



SHAHJALAL UNIVERSITY OF SCIENCE AND
TECHNOLOGY
SOFTWARE ENGINEERING

Internship Report (SWE420)

Submitted By:
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Performed At:
Inverse.AI
1/3 Torongo (Opposite lane of
Biman Office), Airport Rd, Sylhet

July 16, 2022

LETTER OF TRANSMITTAL

July 16, 2022

The Director,

Institute of Information and Communication Technology

Shahjalal University of Science and Technology, Sylhet

Dear Sir,

I am pleased to submit the Internship Report that you asked for. I have been working as an intern at 'Inverse.AI' on 4/1 semester as a part of our course, SWE 420. It is my immense pleasure in presenting you with this report based on my observation and experience and learning during my internship period, starting from September 06, 2021, to February 28, 2021.

I am looking forward to your effective feedback on my entire report.

Sincerely yours,

Fahim Tajwar Saikat

Reg. No.: 2017831020

Department of SWE

IICT, SUST

LETTER OF ENDORSEMENT

To Whom It May Concern

Subject: Approval of the report

This is to clarify that, all information mentioned in this report entitled 'Internship Report' is authentic, is not exaggerated, and does not violate the company's privacy rules and regulations.

I, therefore gladly state the validity of the report and wish Fahim Tajwar Saikat a bright future.



Tahli Ahmed Chowdhury
Chief Executive Officer
Inverse.AI

ACKNOWLEDGEMENT

I am very much delighted to present this report about my internship experience at Inverse.AI. I offer my gratitude to the Department of Software Engineering, IICT, SUST to arrange an opportunity for my internship at Inverse.AI. I also express my regards to Inverse.AI.

From Inverse.AI, I would like to thank Mr. Tahlil Ahmed Chowdhury, CEO of Inverse.AI, who support me throughout the internship period. Being the Machine Learning team lead he was also my mentor. I would like to thank Mr. Shahidul Islam Sony(Machine Learning Engineer) who trained me for this program.

I also want to thank every member of Inverse.AI and my teammates who showed me such kind and generous gestures throughout my internship period.

EXECUTIVE SUMMARY

This internship report was created to document the details of my industrial training at Inverse.AI. In Sylhet, Bangladesh, Inverse.AI is a top-tier startup. The report contains the specifics of my six-month internship in software engineering at Inverse.AI, which began on September 6, 2021, and ended on February 28, 2022. Inverse.AI is now located at 1/3 Torongo (opposite lane of Biman Office), Airport Rd, Sylhet.

Students pursuing a degree in Software Engineering at IICT, SUST are required to complete six months of industry training before graduation. Students are free to choose any audit firm or company to perform their internship with, as long as the audit firm is recognized. This is done to guarantee that the pupils will be exposed to an industrial atmosphere. The goal of this industrial training is to expose students to real-world work situations, allow students to build a better grasp of the course they are taking, and provide relevant industry-related training in the field of software engineering.

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0.1 INTRODUCTION

The position of a student or trainee who works in an organization, sometimes without pay, to gain work experience or satisfy requirements for a qualification is known as an internship.

Department of Software Engineering, IICT, SUST provides the opportunity to their students to experience a six-month internship as a part of their academic curriculum in the 7th semester. SWE always emphasizes the practical part of software engineering. To gain industrial experience internship program is introduced in its course outline.

0.1.1 GENERAL OUTLINE OF INTERNSHIP

My internship was a full-time internship. In this type of internship, interns are almost similar to full-time employees as they also spend the full working hour in the office. Hence, interns get a solid experience of the culture of the industry.

0.1.2 OBJECTIVES

The internship includes certain distinct and specified goals as well. The following are some significant elements of the internship's objectives:

1. Getting to know the business environment
2. Bridging the Gap Between Industry and Higher Education
3. Consider present and future industry requirements.
4. Develop a professional mindset, development, maturity, and judgment.
5. Practical experience.

0.1.3 SCOPES & LIMITATIONS

The key factors that decided my scopes are stated below :

1. Company overview and culture.
2. The training I have received
3. Growth of my technical experiences
4. My opinion on the internship

Some limitations that are impactful on this report are mentioned below in brief.

1. Non-Disclosure Agreement, that Inverse.AI made with me.
2. The report is based on my experience from 6th September 2021 to 28 February 2022. This is due to the demand from my university to submit before.

0.2 COMPANY PROFILE

This section discusses Inverse.AI's customs and culture. The overview of Inverse.AI, what it does, its workflow, employment, training, and leisure facilities, its operations, clients and partners, and management profile are covered in the following subsections.

0.2.1 COMPANY OVERVIEW

Inverse.AI is a SUSTian startup. It was established in 2018. Currently, it has only one branch, which is located in Sylhet. But soon they are planning to expand in Dhaka.

0.2.2 MANAGEMENT

Inverse.AI managing board consist of two members namely Tahlil Ahmed Chowdhury as Chief Executive Officer, Co-founder of the compnay and Ershadur Rahman Talukder as Chief Technical Officer.

0.2.3 WHAT INVERSE.AI DOES

Inverse.AI works on their own mobile applications. Most of the applications have android and ios versions. Recently they are focussing on the web version of those applications. Recently they launched an online grocery shop named Shatkora, which is based on Sylhet.

0.2.4 DIFFERENT TEAMS OF INVERSE.AI

Inverse.AI have some different types of teams to build their applications.

- Android Team
- iOS Team
- Web Team
- Machine Learning / R&D Team
- Quality Assurance Team
- UI/UX Team
- Content Writer / Annotator Team.

0.2.5 SOFTWARE DEVELOPMENT PROCESS

Inverse.AI follow the agile methodology to support the proper integration of project requirements.

0.2.6 EMPLOYMENT FACILITIES

Inverse.AI has a good working environment. Employees and full-time interns need to work for a total of 8 working hours. Inverse.AI has a fixed working schedule. The work hour starts at 8:00 am and end at 5:00 pm. It has a break time of 1 hour starting at 1:00 pm.

The working days for employees are 5 days/week (Sunday to Thursday). Although in the month of Ramadan, there are some changes to this general schedule. In Ramadan, the work hour is from 9:00 am to 3:00 pm. Inverse.AI also follows a casual and informal dress code. It also maintains all government-declared holidays. There are also 3 weeks of paid leaves per year and sick leaves. Inverse.AI provides a competitive salary with half-yearly performance appraisal and evaluation. Inverse.AI offers two festival bonuses in a year and profit sharing for the best performers.

Inverse.AI provides breakfast, launch, and snacks at the office. Besides, there is all time available refreshments like - coffee, tea of various flavors, and chips. Most importantly pure drinking water supply is available here. All these things are free of cost.

0.2.7 TOOLS AND TECHNOLOGIES

Inverse.AI is not specialized or stuck within specific technologies. With time they gain expertise in different technologies and frameworks. Following are some of their used tools:

Mobile	Android, iOS(Obj-C/Swift), Flutter
Web	PHP, Python, Django, Node.js, Express.js
Front-end	HTML5,CSS3, Bootstrap, JQuery, Angular, React
Machine Learning/R&D	C++, Java, Python, Tensorflow, Pytorch
Others	Jira, Gitlab, AWS, Datacrunch

0.2.8 ACTIVITIES

Inverse.AI takes on various CSR activities. It was also a core sponsor of **SEC Inter-University Junior Programming Contest, 2022**.

0.2.9 HUMAN RESOURCE

Inverse.AI has a family of about 30 employees. They are planning to recruit more. Since the beginning, Inverse.AI has grown in the number of resources and production every year. Inverse.AI always looks forward to hiring the best. They have their unique hiring process.

0.2.10 RECREATION

Inverse.AI organizes a lot of events. One of the unique events that Inverse.AI hosts are individual programming contest. Inverse.AI hosts this contest weekly basis. Another team contest is arranged every month. It also arranges sports events like badminton tournaments and football tournaments. It also organizes signature lunch, company dinner, and annual office tour.

0.3 INTERNSHIP ACTIVITIES

I have spent almost 6 months in Inverse.AI. During this period I have taken part in various extra-curricular activities as well as my daily job. All those things are mentioned below.

0.3.1 LEARNING PHASE

During this phase, we had to study about various core concepts of machine learning and had to implement them in our code. In this phase, I had to study core concepts of Machine Learning, Deep Learning, Digital Signal Processing.

The conceptual phase can further be divided into 2 events:

1. **Reading Events:** At first, my mentor chose some topics to study for the next few days. Then I have to start reading those topics and tried to understand them. The mentor then asked about my progress. After that, I continue my study.
2. **Discussion Events:** In these events, I discussed the topics I was given to read. I discussed those topics with our mentors. After the discussion session, a Q/A session also happened.

0.3.2 PRACTICE PHASE:

During this phase, I was asked to implement some of the basics of machine learning/deep learning from scratch. Also, I have solved some beginner problems in kaggle to check if my knowledge is solid or not.

After this phase, my mentor gave me one previous project. My task was to recode some part of that project of my own. The main focus of this part is to clear my knowledge of handling NumPy and Tensorflow.

0.3.3 REAL WORLD TASK PHASE

I have worked on several projects and features. Some of them were very short but very impactful. Before working on these projects I have to read a lot of papers similar to this software.

BACKGROUND REMOVER:

I have implemented a manual background remover algorithm which is based on a 20-year-old paper. I have applied some heuristics ideas along with data structure(like KD-Tree) to make it 1000x faster for an 8k image.

I have also made a hybrid model for background remover. The accuracy of this model is 2% more than the previous one, on our dataset.

This feature is used in almost every photo editing software in Inverse.AI such as effect on humans, removing background, blur background, etc.

NOISE REDUCER:

I have reimplemented a deep learning-based model for noise reducer with TensorFlow and Keras framework. The model was previously written in PyTorch. I have trained this

model on 200GB of audio data. The main challenge for this task was the huge dataset. To run this huge dataset we need a powerful GPU. Being a startup, Inverse.AI could not afford such costly GPUs at that time. That's why I have to train that model on a remote computer having Nvidia A100 GPU. I have used datacrunch for this task. Again, the dataset was so enormous that one GPU was not enough, so I used 8 GPUs, and distributedly trained the model over those GPUs.

TEXT ON PHOTO:

I've implemented a small feature in this project that has an enormous impact on the project. One of the main features of this project was to curve a text and implant it on a photo. I've written the core logic for this task.

0.3.4 EXTRA CURRICULAR ACTIVITIES

I have participated all the individual contests arranged by Inverse.AI. I have also participated in all types of sports competitions.

0.4 CONCLUSION

An internship during a transitional phase of the school year is special from the standpoint of our country. From that standpoint, it is an honor that I was able to finish the best academic year of my life while also completing my internship utilizing real-world technologies. Furthermore, learning more about how the actual world works will me in my preparation for a future career.

I'd like to thank the Institute of Information and Communication Technology at Shahjalal University of Science and Technology for providing me with the opportunity to learn more about the competitive climate in the professional area. My software development coding and design skills have increased. I am now eager to tackle the forthcoming issues.

Inverse.AI is a software business in Bangladesh that produces creative and well-known products. As a result, it was a terrific opportunity for me to complete my internship as a valuable contributor to the progress of Inverse.AI. It was fascinating to put something else I had learned in my bachelor's program into practice with the assignment I was assigned. It piqued my curiosity from a different angle. It was a delight to work in a business cultured workplace.

Furthermore, learning new things while working in a team in a welcoming professional setting was beneficial. Even though it was new to me, it assisted me in making positive changes. Various tools and technologies, experienced human resources, a wide range of business domains, innovative products, inspirational and motivating higher authority, and a friendly environment were the most important factors for learning professionalism, a positive attitude, a winning mentality, self-initiative, and teamwork.

In a summary, I had a fantastic experience throughout this internship. And I'm hoping that this experience will inspire and enlighten me as I seek to improve my own future.