LIBRAI: Liberating Libraries through Generative Artificial Intelligence Incubator Program

Project Summary: The libraries of Virginia Tech (VT, project lead) and the University of California, Riverside (UCR) respectfully request $149,801 from the IMLS LB21 Program for a two-year planning project. We will launch a Generative Artificial Intelligence (GenAI) Incubator Program to address the challenge of limited AI adoption in university libraries. Aligned with LB21's Goal 3 and Objectives 3.1 and 3.3, our program aims to advance professional development and elevate the professional capabilities of librarians, facilitating the seamless integration of GenAI into their roles and work environments. Intended project outcomes include training materials, workshops, and capstone projects specific to four library themes: AI literacy, Collection, Preservation, and Research. The program's capstone projects from participants will be showcased in a virtual symposium and project website to facilitate broader adoption and dissemination of the program. This initiative aims to revolutionize university library operations by integrating and enhancing AI literacy among library professionals to improve collection management, preservation, and research. The expected successful execution will demonstrate the benefits of AI-driven innovations for library service delivery and operational efficiency. Project deliverables will provide a foundation for further implementation in libraries, and workshop participants will gain the practical experience to lead and advocate AI adoption in their institutions. By fostering collaboration between AI and human expertise, this project charts a course towards harnessing emerging technologies in libraries, crafting a distinctive strategy that amplifies their capabilities and influence beyond their traditional roles, impacting the broader landscapes.

Project Justification

Libraries have long aspired to harness Artificial Intelligence (AI) to innovate and improve the services they provide to their communities [29-32]. Although library professionals recognize the transformative capabilities of AI [1], existing educational materials often have prerequisites that are not aligned with their diverse educational backgrounds, making AI integration difficult [2]. An exploratory literature review [3] highlighted unique barriers across different applications of AI in libraries and pointed out the critical need for training and awareness among librarians to navigate these challenges effectively. A survey shows that while 80 percent of research librarians explored AI and machine learning, only 5 percent of research libraries have leveraged AI technology [4]. Studies show challenges in adopting AI in libraries, including librarians' tech attitudes and skill gaps, underscoring the need for targeted training programs [5]. There are efforts to build future AI leaders (RE-246419-OLS-20[1]) or train future faculty (RE-252381-OLS-22[2]), but expected impacts may require years to materialize.

The evolution of AI, from specific-task systems like chess-playing in the mid-20th century to the advent of machine learning and deep learning, has significantly advanced AI's capabilities, enabling complex tasks like image recognition and natural language processing. The recent development of GenAI, including transformers [6], advanced large language models (LLMs) [7], and foundation models [8], represents a shift towards general-purpose AI, capable of performing human-like tasks across multiple domains with remarkable proficiency. This transformation underscores the need for library professionals to update their AI understanding and integration strategies to include these advancements.

Today, GenAI's accessibility is unprecedented. The rapid adoption of ChatGPT, achieving 100 million active users shortly after its launch, raised issues such as ethics, privacy and copyright concerns. Swift actions were taken in response to these challenges, with the White House, along with states such as California and Virginia, implementing executive orders [9-11]. Universities defined guidelines and policies to navigate these challenges. Libraries, facing an increase in patron inquiries about AI-generated inaccuracies such as hallucinations and ghost references, created libguides [12] to gather related information, showcasing their flexibility and resilience in adapting to these new technologies. Furthermore,

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[1] IMLS RE-246419-OLS-20: https://www.imls.gov/grants/awarded/re-246419-ols-20
[2] IMLS RE-252381-OLS-22: https://www.imls.gov/grants/awarded/re-252381-ols-22

building on top of these general-purpose models by using fine-tuning or reducing hallucinations with external sources, GenAIs have achieved widespread adoption in various fields, emerging as the most rapidly adopted technology in history [13]. Worker productivity has increased without compromising quality through the use of LLM-powered tools [28]. This momentum presents an opportunity to reexamine and potentially integrate these new GenAI techniques into the library's general administrative and outreach tasks [14] and to create new innovations that can further enhance library services and community engagement.

The importance of academic institutions developing new mechanisms to support the adoption of GenAI technologies is underscored in [15, 26]. [16] delves into AI's contribution to scientific understanding across three dimensions—as a tool, a source of inspiration, and an agent of understanding—that highlight the new role of AI in facilitating new insights and advancing scientific knowledge. Furthermore, a survey shared in [17] provides insights into the adoption and perspectives of generative AI in library settings. At the 2024 American Library Association's LibLearnX conference, various panels and workshops were dedicated to exploring the impact of AI technology on libraries and education, emphasizing the significant attention focused on AI among the library sectors [19]. Additionally, [18] examines the evolving role of librarians amidst the increasing use of AI in academic environments, and how AI is being integrated into library services. [20] discusses the significant potential and challenges of implementing AI in library services. A recent national survey shows that the need for training faculty, staff, and students in new AI technologies and skills is a key component of AI-related strategies. This suggests a concerted effort by institutions to help their communities update their skills in line with the advancing AI landscape [21].

We propose the GenAI Incubator Program as a strategic initiative aimed at melding theoretical insights with the tangible application of GenAI technologies in library services. This initiative seeks to transcend traditional educational methodologies by providing library professionals with comprehensive, hands-on experiences through project-based learning [25] and experiential learning [27]. In partnership with AI specialists, educators, and library sector administrators, we intend to develop projects that accurately reflect the complex realities faced by libraries today. Our objective is to mentor, educate, and support library professionals in creating GenAI tools that are customized for library-specific applications. These tools will bolster productivity and enhance domain-specific functions through the integration of AI.

By leading this transformative initiative, our vision is to establish libraries as beacons in transitioning to a new era characterized by AI innovation. Participants in this incubator program will become AI practitioners and advocates, possessing a deep understanding, practical expertise, and the capacity to demonstrate the positive impact of AI within their respective libraries. Their role will guide the broader library community towards embracing and ethically implementing AI technologies; libraries continue to serve as dynamic, indispensable hubs of knowledge and innovation in an increasingly technology-driven world.

Program Themes and Target Groups
This planning grant primarily targets library employees participating in our incubator program. They will directly receive training resources, materials, guidelines, and support to help them complete their capstone projects. As time progresses and projects advance, all work will continue to be published on the project website as a training resource. It will demonstrate that library professionals are practical and capable of learning, applying, and completing AI implementations. This will help build confidence and evidence, contributing to a positive cycle, as all the projects' results will be freely available online for access. All activities—including successes, challenges, and outcomes—will be rigorously documented to serve as an essential resource for facilitating the informed development of future implementation projects.

All participants, not limited by their job functions, will, based on what they learn, brainstorm what can be applied to the real-world tasks they have to perform in their daily lives. They will work with the Project Director to form proposals and action plans for the four selected library themes: AI Literacy, Collection, Preservation, and Research. Participants will choose their group based on their job functions, responsibilities, and interests.

1. **AI Literacy Group**: This group is focused on enabling its members to efficiently use essential GenAI tools such as ChatGPT, GitHub Copilot, and Microsoft Copilot. Members will first familiarize themselves with the functionalities of these tools to enhance productivity and creativity. Alongside mastering these tools, they'll also learn how to develop educational content, such as guides, tutorials, and presentations, to teach others how to leverage GenAI tools effectively. Tool selection may be from a list curated by Ithaka S+R [24].

   Building on what they learn, members can either refine existing training materials or create new resources tailored to the specific GenAI tools they use in their professional or personal projects. This approach ensures that the knowledge base grows and evolves, reflecting the latest GenAI applications and best practices. Their efforts culminate in a capstone project, where they apply their skills to produce comprehensive training materials. These contributions are designed to support their immediate learning community and extend the benefits of GenAI technologies to broader audiences and communities. As a result, the training materials will continually improve, expanding in scope and relevance to accommodate users' diverse needs and interests across various sectors.

   Example capstone projects include: 1. "Optimizing ChatGPT Prompts for Educational Content Creation": This project designs a study guide on creating prompts that generate educational materials suited to different learning styles and levels. 2. "Maximizing AI Assistance in Software Development with Custom Prompts": This project focuses on formulating prompts to enhance the efficiency of GitHub Copilot in coding projects.

2. **Collection Group**: This group will immerse themselves in the principles of data-centric AI [22], acquiring the skills necessary to curate, enhance, and manage datasets that drive the performance of AI models. Training will focus on ensuring data quality, hence covering systematic collection, robust annotation, meticulous cleaning, and iterative refinement to build comprehensive and bias-free datasets. They will learn to apply these principles to the library's collection process, integrating the meticulous curation of resources with an emphasis on diversity and relevance. Additionally, they will explore GenAI use cases to automate and improve collection management, such as employing AI for predictive analysis of future resource needs or enhancing cataloging efficiency. Through their capstone projects, members will integrate data-centric AI strategies into the library's collection development, ensuring the library's resources are vast, varied, organized, and accessible to support the advancement of AI technologies and methodologies.

   Example capstone projects include: 1. "GenAI-Enhanced Cataloging System": Develop a system using LLMs to automate cataloging, generating accurate metadata and categorizations efficiently. 2. "Mitigating Bias in Library Collections with Data-Centric Strategies": Implement data-centric techniques to scrutinize and rectify biases in collections, ensuring high-quality datasets for training machine learning models.

3. **Presentation Group**: This group will study open-source GenAI techniques for preservation tasks of library materials, cultural heritage, and historical documents They will learn to experiment with GenAI models, implement applications, and evaluate the results. This goal aims to explore new approaches to enhance digitization quality, adjust image resolutions, restore digital documents, or devise format migration techniques—gaining practical skills in applying GenAI to preservation tasks. Through their capstone projects,

members will apply their acquired knowledge to real-world scenarios in libraries. They will gain hands-on experience adapting these technologies in their preservation practices and libraries.

Example capstone projects include: 1. "Automating Artifact Restoration": Implement a GenAI application to automate the restoration of aged or damaged artifacts, testing different models to find the most effective for various types of materials. 2. "Enhancing Archive Searchability": Develop a GenAI application to convert historical documents into searchable formats, improving access without compromising their integrity.

4. **Research Group**: This group will immerse themselves in GenAI technologies to revolutionize research methodologies, focusing on automated literature reviews, data analysis, and predictive analytics. They'll learn to leverage advanced techniques—such as Retrieval-Augmented Generation (RAG) [33], instruction tuning, and fine-tuning—to reduce hallucinations and create a domain-specific model. Moreover, they will explore recent techniques to streamline literature reviews, uncover data patterns, forecast trends, and analyze texts. The goal is to develop tools that help librarians serve the needs of their research communities. The capstone projects will gather ideas from the patrons and scenarios in the library sector [23].

Example capstone projects include: 1. "Enhancing Research Output with RAG Technology": Utilize RAG techniques to improve the quality and relevance of generated content in research publications, exploring its effectiveness in generating insightful literature summaries or predictive analytics reports. 2. "Domain-Specific Language Model Fine-Tuning for Research Applications": Investigate the application of fine-tuning language models for specific research domains, such as medical or environmental sciences, to enhance data analysis accuracy and generate domain-specific insights.

Project Beneficiaries

The beneficiaries of this project encompass a wide range of individuals and groups, primarily within each participating library and the communities they serve. The library professionals engaging in this incubator program will be poised to directly benefit through learning AI skills and knowledge, further developing practical implementation experience. This project's plan to conduct workshops that accept participants in the United States significantly amplifies its reach. With an anticipated growth in initial workshop attendance, the project expects to engage over 200 library professionals. These participants, in turn, are expected to become AI experts with proven experience, capable of guiding and assisting other staff within their organizations. This cascade of knowledge and expertise significantly increases the project's impact.

Estimating the number of patrons who will benefit from the capstone projects presents a challenge due to the variable nature of library services and the diverse needs of the communities they serve. However, with the project's goal to develop AI-assisted or AI-enabled services into existing library operations, the potential number of beneficiaries should reach the thousands. Moreover, the project's initiative to make training materials developed during the program freely accessible online broadens its impact, allowing a large number of individuals nationwide to benefit. These AI literacy materials are designed to serve as comprehensive teaching resources across US libraries and beyond.

Project Personnel

The LIBRAI project team consists of 1) The VT team: Yinlin Chen, the PI and Project Director, and Edward A. Fox, Co-PI. Chen is assistant director at the Center for Digital Research & Scholarship of the University Libraries and will assume overall responsibility for every aspect of the project including planning, execution, management, developing and conducting workshops, managing capstone projects, overseeing all participation recruitment, organizing the program symposium, and disseminating results; Fox is professor of computer science and will review the workshop training

resources and provide expert guidance on capstone projects. The VT team will hire one Ph.D. student as a graduate research assistant (GRA) to assist Prof. Chen in workshops, capstone projects, the LIBRAI symposium, and program management and logistics (see GRA position description and responsibilities in **Resumes**). 2) The UCR team: Zhiwu Xie, the Co-PI, assistant university librarian for research and technology. Xie will participate in workshop development and program symposium, as well as results dissemination, and will help oversee participation recruitment in UC systems and other US regions.

The team is composed of highly experienced individuals poised to drive the proposed activities forward. With their extensive networks, Fox and Xie are adept at engaging stakeholders and connecting with resources, which will greatly benefit the project. Xie's strategic insights will ensure the project's goals align with the needs and directions of library communities, guaranteeing outcomes that address long-term requirements. Fox's expertise will guide the development of workshops and training materials, drawing on his decades of teaching and capstone project management. Chen will apply his academic library experience and computer science background to simplify complex technical concepts for librarians and the general public alike. His track record in AI education and fostering STEM students' entry into AI fields underscores his capability to translate learned knowledge into practical applications, a core emphasis of this project.

Advisory Board
We have established an advisory committee for this project, chosen to align with the project's vision and goals. This committee comprises esteemed individuals from various sectors, including librarian-scholars, LIS and Computer Science scholars, library administrators, AI experts, and specialists in areas relevant to the program. Based on their job functions and expertise, they will provide strategic advice throughout the project's phases and activities for comprehensive coverage of, and support to, the project's success. (See their **resumes** in **Supportingdoc2**.) The project team and advisory board will meet twice yearly to review the curriculum, evaluate teaching methods, scrutinize workshops, and assess capstone project outcomes.

Library Senior Administration: **Todd Grappone**: Associate University Librarian for Digital Initiatives and Information Technology, UCLA Library. **William A. Ingram**: Associate Dean and Executive Director of Information Technology, Virginia Tech's University Libraries. **Salwa Ismail**: Associate University Librarian for Digital Initiatives and Information Technology, University of California, Berkeley. **Hong Ma**: Interim Associate University Librarian, Loyola University Chicago. They will monitor and guide the project's strategic direction, scope, and coverage to fit the library professionals' needs. The capstone projects will be relevant and beneficial to the library operations, functions, and staff professional development. They will also help recruit participants to join the incubator program and workshops within their libraries and their regions.
Information Science and Computer Science: **Jiangping Chen**: Professor and Department Chair, Department of Information Science, University of North Texas. **Daniel Dunlap**: Instructor (of "Computer Professionalism"), Computer Science, Virginia Tech. These professors are skilled over two decades in applying data science techniques to information problems, analyzing the information science literature, and addressing misinformation, as well as teaching professionalism in computing, focusing on ethical, social, and professional impacts.
Education and Workshop Leadership: **C. Edward Watson**: Associate Vice President for Curricular and Pedagogical Innovation and Executive Director for Open Educational Resources and Digital Innovation, AAC&U. **Mike Abbott**: Owner and Managing Director, Cambrian Design and Development LLC and NSF I-Corps trainer. This group comprises professionals distinguished in AI education, authorship, conducting NSF workshops, and expertise in identifying customer needs. They will provide guidelines on crafting training materials suitable for the general public and offer expert advice on workshop design, catering specifically to the needs of library professionals.

Project Work Plan

Participants will start with the fundamentals of GenAI, advancing through guided demonstrations, real-world examples, and targeted tasks, working as a team on a capstone project to create a GenAI application for a specific library use case. The program will feature a multi-day workshop, supplemented by consultation sessions and project management tools to assist participants in completing their capstone projects. We will initiate this program with participating academic libraries, collecting feedback to understand the practical challenges of implementing GenAI in library settings. The program will undergo several iterations and refinements based on the feedback and challenges encountered, producing a comprehensive report as the groundwork for a future implementation grant that expands the program scope to all US libraries.

We will develop a training curriculum consisting of a five-week workshop, followed by a twelve-week period for participants to develop and implement their own capstone projects under the guidance of project staff through consultation sessions. During the project periods, we plan to offer this curriculum a total of six times, each time forming a cohort recruited and organized by project staff and collaborators at academic libraries based on time zones across the US. Participants do not need to work at the organizing libraries. The first cohort will start at Virginia Tech with participants located within the Eastern Time (ET) zone, followed by the UCR cohort, which will cater to individuals in the Pacific Time (PT) zone. Then followed 2 parallel cohorts, one with participants located in the ET zone and one with participants located in the Central Time (CT) zone, ending with 2 parallel cohorts, one with participants located in the Mountain Time (MT) zone and one with participants located in the PT zone. We cluster cohorts based on time zones to ensure participants can easily engage in synchronous activities and discussions with enhanced collaboration and learning efficiency. Between each cohort, the project team will refine the curriculum based on participant feedback. After all six cohorts have successfully completed, the program will culminate in the LIBRAI Symposium, a one-day virtual event showcasing all the capstone projects and highlighting the practical AI solutions developed by the participants for library scenarios and services. Please refer to the **Schedule of Completion** document for the planned project timeline, which is developed based on the project team's many years of teaching, research, project management, workshop, and capstone experience (see **Key Project Staff** document).

Project Activities

Workshop: This five-week workshop consists of four weekly themed sessions, each covering one of the themes, and the final week covers the capstone project introduction and logistics. Participants may choose to attend one or more of the themes, but need to attend the final workshop in order to move forward to the twelve-week capstone project period. Each of the themed workshops includes an hour-long synchronous online meeting and multiple hours of pre-recorded learning materials, hands-on exercises, and practice assignments that participants can consume on their own schedule. The learning outcomes are designed to enable participants to apply GenAI to one selected program theme, regardless of their prior knowledge or job responsibilities. Consequently, everyone will gain insights into relevant themes and broaden their knowledge base.

In the final session, the instructor will introduce the capstone project, covering logistics, selection guidance, consultation sessions, offline communication methods, and steps for project completion. A list of curated capstone projects will be presented to the participants for them to sign up and work in a team. Participants may also propose their own capstone project for a use case from their institution. The instructor will facilitate the project sign-up process, guiding participants toward projects that align with their interests and ensuring that at least one team works on each of the four themes. All participants will receive a digital certificate of completion, provided they attend the workshop. Additionally, we will provide a feedback form for participants to share their experiences and suggestions to improve future workshops.

Capstone Project: This project-based learning experience allows participants to demonstrate the knowledge and skills they have acquired throughout the workshop training. Each capstone project will include an introduction, deliverables, significance, skill requirements, and references for additional information. Participants have twelve weeks to develop a Minimum Viable Product (MVP) or prototype that incorporates the core functionalities necessary to meet the primary objectives, along with experimental testing phases to evaluate the MVP's performance, usability, and effectiveness in achieving the project goals.

During these twelve weeks, PI Chen, with the assistance of the GRA, will offer consultation sessions and utilize a project tracking platform to monitor the progress of all capstone projects. This platform serves as a medium for answering queries and resolving any issues participants raise, ensuring a smooth and enriching project development experience. Participants will submit their project deliverables via the program's website upon completion. They will receive a digital certificate of completion of the capstone project and display their achievements on the program website. The PI will provide an online survey form for participants to share their experiences and suggestions about the capstone project. We expect four capstone projects to be developed after each workshop, amounting to a minimum of 24 projects during the program period. The final count may surpass this estimate, depending on participant enrollment.

PI Chen has worked diligently with Professor Fox since 2009, consistently learning from his extensive experience. Fox is globally recognized for his contributions to research and education, has been the (co)PI of over 142 sponsored projects, and oversaw more than 250 capstone projects[3], bringing a wealth of knowledge that will enrich the capstone experience. Chen has years of experience teaching CS AI courses to over 600 undergraduate and graduate students from various academic disciplines and oversaw more than 60 student teams in creating AI applications based on lessons from Chen's courses. This extensive experience uniquely qualifies them to lead this program's capstone projects, ensuring success and benefits to participants from library communities.

LIBRAI Symposium: This one-day open to the public virtual event. The provisional agenda is shown below:

	Track 1	Track 2	Track 3	Track 4
	AI Literacy	Collection	Preservation	Research
Open Keynote	We will invite a prominent figure in the library sector who has been dedicated to adopting AI within libraries. They will share their insights on the future vision of AI implementation in this field.			
Capstone Project Session 1	Four concurrent tracks will correspond to the program's four themes. Each track will feature capstone project presentations, highlighting AI implementation, lessons learned, and the project's current status, including usage statistics and other relevant measures of success post-deployment in their libraries, followed by a Q&A session.			
Capstone Project Session 2				
Afternoon Keynote	A leader at the institutional level, known for advocating and taking significant steps towards AI adoption, will be invited to share their vision for the future.			
Panel Discussion	We will invite a group of administrators from the participating libraries to discuss their perspectives on library staff participation and insights on the adoption process of AI within their libraries.			
Capstone Project Session 3	Parallel tracks for capstone project presentations. We will organize additional sessions if more capstone projects are created during the program period.			
Awards ceremony	We will award outstanding capstone projects from each track will be recognized. The winning teams will receive a certificate to acknowledge and celebrate their achievements.			

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[3] CS4624: Multimedia, Hypertext, and Information Access: https://hdl.handle.net/10919/18655

Training Materials Development and Refinement: PI Chen, in collaboration with the project team, Co-PI Xie, Professor Fox, and the advisory board, will design and develop training materials for the workshop and capstone projects. Chen will primarily be responsible for creating training materials, utilizing his teaching experience in AI, and tailoring the training materials to the library context. Fox and Xie will review and provide feedback on the technical level and depth. Xie will ensure the materials are applicable from a library professional's standpoint. Once a version of the training material is complete, Chen will deliver it to advisory board members Abbott, Chen, Dunlap, and Watson for further input and adjustments.

The training materials will dynamically evolve, integrating participant feedback and keeping pace with emerging trends in AI research and applications, as well as library professionals' evolving needs and demands. After each workshop, PI Chen will revise and update the training materials, notify the team and advisory board about the changes, and seek improvement. This iterative process includes conducting pre- and post-workshop assessments to gauge the effectiveness of the training. The workshop training materials will be revised four times during the entire program period, ensuring they provide the most current and applicable information throughout the project's duration.

During the summer and project period 2, PI Chen will work with a GRA to transform the workshop training materials into online courses in Virginia Tech's online eLearning system (TLOS), allowing participants to register and take the workshop training at their own pace, although the duration will be consistent for all participants.

Capstone Project Development and Refinement: The project team will develop exemplary capstone projects as demonstrations, establishing a clear standard for expected outcomes. These examples will guide participants and serve as a source of inspiration for their project endeavors. Furthermore, every capstone project completed during the project period will be showcased, serving as a compelling example for future participants. This approach aims to reinforce confidence among library professionals in their capacity to adapt, learn, and innovate with AI applications in the context of library settings.

In addition, Chen will curate a list of project ideas, providing a foundation for those who need help figuring out where to start. Chen will regularly review and update this list with Co-PI Xie and advisory board members to ensure the projects are relevant to library operations and have the potential for practical application within libraries.

GitHub will serve as the central platform for managing capstone projects. Chen will design a project template, enabling participant teams to directly engage in planning, tracking, and executing their projects. This infrastructure will support project implementation, issue reporting, inquiries, discussions, and work submission, thus facilitating efficient collaboration and progress monitoring. The project team will refine capstone project materials and designs based on participant feedback and outcomes, with scheduled updates occurring three times during the project period.

Recruitment: Our recruitment strategy aims to enhance participation by broadcasting our program's goal: to advance participants' professional growth and provide practical AI experience, with the added benefit of contributing to their libraries. We invite university library professionals from all job roles, emphasizing that no prior AI knowledge is required. We will offer a multi-tiered recognition system to acknowledge and reward participants, including digital badges and certificates. Their achievements will be highlighted on the program website, through conference presentations, in news articles, and by showcasing their capstone projects at the program's inaugural LIBRAI Symposium, ensuring their efforts gain national and global recognition. Completing this program offers immediate and enduring benefits, positioning it as a valuable opportunity for professional development and career progression.

In project period 1, we'll begin with VT and UCR, utilizing direct contacts and established channels to gather a diverse and comprehensive participant group for the pilot workshops. We'll also promote our workshop to other university libraries in the same time zone through multiple channels to attract additional participants. In project period 2, we will aim to recruit library professional participants nationwide, using various outreach methods, such as presenting our program at conferences and leveraging the advisory board's influences and wide networks for broader participation. The support from our advisory board and partner universities will bolster our recruitment efforts (see their **letters of support** in **Supportingdoc3**).

Capstone projects will involve participants from multiple libraries. PI Chen will tailor these capstone projects to be flexible and benefit a broad spectrum of library operations. Moreover, Chen will oversee progress and address issues and challenges to ensure the project continues smoothly. GRA will assist in the coordination of activities, facilitating communication between participants. By diligently documenting outcomes and analyzing feedback, we will periodically refine our recruitment plan in collaboration with our advisory board. Our goal is not just to recruit participants but to foster a community of library professionals who are engaged in practical, beneficial AI projects that advance library operations and their own professional growth.

Project Results

The intended results of our project are multifaceted. We will offer comprehensive resources to empower library professionals and engage the general public in the exploration and implementation of GenAI. Our program's website will serve as a national hub, featuring an array of materials such as training modules, AI implementation guides tailored to library use cases, and a platform to highlight the achievements of library professionals in GenAI development. Additionally, we will draft a strategic plan for a future implementation grant. This plan will broaden the scope of our incubator program to a national level, enhancing connections between libraries, initiating new partnerships, and extending our program's reach to a varied audience, including academic and public libraries.

Throughout each workshop and capstone project cycle, we will generate evaluation reports to measure the effectiveness and feasibility of our initiatives, sharing insights with our advisory board for continual refinement. These reports will cover workshop outcomes, participant engagement with our online resources, and the practical impact of capstone projects on library services. By assessing training material effectiveness and the overall participation experience, we aim to ensure that our efforts lead to tangible benefits and lay the groundwork for future grants with broader institutional partnerships and regional outreach. This iterative process allows us to enhance our strategy for equipping librarians with the skills to create and implement practical AI materials and applications. Our resources, designed to be customizable and easily usable in US library environments, will support ongoing learning through interactive online workshops.

Furthermore, we will provide detailed documentation for each capstone project, making it easier for others to replicate or customize them to meet specific needs. We plan to disseminate our work and program widely through publications, presentations, and webinars, consistently showcasing our project's progress, and gaining influence and recognition in library communities. The project team will also attend conferences to promote our incubator program, build connections with other universities, and seek new collaborative opportunities. We have carefully selected conferences such as the ALA and CNI annual conferences, DLF Forum, JCDL, ICADL, TPDL, and AAAI because of their potential to significantly enhance our program's visibility and impact within the academic and professional communities.

To ensure the sustainability of the project's benefits beyond the funding period, we will maintain and make workshop training materials and capstone projects publicly accessible on a dedicated website hosted by VT University Libraries, GitHub, and VT TLOS, with all resources open to the public for at least five years. (See **Digitalproduct**.)

Diversity Plan: Our project is dedicated to democratizing access to AI education, ensuring that learning and utilizing AI is an opportunity available to all, not just a privilege for a few. We recognize the gap in technical expertise among various groups; our initiative aims to empower those who may not have the background to create AI technologies but have the potential to use AI in innovative ways to enhance services and positively impact their communities.

To bridge this gap, we are designing our program to be accessible and understandable for participants across a broad spectrum of technical abilities. This includes librarians, educators, and community leaders who, while not traditionally technical, play crucial roles in disseminating knowledge and fostering innovation within their spheres. Our curriculum will focus on the practical applications of AI, equipping participants with the tools and understanding necessary to leverage AI technologies in their work, regardless of their technical background.

VT, an Asian American and Native American Pacific Islander-serving Institution, has partnerships with Historically Black Colleges and Universities, and has maintained long-term collaborations with Inclusive VT[4], Cultural and Community Centers, and employee Caucuses. UCR is the nation's top public university for social mobility and Hispanic enrollment. PI Chen has already initiated contact with partner libraries across diverse communities, including underrepresented populations. One participant pool will be from the University of Texas at El Paso, a notable institution with a majority Mexican American student body, covering border regions (see their **letters of support** in **Supportingdoc3**).

We will commit to actively recruiting a diverse participant base, inclusive curriculum vetting, and accessibility measures. Collaboration with our team, partners, and advisory board ensures diverse representation in content, perspectives, and cited sources from scholars and experts from diverse identities, including racial and ethnic diversity, age, LGBTQ+, gender identity, and scholars with disabilities. In doing so, we will receive direct feedback from diverse participants and understand what they need, their challenges, and their perspectives via the program's workshops. These valuable voices will drive our program's direction, ensuring our efforts align with the diverse needs of the communities we aim to serve.

Moreover, we will ensure that the products created from capstone projects will cater to a diverse audience's needs. For example, Chen will create an example AI literacy capstone project that the GenAI training resources will deliver to the Center for the Enhancement of Engineering Diversity[5] (CEED) and the Black College Institute[6] (BCI) summer program. The participants in these programs are underrepresented and first-generation students. Chen has already contacted Inclusive VT and received their support (see their **letter of support** in **Supportingdoc3**).
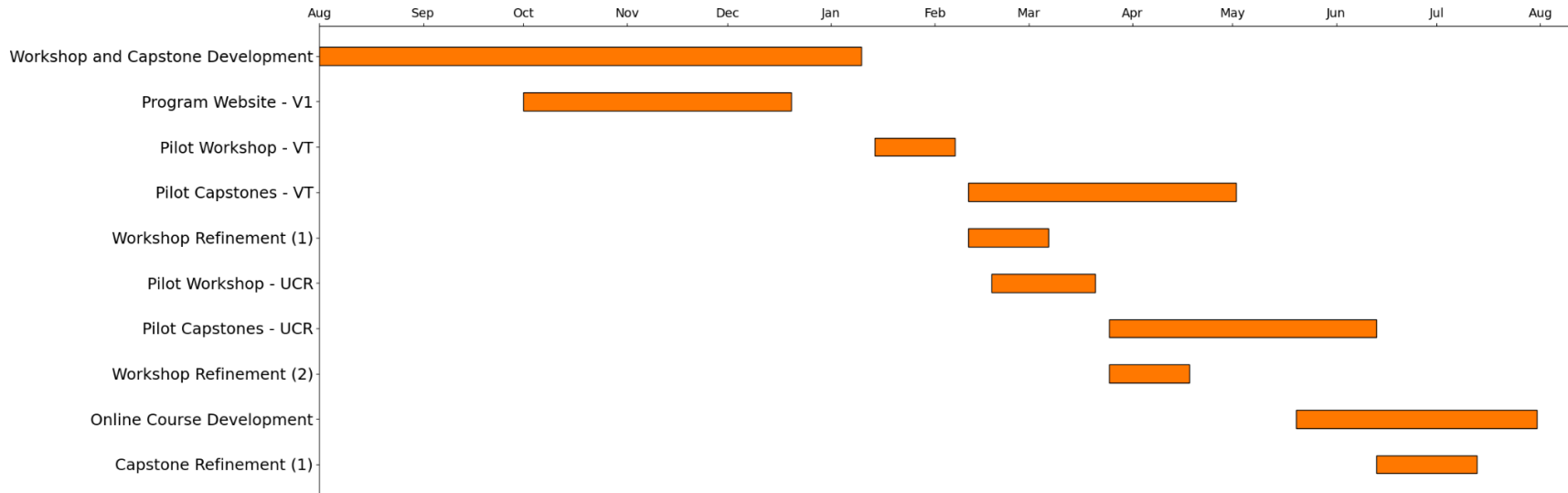
We're committed to making AI education available to everyone. Our goal is to extend the benefits of our program to reach as wide an audience as possible. We will look for new collaborations, expand our network, and connect with more diverse communities.
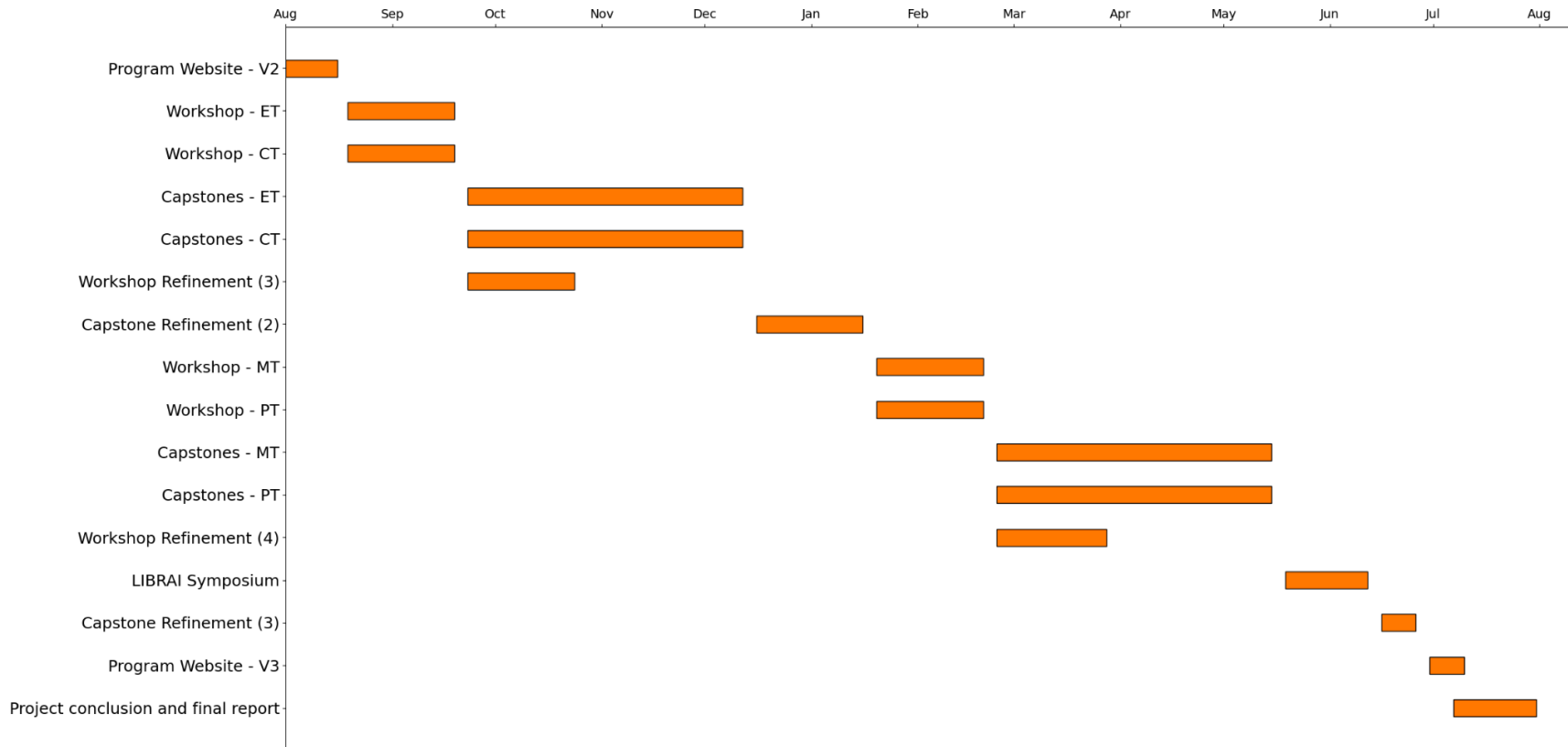
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[4] Inclusive VT: https://www.inclusive.vt.edu/
[5] Center for the Enhancement of Engineering Diversity: https://eng.vt.edu/ceed/ceed-pre-college-programs/BEEVT.html
[6] Black College Institute: https://www.vt.edu/admissions/black-college-institute.html

Project period1: 08/01/2024 - 07/31/2025

Project period2: 08/01/2025 - 07/31/2026

LIBRAI: Liberating Libraries through Generative Artificial Intelligence Incubator Program

Type

This project will generate open educational resources in digital format, including still and moving images, audio/video recordings, text documents, curricula, instructor resources, training materials, publications, presentations, white papers, and software, including source code, algorithms, applications, and digital tools, plus accompanying documentation. All digital products will include descriptive metadata (e.g., title, author, date, description, keywords, license information) following metadata standards like Dublin Core for interoperability and preservation.

- Text documents, curricula, instructor resources, and training materials in Markdown or Word format.
- Presentation slides in PPTX format.
- Publications and white papers in Word format.
- Audio/video recordings and multimedia content will be in MP4 format, accompanied by captions in plain-text format.
- Images and screenshots in PNG format.
- All documents can be converted to PDF format.

The software will be implemented using Python, JavaScript, or HTML, offering flexibility for deployment either locally, in the cloud, or through container images in a container environment. Each piece of software will come with its source code, comprehensive documentation, and instructions for use. Python is recognized for its extensive machine learning, deep learning, and AI application. JavaScript and HTML are leveraged for their prowess in web application development. Additionally, certain training software will be compiled in Jupyter Notebook to provide an interactive learning environment featuring live code, equations, visualizations, and narrative text. We aim to provide software that meets diverse operational needs and facilitates participants' understanding and learning of these programming languages, thereby offering significant educational value.

We will produce a plentiful and well-balanced set of educational resources tailored to the program's selected themes. Based on workshop outcomes and user feedback, we will continue refining the quantity of each resource type and ensure that our offerings remain responsive to participants' demands and effectively meet users' needs.

Availability

All the program's digital products, including training materials, multimedia content, software, and metadata, will be available across multiple channels. These channels include VTechWorks (https://vtechworks.lib.vt.edu/) and the Virginia Tech Data Repository (https://data.lib.vt.edu/), both hosted by VT Libraries (https://lib.vt.edu/), for depositing whitepapers, publications, and presentations. Video recordings will be available for streaming on Virginia Tech - Video (https://video.vt.edu). Furthermore, our training materials and software will be public without authentication via the University Libraries at Virginia Tech's public GitHub page (https://github.com/vtul). The program's website, hosted within the Center for Digital Research & Scholarship at VT Libraries (https://cdrs.lib.vt.edu/), will serve

as a comprehensive hub, offering direct links to all these distribution channels to facilitate easy access and navigation for users.

Access

All educational resources, publications and software will be open access. Rights will be assigned to this project with a flexible reuse license based on the resource type. Publications and presentations, when feasible, will be made accessible through a Creative Commons License, such as CC-BY. We will release all software we create as open source. For traditional results of academic scholarship (e.g., white papers, reports), the presumption of ownership is to the author(s). University Policy 13000 and 13015 (http://www.policies.vt.edu/13000.pdf; http://www.policies.vt.edu/13015.pdf), Virginia Tech asserts its rights to the results of research funded in any part with university resources. Thus, the university may claim ownership in accordance with policy. If such a case arises, we will advocate for open access.

We will use online surveys to collect participtor's feedback that may contain personally identifiable information (PII). We will get Institutional Review Board (IRB) approve and Provide an online consent form when it is required by protocol. PII will only be linkable to the data collected by a codebook (what is this?) that will be kept with the consent forms. The collected data will be used only for the purposes of the project. We will ensure that the information is securely stored in a locked file drawer in a locked office accessible only to the PI. We may integrate third-party open-source or proprietary software and content into our training materials, adhering to their specific terms of use. Our commitment is to clearly document any limitations and provide justifications, ensuring full transparency and understanding for our users.

Sustainability

We will host our online workshop courses through the Virginia Tech Technology-enhanced Learning and Online Strategies (TLOS), which has an infrastructure dedicated to providing public and long-term access. We will publish documents, scripts, and software training materials on GitHub repositories with local backups. Publications such as papers and datasets will be deposited into VTechWorks or the Virginia Tech Data Repository, becoming a permanent part of the VT Libraries' digital collections. Although long-term access to these materials is anticipated to be indefinite, the project team commits to providing access to all products and data from this project for at least five years following the end of the grant period. Resources will remain on GitHub as long as it remains a viable and free platform for software and code access. Should GitHub cease to exist, the team will transfer the repositories to another available platform or archive the final version in the VT Libraries. The University Libraries are committed to maintaining three preservation copies of each object for at least five years, adhering to digital preservation best practices. Preservation copies will be deposited into the local storage, VT Archive, and one subscription storage destination, either APTrust (http://aptrust.org/) or the MetaArchive Cooperative (https://metaarchive.org/), both of which employ proven digital preservation strategies to monitor and maintain content.