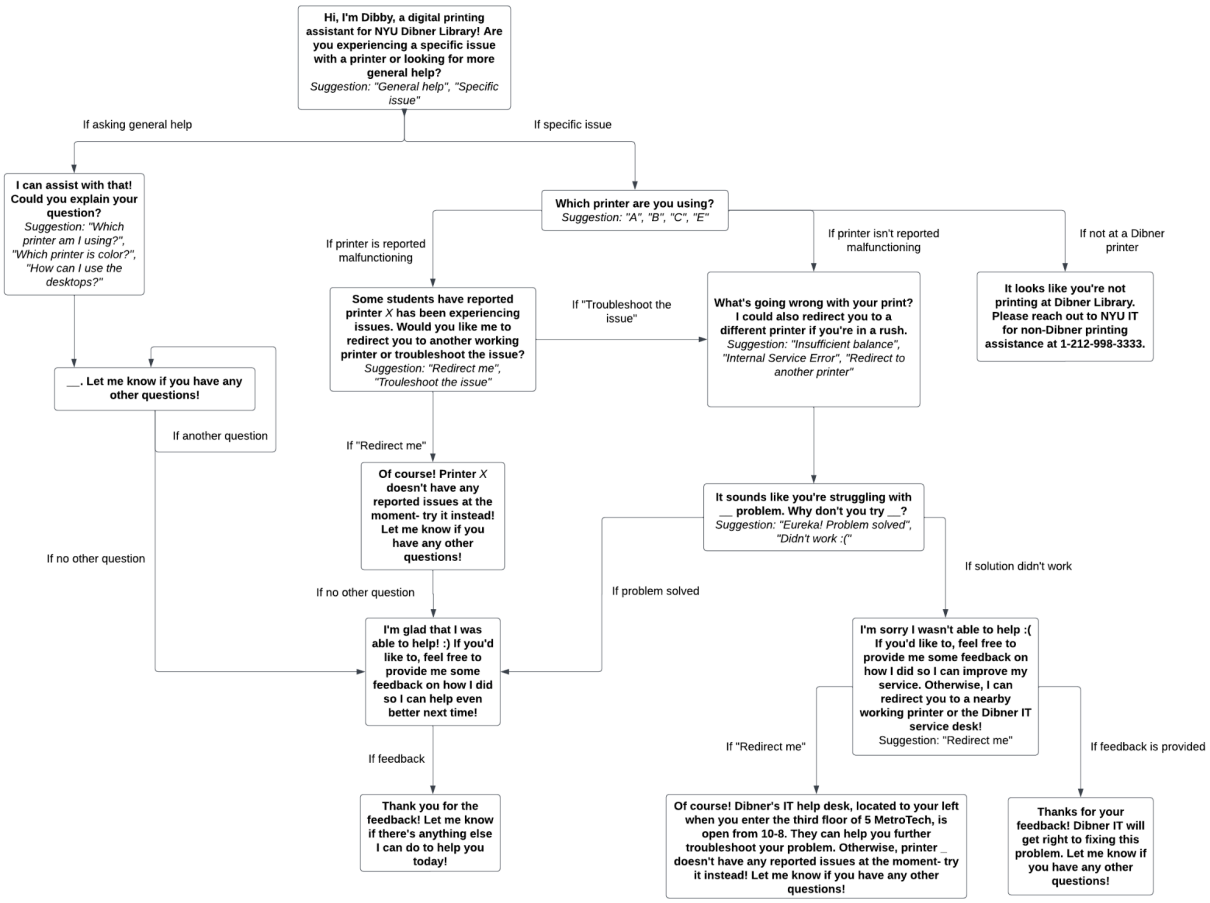


Figure 5: Chatbot Flowchart

To construct Dibby's backend, TensorFlow, an open-source software library for artificial intelligence, was used. This library facilitated the creation and training of a machine-learning model on a dataset. The dataset comprised sets of user inputs and a corresponding response that Dibby should provide. It was generated using the chatbot flowchart, which determined the questions or statements to which Dibby should respond and the appropriate answers. We then enlisted ChatGPT to rephrase each question/statement in 10 different ways. These variations were used to construct the sets of user inputs, each linked to an appropriate response in the dataset. After training, the model functioned properly, replicating the flowchart we created.

If users discuss a printer issue with Dibby, their input will be processed via a natural language processing (NLP) algorithm. NLP algorithms allow computers to interpret and analyze human language. Additionally, they can be trained to classify human text into predefined categories. For our purposes, the NLP algorithm will take in user input about a specific printer issue and categorize it according to the underlying factor causing the issue. For initial training of the NLP algorithm, a list of common printer issues shared by Kanishk Pandey will be used to identify the most underlying factors of printer problems at Dibner. In the future, the NLP algorithm can be retrained to classify additional underlying factors if new common ones crop up in Dibner.

If a user reports a printer issue to Dibby, their input will be sent to NYU Mobile Print Admin's Transaction page. A new column titled "User Report" will be created on the page to store this text. Since NYU Mobile Print Admin is a website managed by NYU's IT staff, gaining access to the application and making changes to it is certainly possible.

In order to manage both Dibby's display of malfunctioning printers and the Trello board, we will use a database, an organized collection of data. If a user reports a printer issue to Dibby, relevant information will be stored in the database. This relevant information includes the user's input, the underlying cause of the issue (as identified by the NLP algorithm), and the printer ID associated with the issue.

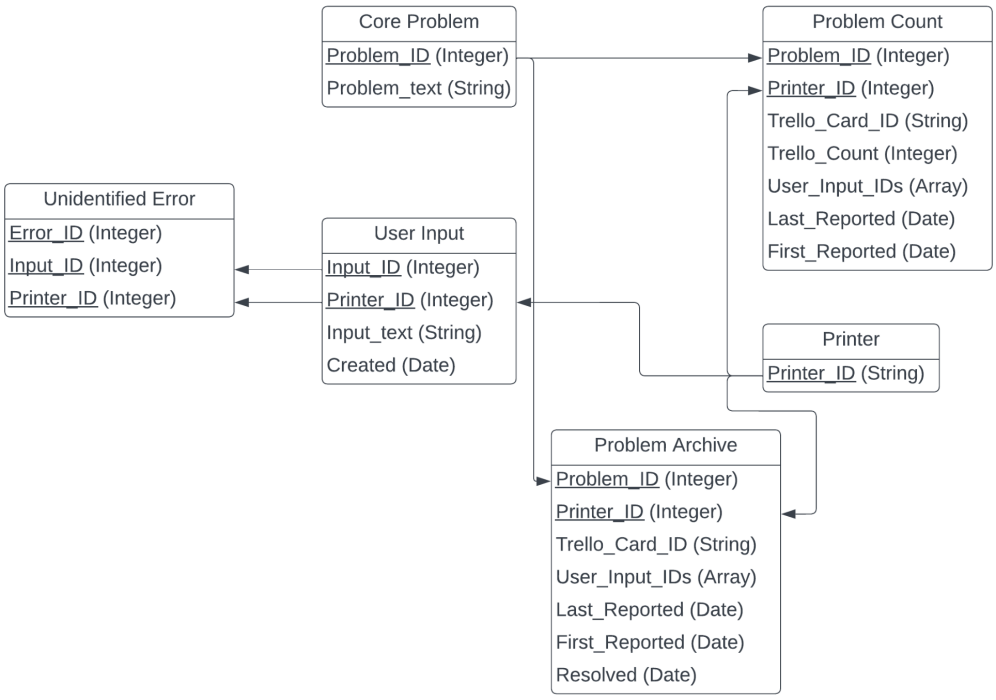


Figure 6: Database Schema

It is crucial to avoid overwhelming the Trello board with redundant error reports. Specifically, if multiple people report the same issue with a particular printer to Dibby, we should only have one card on the Trello board addressing that issue. Prior to storing relevant details about a printer issue in the database, we search the database's "Problem Count" table to check if an issue with the same root cause has already been reported for the corresponding printer. If such an entry exists, it indicates that a card reporting this issue is already on the Trello board. Then, we update the count of occurrences of this issue on the relevant Trello card and in the database. Otherwise, if no such entry is found, we create a new Trello card to report the issue and record relevant information, including this new Trello card's ID number, in the "Problem Count" table of the database. Additionally, we will update Dibby's display of malfunctioning printers to reflect that the appropriate printer is experiencing issues.

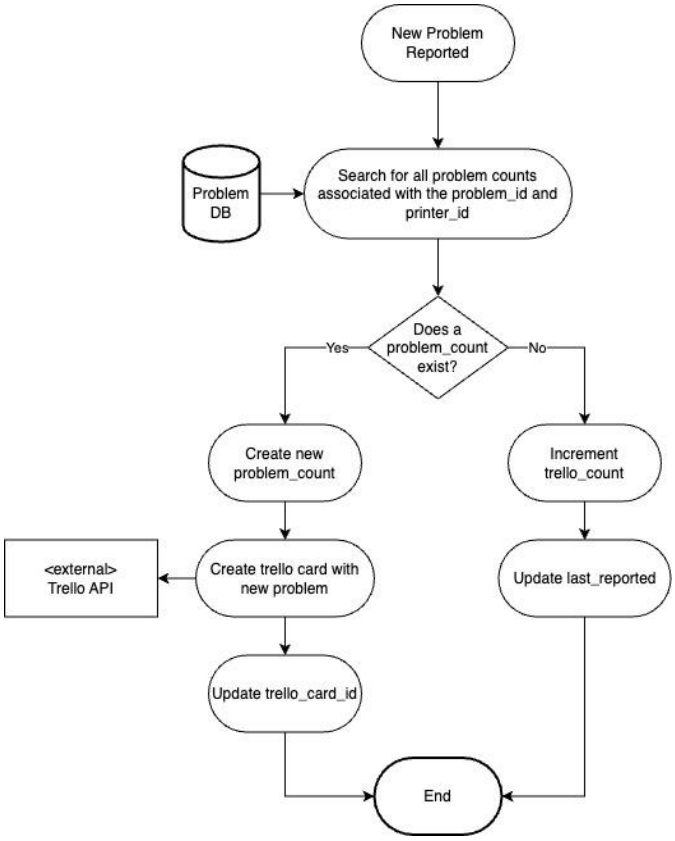


Figure 7: Decision Making Diagram for Uploading to Database

Once a Dibner IT staff member resolves the reported issue, they will delete the corresponding Trello card. Our application will be automatically notified of this action through a webhook, which is a mechanism that informs an application when a specific event occurs in another application. Subsequently, we will search the database for an entry in the “Problem Count” table associated with the Trello card ID that was just deleted. Once found, we will remove that entry from the “Problem Count” table and transfer it to “Problem Archive”. Finally, we will search the “Problem Count” table again. If there are remaining reported issues linked to the same printer ID, we will update Dibby’s display of malfunctioning printers to indicate that the corresponding printer is functioning properly.

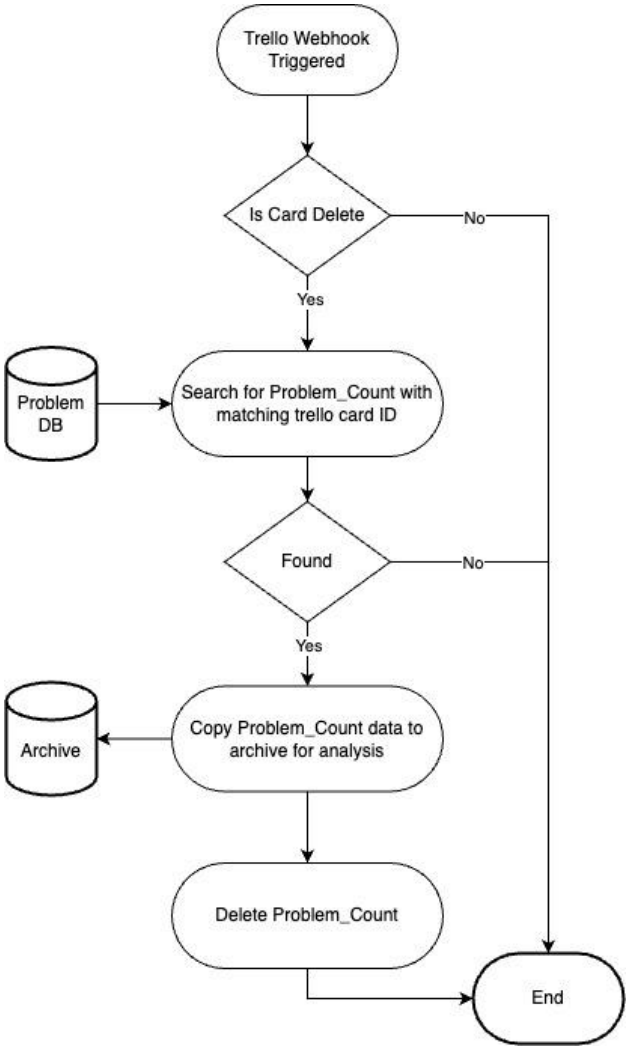


Figure 8: Decision Making Diagram for Updating Trello Cards

The purpose of maintaining a record of deleted Trello cards in the “Problem Archive” table is to facilitate the collection of data about printer issues. Once a month, a query on the “Problem Archive” table will be automatically executed, filtering for errors reported within the current month. This data will be analyzed to extract valuable insights, such as identifying the most common issues associated with each printer, pinpointing printers that experience problems frequently, and determining the average error resolution time by the Dibner IT staff. To visualize this data, we will use Matplotlib, a software library which supports the creation of various types of graphs and charts. These graphs will be displayed on the Printer Analysis tab of NYU Mobile

Print Admin, providing Dibner IT staff with a clear and accessible presentation of the analyzed information.

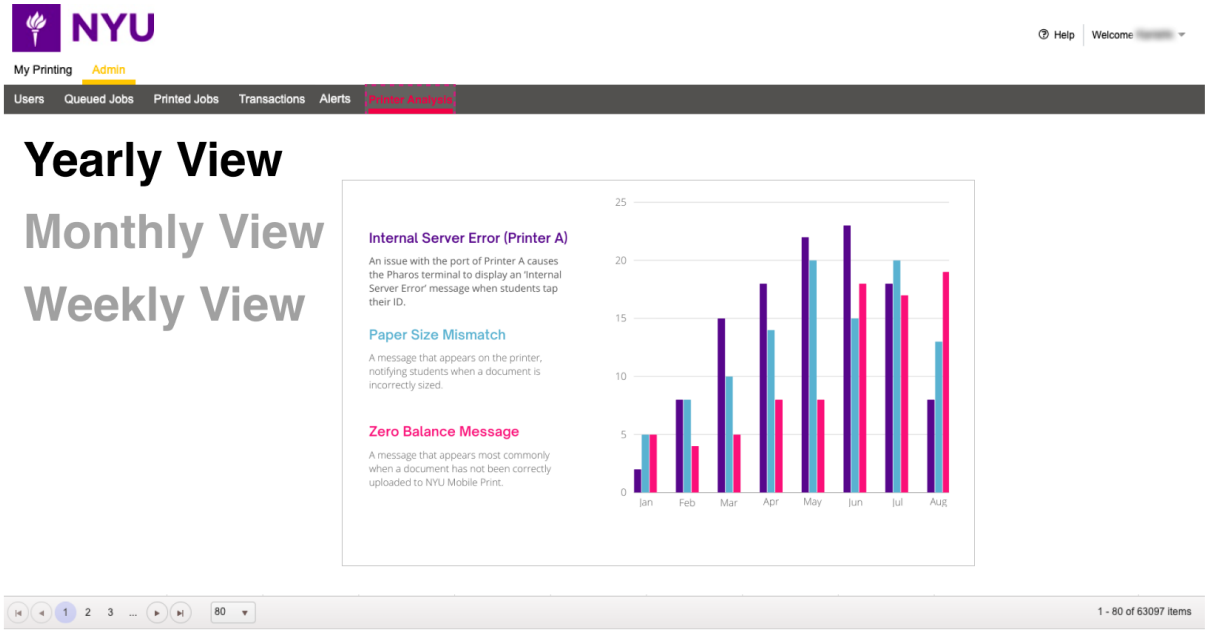


Figure 9: Decision Making Diagram for Monthly Analytical Reports

In regards to data privacy and security, Dibby will not gather any identifying information about users to protect their privacy. Additionally, the database will not store any identifying data about the users who interact with Dibby. Rather, it will solely store information about issues associated with the Dibner printers. This data will be displayed either in NYU Mobile Print Admin, a service that already meets NYU's high standards for security, or on Trello. To ensure data is handled responsibly, Trello maintains General Data Protection Regulation (GDPR) compliance, a law enacted to regulate information privacy. Therefore, users can be assured their data will be collected minimally, and any data that is collected is secure. If a user has any questions about what parts of their data are being distributed by this chatbot, there will be a "Privacy Policy" section on Dibby they can read.

Due to our commitment to preserving user privacy, we cannot guarantee the exclusive use of Dibby by students in Dibner as it would require location tracking. Instead, Dibby explicitly declares they are a chatbot meant to serve Dibner patrons only at the beginning of every interaction. Additionally, if a student attempts to report issues with printers outside of Dibner Library, Dibby redirects them to seek assistance from general NYU IT support instead.

To mitigate the risks of cyberattacks, the same firewall that protects all NYU applications will be applied to this chatbot. Additionally, we can implement access control to regulate who can access the chatbot. The chatbot will be located on NYU Mobile Print. Thus, to access the chatbot, users will have to log in to NYU Mobile Print using their NYU NetID and password on Duo Mobile, a multi-factor authentication service. This will ensure only authenticated NYU students, faculty, or staff can access the chatbot.

IV. Front-end Description

Our methodology for developing the chatbot aimed to create a friendly, easy-to-engage, and quick interaction with the user. We estimate that printing solutions will be arrived at within the span of three questions, and less than four clicks. Our frontend research was based around various popular and widely used messaging systems such as Instagram's direct message feature and layouts from Marshall McLuhan and Zendesk. For the user experience, we looked at various AI service chatbots such as Chipotle's Pepper chatbot and the Amazon Lex chatbot. Based on our inspiration from those messaging systems and chatbot designs as well as our user feedback, we decided that our main priority for students was efficiency and readability. Rather than have students type out their problems, the chatbot will provide text prompt suggestions based on the most common responses students receive, and optimally, the most a student would have to do is just click their response.

Figure 10: Dibby's Logo

To align with NYU's branding, we incorporated a predominately purple and simplistic design along with using features of NYU's logo, making sure that our branding coincides with the university's identity. To bring further value to our chatbot, we designed our conversations to keep the students engaged by selecting a tone and a persona, or mascot, for the bot. To enhance the chatbot's friendliness and relatability, we themed Dibby with a librarian look and personality. Our designs present Dibby as a helpful and knowledgeable assistant with a cheery and customer service-oriented demeanor to influence students to feel more inclined to give helpful feedback. We derived the Dibby logo from the NYU torch, but after our first round of feedback, carefully modified the fire symbol to prevent any confusion with Tinder's fire emblem. Because Tinder is a popular messaging app, to prevent confusion about the purpose of our chatbot, we removed the gradient, created an additional torch spike, and added a torch handle to firmly represent NYU's logo.

Priority is assigned to specific interactions, with the foremost focus on addressing student needs for printer status, followed by troubleshooting assistance and feedback collection for long-term printer issues. To streamline user experience, information on down printers is readily accessible without the user having to interact with the page. Assistance and troubleshooting is

accessible in less than two clicks, the first to open the chatbot, and the second to optimally figure out a student's first issue. The feedback mechanism is input/typing-based for our next priority, allowing students to express their thoughts without imposed suggestions from our backend system.

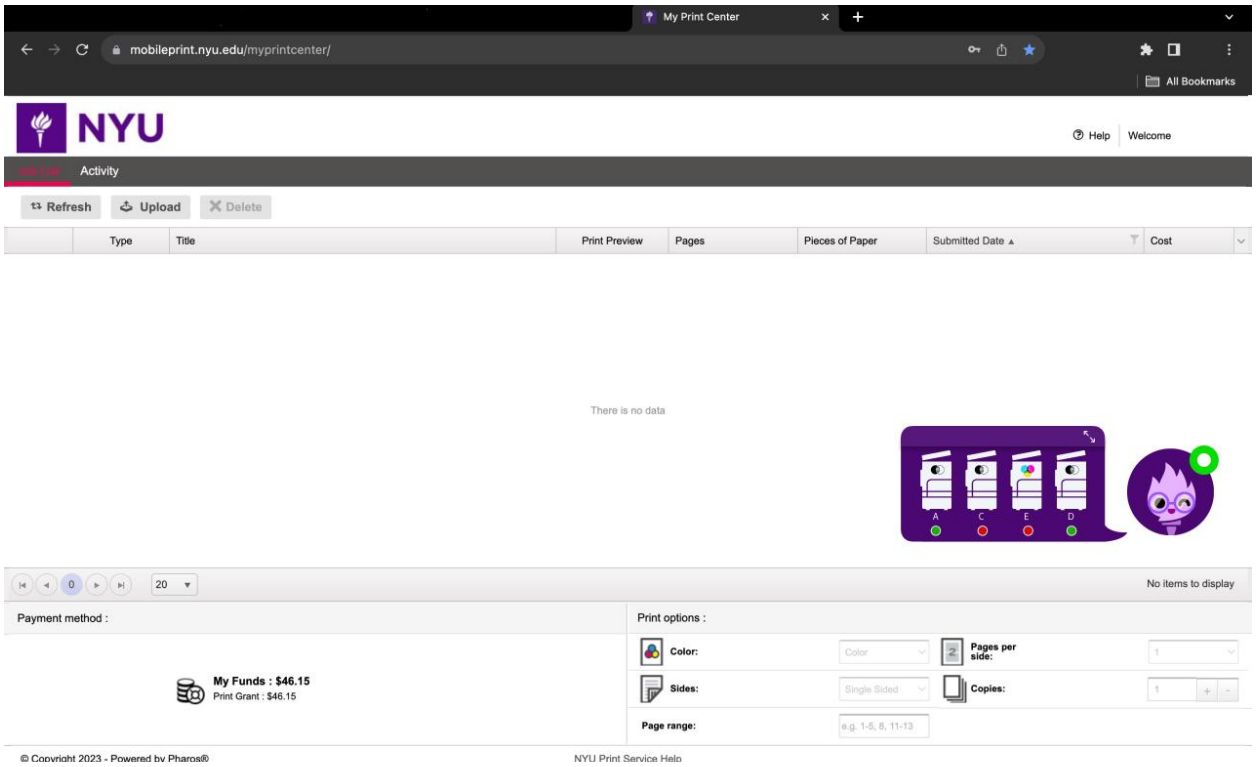


Figure 11: Dibby's Desktop Interface

We believe that small details are the main differentiators from a typical user experience to a great one. We focused on micro-transactions between the interface and the user to focus on user satisfaction. For example, although Dibby is accessible 24/7 through NYU Print Mobile's website, the green active indicator points out and reassures students that there is an assistant available and online at every single moment.

Additionally, the placement of down printers at the top of the chatbot interface ensures quick access to critical information for top-priority interactions. To avoid reliance solely on color-based design, open and empty circles were incorporated to indicate the operational status

of the printer, enhancing the chatbot's accessibility and usability. The colored printer located in Dibner is seen in color with three circles, differentiating it from the black and white printers which are seen with two grayscale circles.

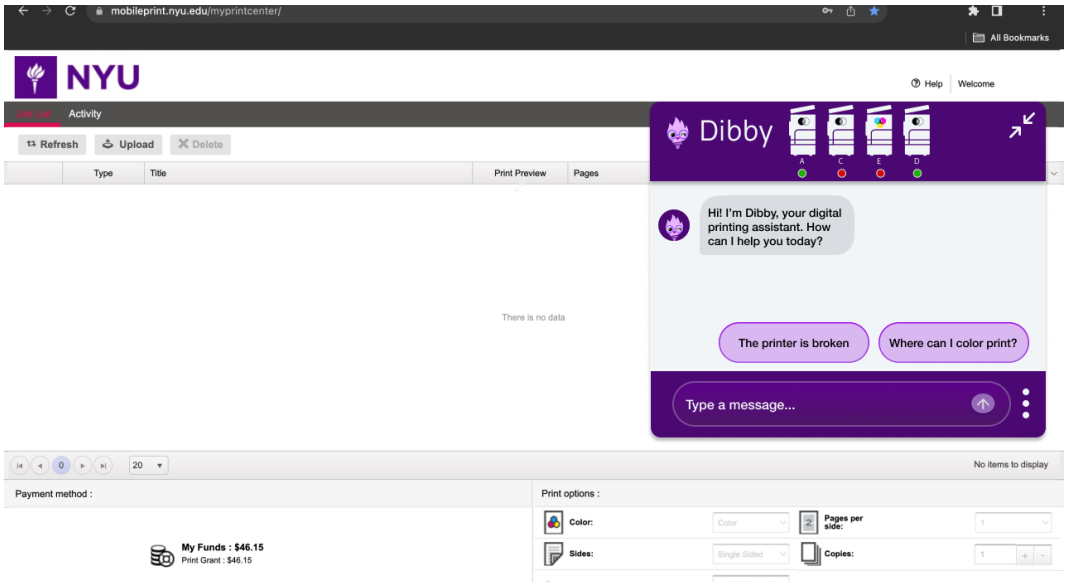


Figure 12.1: Dibby on NYU Mobile Print

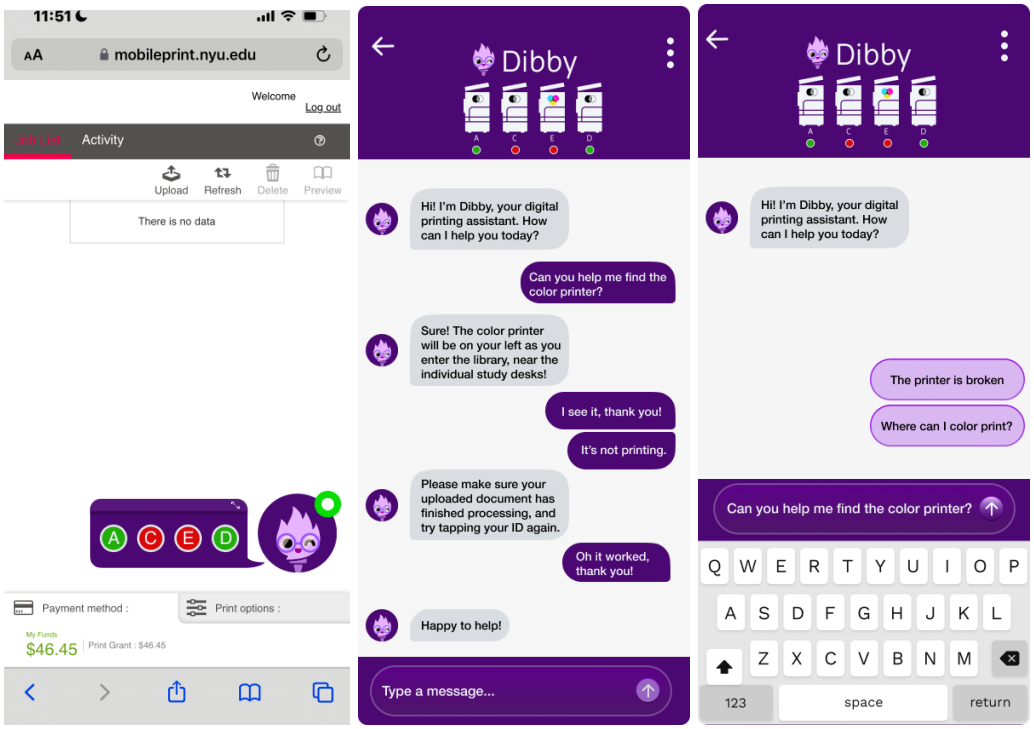


Figure 12.2: Dibby on NYU Mobile Print for Mobile Phones

The responsiveness for the layouts based on the device that a user is accessing NYU mobile print was also taken into account. Our printer status icons were too detailed for us to seamlessly transfer to mobile, so to adapt to the smaller screen, we constrained our no-click printer status icons to be four letters in either green or red. For mobile, clicking on Dibby will open a full-sized screen chat, much like how typical messaging apps are designed. For large-screen interactions, it opens a smaller window that resembles a mobile layout, ensuring that the overall chat messaging feel is not lost and so people with the extra screen space can utilize the NYU Print Mobile site and Dibby at the same time.

V. Feasibility/Cost

To fully develop this chatbot, we estimate that one software developer would need approximately three months. There would be no cost incurred for software used. TensorFlow is free to use. Additionally, we would use Postgres, an open-source and free software, for database management. The databases would need to be hosted on some server, though, which would have an associated cost. The databases can easily be hosted on NYU's own machines, such as the servers maintained by NYU High Performance Computing Team, or on servers maintained by larger corporations such as Amazon Web Services (AWS). The cost of running the server varies, with industry standard services such as AWS costing an average of $0.098 per hour, or $859 a year.

In the event that Dibby's artificial intelligence model needs to be retrained to accommodate new errors, we estimate roughly 8 hours of work will be required to prepare the new training data, retrain the model, and put the new model into production.

VI. Impact

While the creation of this project will incur a modest cost, the investment is justified by the substantial time saved by Dibner staff. Creating a clear channel for understanding printer issues reported by students, this project not only enhances staff efficiency but also provides a display of recurring printer issues over spans of time, allowing for more effective troubleshooting. This project also eases the lives of Dibner staff by placing additional information about failed prints in NYU Mobile Print Admin's Transaction tab, helping them with their refund process. The function of Dibby relies on the contributions of Dibner IT staff to solve issues which students cannot fix themselves. It works in tandem with staff, rather than replacing their roles.

This project not only benefits Dibner IT staff but also improves the overall experience for the many Dibner patrons, particularly students. It simplifies the printing process, as evidenced by the results of our final interviews with students. During these interviews, we presented three students with a common printer error and observed their typical problem-solving approaches. Two students attempted unsuccessful online searches for the solution, while one opted to leave Dibner to try printing elsewhere. However, when given access to Dibby, all three students successfully resolved the printer issue. One surveyed student stated Dibby made them "feel more supported" throughout the printing process, showing Dibby not only resolved their technical problem but also provided a sense of assistance and reassurance. Another student elaborated that "Dibby gives me the exact information I'm looking for. It's much more convenient than using a website or a manual", illustrating how a chatbot like Dibby is an accessible tool for obtaining printer-related information.

We combined user-friendly design, a unique chatbot personality, and a focus on user interaction to create a holistic and pleasant user experience with the chatbot. Additionally, we

took into account meaningful accessibility and technological considerations when designing Dibby. Ultimately, Dibby stands as a valuable tool that improves the overall printing experience for both Dibner IT staff and patrons, contributing to a more efficient and user-friendly environment within Dibner Library.

Pitch and Conclusion

In the fast-paced world of college, every minute counts. When the printing experience takes up too many of these precious moments, frustration erupts. Enter Dibby, the AI-powered chatbot ready to revolutionize the printing landscape at Dibner Library. An intuitive interface and simple design invites users into a world where printing is seamless and troubleshooting is instant.

Dibby not only enhances the student printing experience– it also helps the Dibner IT staff operate more efficiently and give each student the one-on-one attention they deserve. Dibby isn't just about fixing printers– it's about providing instant support, boosting productivity for all, and shaping a library experience that students and staff never knew they needed. The chatbot not only solves printer problems; it enhances user experience and efficiency.

We want students to focus on learning, not troubleshooting. We want to ensure that each printer hiccup is met with a satisfying solution for our library workers, and a frustration-free experience for all students–one print, one student, and one smile at a time!

Works Cited

Følstad, Asbjørn, and Marita Skjuve. “Chatbots for Customer Service: User Experience and Motivation.” *Proceedings of the 1st International Conference on Conversational User Interfaces*, Association for Computing Machinery, 2019, pp. 1–9. *ACM Digital Library*, https://doi.org/10.1145/3342775.3342784.

Lister, Kate, et al. “Accessible Conversational User Interfaces: Considerations for Design.” *Proceedings of the 17th International Web for All Conference*, Association for Computing Machinery, 2020, pp. 1–11. *ACM Digital Library*, https://doi.org/10.1145/3371300.3383343.

Ye, Winson, and Qun Li. “Chatbot Security and Privacy in the Age of Personal Assistants.” *2020 IEEE/ACM Symposium on Edge Computing (SEC)*, IEEE, 2020, pp. 388–93. *DOI.org (Crossref)*, https://doi.org/10.1109/SEC50012.2020.00057

0:00 - 0:30 | Skit

Kevin: Sorry guys, we're waiting for our final member of our group. I have no idea where she is.
Riola: She's never late, this isn't like her
(bust down the door)
Nisha: Oh my god my guys I'm so sorry. I was trying to print out these brochures for our judges but I tried three different printers at Dibner before I found one that was working. If only there was a product that could have made this process easier

Introducing Dibby (fanfare) (Charlie's angels pose)

0:30 - 1:30 | Overview of Problem

- People aren't happy with printing in Dibner

2:30 - 3:30 | Research

70% of students use dibner
80% said they experienced issues
Interviewed both patrons and staff
Generative Interviews
User interviews
Final user interviews

_:__ - _:__ | Project Description

NLU
Trello
Database
Reports (in the admin page)

_:__ - _:__ | Trailer

3:30 - 4:00 | Feasibility/Cost

Simple NLU model
On top of nyu mobile print
Can be made by nyu computer science students
$859 a year

4:00 - 5:00 | Impact/User Experience

Accessibility
Print status being visible
Branding? (conclusion maybe)
How we designed how Dibby talks (why friendly)

Creating a clear channel of communication between IT staff and students
Reducing workload for staff
    Common easy to fix issues, prevent unsafe troubleshooting by students
    Refund process
    Catered reports and issue lists

5:00 - 6:00 | Uniqueness/Creativity
- Why our competition wouldn't work
  - Step over ask a librarian
  - Tutorial aren't fun
  - Prioritizes both students AND staff

6:00 - 7:00 | Conclusion (try to be 20 seconds loop back to title)
- Reiterate impact
- Proven to be needed and effective
- Built to be scaled
- More successful prints = more people finding Dibner's potential
- Help staff and students have a more enjoyable experience

Megan: Trailer

Riola: User experience slides, design of the slides

Kevin: Feasibility/Cost

Nisha: Everything before trailer

Olivia: Conclusion, uniqueness

Finish wednesday by 4:30

Feedback

All students use dibner printers

Include that information

Include more of the design photos

If you want to show the code you can but make sure its in 7 minutes

Accessibility issue is important

One line based on each category of feasibility, creativity, etc.

More visualization of data

Make sure background of AI is flushed out because one of them knows AI stuff

Emphasize that its on the mobile print website

Trello board - Picture of trello board

Say “I talked to ___ and they said”

More personal, more urgent

Sprinkle stats through the rest of the presentation

How does our project stand out

Make sure its not taking a librarian’s job