AI PROJECT LOGBOOK

Resource for Students

(Adapted from "IBM EdTech Youth Challenge – Project Logbook" developed by IBM in collaboration with Macquarie University, Australia and Australian Museum)

KEY PARTNERS

INDIA IMPLEMENTATION PARTNERS

GLOBAL PARTNERS

Acknowledgement

We would like to express our heartfelt gratitude to our teacher Ms. Priyanka Arora for guiding us through our Artificial Intelligence Capstone project. Her unwavering support, invaluable insights, and encouragement have played a pivotal role in shaping our understanding and enhancing our skills in the field of AI.

We extend our sincere appreciation to Dr. Jyoti Gupta for providing us with the resources and environment conducive to learning and exploration. Her commitment to fostering innovation and academic excellence has been a driving force behind our success.

To our parents, we thank them for their constant encouragement and understanding. Their support has been a source of strength, motivating us to persevere through the challenges of this ambitious project.

Our friends, fellow classmates, and the entire academic community have been instrumental in creating a collaborative and enriching learning environment. The exchange of ideas and constructive feedback has been invaluable in refining our project and pushing the boundaries of our understanding.

Lastly, we would like to express our gratitude to the Almighty for the wisdom, guidance, and strength bestowed upon us throughout this journey. We acknowledge the divine grace that has enabled us to overcome obstacles and achieve our goals.

Once again, thank you to each and every individual who has contributed to the success of our AI Capstone project. Your support has been indispensable, and we are truly grateful.

AI PROJECT LOGBOOK

PROJECT NAME: **Object Detection**

SCHOOL NAME: **K.R Mangalam World School**

YEAR/CLASS: **2023-24 | XII**

TEACHER NAME: **Mrs. Priyanka Arora**

TEACHER EMAIL: **priyanka.arora@gk2.krmangalam.com**

TEAM MEMBER NAMES AND GRADES:

- **Vatsal Gupta (XII-E)**
- **Arjun Sehgal (XII-E)**
- **Aaryav Behl (XII-F)**
- **Krishya Khajanchi (XII-F)**

1. Introduction

This document is your **Project Logbook**, and it will be where you record your ideas, thoughts, and answers as you work to solve a local problem using AI.

Make a copy of the document in your shared drive and work through it digitally with your team. You can also print a copy of the document and submit a scanned copy once you have completed the Project Logbook. Feel free to add pages and any other supporting material to this document.

Refer to the **AI Project Guide** for more details about what to do at each step of your project.

2. Team Roles

2.1 Who is in your team and what are their roles?

Role	Role description	Team Member Name
Project Leader & Prototype builder	● Schedules and allocates tasks. ● Ensures tasks are completed on time. ● Creation of model &b Prototype	Vatsal Gupta
Data Expert & Designer	● Works with data experts to train/teach computers. ● Gathers necessary data and shoots & edits interview	Arjun Sehgal
Video Editor & Researcher	● Takes all the data, shoots and edits and compile them in a video.	

	● Works mainly on graphics and overall presentation. ● Train and research data models.	Aaryav Behl
Communication Leader	● Scripting ● Setup Meetings ● Video Creation	Krishya Khajanchi

2.2 Project plan

The following table is a guide for your project plan. You may use this or create your own version using a spreadsheet which you can paste into this section. You can expand the 'Notes' section to add reminders, things that you need to follow up on, problems that need to be fixed urgently, etc.

Phase	Task	Planned start date	Planned end date	Planned duration (hours, minutes)	Actual start date	Actual end date	Actual duration (hours, minutes)	Who is responsible	Notes/ Remarks
Preparing for the project	Coursework, readings	07 March	09 March	2 hours	07 March	08 March	1 hour	Vatsal, Arjun, Aaryav & Krishya	Reading of the guide
	Set up a team folder on a shared drive	07 March	07 March	20 minutes	07 March	07 March	10 minutes	Krishya	Google Drive Setup
Preparing for the project	Background reading	07 March	07 March	1 hour	07 March	07 March	1 hour	Vatsal, & Aaryav	Searching a Problem Statement
	Research issues in our community	08 March	08 March	2 hours	08 March	08 March	1 hour	Aaryav	Reading possible issues
	Team meeting to discuss issues and select an issue for the project	08 March	08 March	1 hour	08 March	08 March	30 minutes	Krishya	Discussion of Coursework
	Complete section 3 of the Project Logbook	09 March	09 March	30 minutes	09 March	09 March	45 minutes	Arjun	Finishing up Logbook
	Rate yourselves	10 March	10 March	2 minutes	10 March	10 March	2 minutes	Arjun	Rate
Understanding the users	Identify users	11 March	11 March	20 minutes	11 March	11 March	25 minutes	Arjun	Identifications of users
	Meeting users to observe them	12 March	12 March	45 minutes	12 March	12 March	30 minutes	Krishya	Understanding user issues and thought
	Interview user (1)	14 March	14 March	15 minutes	14 March	14 March	15 minutes	Vatsal	Interview

	Interview user (2)	14 March	14 March	15 minutes	14 March	14 March	15 minutes	Vatsal	Interview
	Complete section 4 of the Project Logbook	14 March	14 March	30 minutes	14 March	14 March	30 minutes	Arjun	Completion
	Rate yourselves	15 March	15 March	2 minutes	15 March	15 March	2 minutes	Arjun	Rate
Brainstorming	Team meeting to generate ideas for a solution	18 March	18 March	1 hour	18 March	18 March	50 minutes	Krishya	Discusion
	Complete section 5 of the Project Logbook	19 March	19 march	2 hours	19 March	19 March	1.5 hours	Krishya	Completion
	Rate yourselves	19 March	19 March	2 minutes	19 March	19 March	2 minutes	Vatsal	Rate
Designing your solution	Team meeting to design the solution	23 March	23 March	1.5 hours	23 March	23 March	1.5 hours	Krishya	Designing structure of solution
	Complete section 6 of the Project Logbook	24 March	24 March	2.5 hours	24 March	24 march	2.75 hours	Arjun	Completion
	Rate yourselves	24 March	24 March	2 minutes	24 March	24 March	2 minutes	Aaryav	Rate
Collecting and preparing data	Team meeting to discuss data requirements	2 April	2 April	45 minutes	2 April	2 April	40 minutes	Krishya	Discussion on data privacy and public data
Collecting and preparing data Prototyping	Data collection	3 April	3 April	1 hour	3 April	3 April	1.5 hours	Vatsal	Searching for data
	Data preparation and labelling	3 April	3 April	2 hours	3 April	3 April	1.75 hours	Vatsal	Visualisation
	Complete section 7 of the Project Logbook	4 April	4 April	3 hours	4 April	4 April	2.75 hours	Vatsal	Completion
	Team meeting to plan prototyping phase	6 April	6 April	45 minutes	6 April	6 April	1 hour	Krishya	Discussion
Testing	Train your model with input dataset	10 April	10 April	4 hours	10 April	10 April	6 hours	Vatsal	Model training on data set
	Test your model and keep training with more data until you think your model is accurate	10 April	10 April	3 hours	10 April	10 April	4 hours	Vatsal	Model testing using previously trained model
	Write a program to initiate actions based on the result of your model	11 April	11 April	8 hours	11 April	11 April	12 hours	Vatsal	Formation of source code
	Complete section 8 of the Project Logbook	12 April	12 April	4 hours	12 April	12 April	2.5 hours	Arjun	Completion

	Rate yourselves	12 April	12 April	2 minutes	12 April	12 April	2 minutes	Arjun	Rate
	Team meeting to plan prototyping phase	13 April	13 April	1.5 hours	13 April	13 April	1 hours	Krishya	Discussion
Testing Creating the video	Invite users to test your prototype	14 April	14 April	4 hours	13 April	13 April	2.5 hours	Arjun	Finding suitable stakeholders
	Conduct testing with users	14 April	14 April	6 hours	14 April	14 April	3.5 hours	Arjun	Testing
	Complete section 9 of the Project Logbook	16 April	16 April	5 hours	16 April	16 April	3 hours	Arjun	Completion
	Rate yourselves	16 April	16 April	2 minutes	16 April	16 April	2 minutes	Arjun	Rate
	Team meeting to plan video creation	19 April	19 April	2 hours	19 April	19 April	1 hours	Arjun	Brainstorming
	Write your script	21 April	21 April	5 hours	21 April	21 April	4.5 hours	Krishya	Scripting
	Film your video	23 April	23 April	1 hour	23 April	23 April	1 hour	Vatsal, Arjun	Collecting content
	Edit your video	24 April	24 April	4 hours	24 April	24 April	4 hours	Aaryav	Editing
Completing the logbook	Reflect on the project with your team	26 April	26 April	2.5 hours	26 April	26 April	2 hours	Vatsal, Arjun, Aaryav & Krishya	Project Reflection
	Complete section 10 and 11 of the Project Logbook	27 April	27 April	4 hours	28 April	28 April	5.5 hours	Arjun	Completion
	Review your Project, Logbook and Video	30 April	30 April	2.5 hours	30 April	30 April	3 hours	Vatsal, Arjun, Aaryav & Krishya	Review & improvement
Submission	Submit your entries on the IBM			-			-	Vatsal, Arjun, Aaryav & Krishya	Submission

2.3 Communications plan

Q- Will you meet face-to-face, online or a mixture of each to communicate?
A- Mixture of both

Q- How often will you come together to share your progress?
A- Weekly

Q- Who will set up online documents and ensure that everyone is contributing?
A- Team Leader

Q-What tools will you use for communication?
A- Text Messages, Face-to-Face meetings, Online Meetings

2.4 Team meeting minutes

Date of Meeting: 8th March, 2023

Who attended: All Members

Who wasn't able to attend: None

Items Discussed: Getting started on the Project, Roadmap

Things to do:

1. Research Start by Team Leader
2. Drive Folders & Groups setup by Communications Leader

Date of Meeting: 12th March, 2023

Who attended: All Members

Who wasn't able to attend: None

Items Discussed: Finalizing Idea of the Project and identifying its stakeholders, users & the overall problem

Things to do:

1. Designing & Data collection
2. Startup the Model Creation

Date of Meeting: 18th March, 2023

Who attended: All Members

Who wasn't able to attend: None

Items Discussed: Deciding how the model should work, Functions, Thinking of ideas

Things to do:

1. Advancement of the Model
2. More Data needed
3. Startup UI generation

Date of Meeting: 23th March, 2023

Who attended: All Members

Who wasn't able to attend: None

Items Discussed: Design Suggestions, Discussion on how the model & its UI should be constructed

Things to do:

1. Write code for the User Interface
2. Set theme & colors
3. Finalize ways of Object Detection

Date of Meeting: 2nd April, 2023

Who attended: All Members

Who wasn't able to attend: None

Items Discussed: Collection of Data keeping in mind data concerns

Things to do:

1. Data was collected
2. Data Sorting

Date of Meeting: 6th April, 2023

Who attended: All Members

Who wasn't able to attend: None

Items Discussed: Protype Showcase

Things to do:

1. Protype Shown
2. Small changes were made
3. Model Refinement

Date of Meeting: 13th April, 2023

Who attended: All Members

Who wasn't able to attend: None

Items Discussed: Testing Done on final Data, Interview Process discussed

Things to do:

1. Interviews of two selected students to be conducted
2. Project to be tested off camera by other stakeholders

Date of Meeting: 19th April, 2023

Who attended: All Members

Who wasn't able to attend: None

Items Discussed: Planning of Video, Scripting, Recording date discussed

Things to do:

1. Video to be recorded
2. Video edit discussion
3. Finalize Project

3. Problem Definition

3.1 List important local issues faced by your school or community

1. Stress
2. Theft
3. Substance Abuse
4. Accidents
5. No Quality Education
6. Cyber Crime
7. Insanitation
8. Security

3.2 Which issues matter to you and why?

Thefts & Accidents: Huge effects on the masses, loss to the society

3.3 Which issue will you focus on?

Security

3.4 Write your team's problem statement in the format below.

How can we help security personal, police & public to find a way to detect problems & unwanted situations so that they can lead a healthy and stress-free life.

Rate yourself 6

Problem Definition

1 point - A local problem is described
2 points - A local problem which has not been fully solved before is described.
3 points - A local problem which has not been fully solved before is explained in detail with supporting research.

4. The Users

4.1 Who are the users and how are they affected by the problem?

Security Personal, Governments, Companies, Organisation, Public Institutions

4.2 What have you actually observed about the users and how the problem affects them?

The user finds a lot of difficulty in manually detecting objects. The current technology requires on stationed supervisors or people who keep watch. Manual intervention is needed to identify and take action.

4.3 Record your interview questions here as well as responses from users.

We are aware of the problems associated with this problem. What do you think they are?

Answer (1): Old hardware, Non-Updating, lack of awareness

Answer (2): Privacy Issues

How can the aforementioned problems be solved?

Answer (1): generalisation of the technology, accepting AI in lifestyle

Answer (2): Traffic Management, Security

How is object detection currently in use, and how it can be expanded?

Answer (1): Airports, security, can be expanded to hospitality

Answer (2): Speed Cameras, Face Detection

4.4 Empathy Map

Map what the users say, think, do and feel about the problem in this table

What our users are saying • Users find difficultly in identifying certain things • Users need better solutions than what is currently available	**What our users thinking** • Users think the problem can be solved using AI • Users think the problem can create issues for them if it is not solved • Users think there is a lot of manual input
What our users are doing • Users are currently using either manual work or outdated technology to solve the problem • Users currently lack the input of AI in solving the problem	**How our users feel** • Users feel that there is a need for a common solution to all of these problems refined for specific areas

4.5 What are the usual steps that users currently take related to the problem and where are the difficulties?

The users are currently using solutions of the problem that are not up to date which require manual intervention. These solutions are very old for the modern growing age and are not suited to the situations that arise in today's times.

4.6 Write your team's problem statement in the format below.

Security personal, Police & General public including students are experiencing issues with Security today because of issues in identification

Rate yourself 5

The Users

1 point - The user group is described but it is unclear how they are affected by the problem.
2 points - Understanding of the user group is evidenced by completion of most of the steps in this section.
3 points - Understanding of the user group is evidenced by completion of most of the steps in this section and thorough investigation

5. Brainstorming

5.1 Ideas

How might you use the power of AI/machine learning to solve the users' problem by increasing their knowledge or improving their skills?

AI Idea #1	Night Vision
AI Idea #2	Number Plate Detection
AI Idea #3	Self-Driving Cars
AI Idea #4	Security
AI Idea #5	Accident Prevention

5.2 Priority Grid

Evaluate your five AI ideas based on value to users and ease of creation and implementation.

High value to users, easy to create ● Night Vision ● Security Cameras	**High value to users, hard to create** ● Self-Driving Cars ● Traffic Management Bot
Low value to users easy to create ● Alert Systems ● Use of Biometrics	**Low value to users, hard to create** ● Accident Prevention ● Cyber Crime Detection

5.3 Based on the priority grid, which AI solution is the best fit for your users and for your team to create and implement?

Briefly summarize the idea for your solution in a few sentences and be sure to identify the tool that you will use.

The AI solution we found best fit for solving our problem is Object Detection using the AI domain Computer Vision. The technology used to detect Objects or motion is OpenCV used to apply Computer Vision along with its Haarcascade Models, Contouring, etc. The models paired along with the Tkinter user interface (UI) brings out an app that combines all of these three models into one.

Rate yourself 5

Brainstorming

1 point – A brainstorming session was conducted. A solution was selected.
2 points - A brainstorming session was conducted using creative and critical thinking. A solution was selected with supporting arguments in this section
3 points - A brainstorming session was conducted using creative and critical thinking. A compelling solution was selected with supporting arguments in this section.

6. Design

6.1 What are the steps that users will now do using your AI solution to address the problem?

1. Security 2. Attendance 3. People Tracking 4. Biometrics 5. Night Vision 6. Cyber Crimes 7. Traffic Management 8. Insanitation

Rate yourself 5

Design

1 point – The use of AI is a good fit for the solution.
2 points - The use of AI is a good fit for the solution and there is some documentation about how it meets the needs of users
3 points - The use of AI is a good fit for the solution. The new user experience is clearly documented showing how users will be better served than they are today.

7. Data

7.1 What data will you need to train your AI solution?

Videos, Images, CCTV Footage, Traffic Footage, Webcam Video, Some inaccurate images (to train & refine model against them)

7.2 Where or how will you source your data?

Data needed	Where will the data come from?	Who owns the data?	Do you have permission to use the data?	Ethical considerations
Have	Websites, Open Source	Public Data	Yes	None
Want/ Need	CCTV Footage	Companies, organisations, government	No	The foresaid might not want to share the data
Nice to have	Webcam Videos	Private Data	No	Privacy Concerns

Rate yourself 6

Data

1 point – Relevant data to train the AI model have been identified as well as how the data will be sourced or collected.
2 points - Relevant data to train the AI model have been identified as well as how the data will be sourced or collected. There is evidence that the dataset is balanced.
3 points - Relevant data to train the AI model have been identified as well as how the data will be sourced or collected. There is evidence that the dataset is balanced, and that safety and privacy have been considered.

8. Prototype

8.1 Which AI tool(s) will you use to build your prototype?

OpenCV, Tkinter, Numpy

8.2 Which AI tool(s) will you use to build your solution?

OpenCV, Tensorflow, Streamlit and/or Kivy

8.3 What decisions or outputs will your tool generate and what further action needs to be taken after a decision is made?

A summary will be generated for a user identifying and highlighting all the issues, also, a list of counsellors/doctors/ psychiatrist will be suggested by the app based on the summary for further action. a chatbot will be able to answer queries related to mental health, and the user can also enjoy a healthy conversation when in need without hesitation or the fear of being judged.

Rate yourself 6

Prototype

1 point – A concept for a prototype shows how the AI model will work.
2 points - A prototype for the solution has been created and trained.
3 points - A prototype for the solution has been created and successfully trained to meet users' requirements.

9. Testing

9.1 Who are the users who tested the prototype?

Security Officials, various people working in companies, people working in institutions, Students

9.2 List your observations of your users as they tested your solution.

- The model works best at its video object motion detection but requires some refinement in its camera footage detection.
- The model is diverse and can be built upon more in the final product and can be used in multiple use cases as mentioned above

9.3 Complete the user feedback grid

What Works	**What needs to change**
• Model functions well • Detects Objects with good accuracy	• UI can be made better • More ways of detection can be added
Questions?	**Ideas**
• Does the model consider privacy concerns? • Is the model tested on larger scale?	• A function can be added to capture still images • UI could be deployed as a tool

9.4 Refining the prototype: Based on user testing, what needs to be acted on now so that the prototype can be used?

- The model needs to be made dynamic to act on different use cases
- In order to do so, each segment or use case of the model has to be segmented out like a branch to work individually
- UI also needs to be updated accordingly

9.5 What improvements can be made later?

- User Interface can be updated to use more newer and updated libraries
- Project can be branched to more advanced use cases when implemented

Rate yourself 5

Testing

1 point – A concept for a prototype shows how it will be tested.
2 points - A prototype has been tested with users and improvements have been identified to meet user requirements.
3 points - A prototype has been tested with a fair representation of users and all tasks in this section have been completed.

10. Team collaboration

10.1 How did you actively work with others in your team and with stakeholders?

Throughout this project we collectively worked as a team, effectively allocating tasks to each member according to their various capabilities. Thus, each member helped the other and our tasks were completed on schedule. We also discussed the need of the project with locals in our areas and they could see its value in our society.

Rate yourself 6

Team collaboration

1 point – There is some evidence of team interactions among peers and stakeholders.
2 points - Team collaboration among peers and stakeholders is clearly documented in this section.
3 points - Effective team collaboration and communication among peers and stakeholders is clearly documented in this section.

11. Individual learning reflection

11.1. Team Reflections

A good way to identify what you have learned is to ask yourself what surprised you during the project. List the things that surprised you and any other thoughts you might have on issues in your local community.

Team member name: Vatsal Gupta

I handled the complexities of computer vision and programming throughout the capstone project, which used Python and focused on fundamental motion detection. My comprehension of image processing and event triggers has improved as a result of experimenting with various methods. My coding abilities and problem-solving prowess were much improved by this practical experience.

Team member name: Arjun Sehgal

As the data expert & designer for our project I obtained public-available data from trusted data sources and played a role in deciding how to implement our team leader's ideas. I, through this project learned how to efficiently work as a team to create something completely new and unexpected.

Team member name: Aaryav Behl

I don the hat of a model trainer, dedicated to fine-tuning and refining our AI model to the peak of accuracy. My commitment to perfection pushes me to explore every nook and cranny of data, unravelling its potential to become into a very accurate model.
Within the team, I organize and orchestrate our collaborative efforts into a harmonious symphony of innovation. This journey into the heart of AI has been a transformational experience for me. It's not just about editing and training; it's about gaining a profound understanding of the mechanisms that power our predictions, enabling us to chart a course towards precision and error-free outcomes.

Team member name: Krishya Khajanchi

As the Communications Leader, I was responsible for setting up meetings as well as assigning tasks. I also helped in scripting and making of the video. I learned team management and leadership in my role which would definitely help me on further.

Rate yourself	6

Individual Learning Reflection

1 point – Some team members present an account of their learning during the project.
2 points - Each team presents an account of their learning during the project.
3 points - Each team member presents a reflective and insightful account of their learning during the project.

12. Video link

Enter the URL of your team video:
https://www.youtube.com/watch?v=foBUItXOgZk

Enter the password (if any): None

Github Project Link: https://github.com/vatsal-06/ObjectDetection

Appendix

Recommended Assessment Rubric (for Teachers)
LOGBOOK AND VIDEO CONTENT

Steps	**3 points**	**2 points**	**1 point**	**Points Given**
Problem definition	A local problem which has not been fully solved before is explained in detail with supporting research.	A local problem which has not been fully solved before is described.	A local problem is described	
The Users	Understanding of the user group is evidenced by completion of all of the steps in *Section 4 The Users* and thorough investigation.	Understanding of the user group is evidenced by completion of most of the steps in *Section 4 The Users*.	The user group is described but it is unclear how they are affected by the problem.	
Brainstorming	A brainstorming session was conducted using creative and critical thinking. A compelling solution was selected with supporting arguments from *Section 5 Brainstorming.*	A brainstorming session was conducted using creative and critical thinking. A solution was selected with supporting arguments in *Section 5 Brainstorming.*	A brainstorming session was conducted. A solution was selected.	
Design	The use of AI is a good fit for the solution. The new user experience is clearly documented showing how users will be better served than they are today.	The use of AI is a good fit for the solution and there is some documentation about how it meets the needs of users.	The use of AI is a good fit for the solution.	

Data	Relevant data to train the AI model have been identified as well as how the data will be sourced or collected. There is evidence that the dataset is balanced, and that safety and privacy have been considered.	Relevant data to train the AI model have been identified as well as how the data will be sourced or collected. There is evidence that the dataset is balanced.	Relevant data to train the AI model have been identified as well as how the data will be sourced or collected.	
Prototype	A prototype for the solution has been created and successfully trained to meet users' requirements.	A prototype for the solution has been created and trained.	A concept for a prototype shows how the AI model will work	
Testing	A prototype has been tested with a fair representation of users and all tasks in *Section 9 Testing* have been completed.	A prototype has been tested with users and improvements have been identified to meet user requirements.	A concept for a prototype shows how it will be tested.	
Team collaboration	Effective team collaboration and communication among peers and stakeholders is clearly documented in *Section 10 Team collaboration*.	Team collaboration among peers and stakeholders is clearly documented in *Section 10 Team collaboration*.	There is some evidence of team interactions among peers and stakeholders.	
Individual learning	Each team member presents a reflective and insightful account of their learning during the project.	Each team presents an account of their learning during the project.	Some team members present an account of their learning during the project.	
Total points				

VIDEO PRESENTATION

Criteria		**Points Given** 3 – excellent 2 – very good 1 – satisfactory
Communication	The video is well-paced and communicated, following a clear and logical sequence.	
Illustrative	Demonstrations and/or visuals are used to illustrate examples, where appropriate.	
Accurate language	The video presents accurate science and technology and uses appropriate language.	
Passion	The video demonstrates passion from team members about their chosen topic/idea.	
Sound and image quality	The video demonstrates good sound and image quality.	
Length	The content is presented in the video within a 3-minute timeframe.	
Total points		