Summer Internship Report 2022

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***Abstract*—This document is a report on the summer internship carried out for two months at Systems Engineering as a JAVA Developer Intern.**

I. COMPANY PROFILE

SYSTEMS ENGINEERING is an organization dedicated to delivering best projects with a team of enthusiastic and immaculately experienced professionals.

With thier innovative solutions, smart products, rather the developments and individual services, they strive to solve problems that have been identified and exceed the customers' requirements. they identify the innovative methods based on the finding of the problems which remain and remained unidentified in front of many eyes for a long time.

Successful inventions are being integrated into the products at Systems Engineering for their betterment, using our reliable but the very common senses for a future technological and market requirements. When both converge, product reaches a higher level of quality.

Their technology products feature innovative ideas and comprehensive solutions, from conception through implementation.

II. WORKS ACCOMPLISHED

During my summer internship at Systems Engineering, I developed a Java application, GUI for signal generation, processing and data acquisition. The breakdown for work was as follows:

A. An Analysis and Requirement Gathering of a Project

I began my internship by analyzing the project in detail, gathering the requirements and developing the project during my first week of work.

We were tasked with developing a Java and GUI application for a furnace Surveillance project requirement where the Client's vision was to observe combustion and study related measures. In order to accomplish this, we spoke with the client and gathered requirements, as well as relevant information about the project, and discussed some ideas that could be improved.

We brainstormed ideas and planned to build it under a time and cost-effective methodology, since my objective was to develop a GUI to view and control measures.

The main Components are as follows:

1) Consultation with the client: Communication between the team, the mentor, and the client is essential to any project. With both my mentor and client, I've had some fruitful discussions about it as well. When I discussed the requirements with my client, I noted all the details. It was my responsibility to maintain the product in line with the requirements that I received and to make any necessary updates and changes.

2) Mentor-mentee discussion: In addition to talking with the client, I also spent a lot of time with my mentor, Mr. P. Bakshe. During my project period, he was a great help. Every feature of the project was discussed in detail, and he guided me to achieve the best results. In order to get the best results and user experience, we also analyzed edge cases for the features.

Each element of the project was discussed in detail and we spent a lot of time coming to a clear understanding of it. Analyzing the problem and prototyping it to make sure the scenario is very clear is the first step.

3) Selection of Framework Technologies: The technology we will use to develop the project should ideally be carefully chosen because different frameworks have various benefits and drawbacks. It was chosen to use JAVA to construct the solution after talking with the client and my mentor and reviewing the project's needs.

B. Brushing up the fundamental features of Java and JAVAFX

I've reviewed my prior knowledge of Java and *JAVAFX*. I now know how to work with JAVA, as well as JAVAFX's graphs and many other components.

C. Learning the fundamental features of Java and JAVAFX

In addition to the previously mentioned skills, I have also learned many new things, such as how to work with dataseries, threads, animators, and much more. Since HTML CSS are both better suited for styling, I have also learned how to connect the two in order to incorporate CSS styles into the Observation panel.

D. Understanding the signal data series that was generated

As previously mentioned, as the project completed its first stages, we started to visualise and acquire the generated data, and for this, I needed to understand the data series.

E. Implementation of visualisation class

Since dealing with the GUI portion is my main duty, I built a class that shows the generated curve and a few other attributes to deal with it. As it may be necessary to display multiple graphs at once, the class also includes some room for building multiple graph panels. It also includes numerous buttons that interact with the generated curve's characteristics.

Additionally, it was separated and placed into several packages since, when in the production phase, the code must always be in a readable and reusable manner and must be on different machines.

F. Operations on the produced signal curve

The panel has numerous operations that can be applied to the generated curve, including fitting, overfitting, adding and modifying its features, and observing changes to its other characteristics.

As signal curves are created from a big number of data values, there are some curves that are interrelated to one another and where processes must be carried out simultaneously. We must ensure that these processes will operate even for larger values.

G. Transfer of data between machines

We need to connect the two computers in this part so that they can communicate with one another because the values are generated in one location while the panel and curve operations are performed in a different location.

As mentioned earlier, the data used here is extremely large, so transferring such a large amount of data is a significant challenge that was overcome by some memory management techniques. The connection established must be two-way as both machines must request and respond to the request sent by the other machine.

H. Launching the developed application

Another difficult aspect of any product is its deployment. We had to construct a *.exe* for the *Java* application we had developed, and we had used a lot of static assets that needed to be downloaded automatically when the application was installed.

As a result, we must generate installation and executable files that contain all the necessary files.

In order to structure the created signal files in case of overhead, the generated executable file needs to perform some preliminary processing.

I. Testing

After additional conversation with the team, we implemented the improvements they requested to improve its integration in users' environments. During this phase, every core operation that was constructed was tested. It was then merged with the other team and put to the test in their environment.

The implementation of the created code on our computer for the verification of the universal functionality test, testing the code and corrective actions, multiplatform interfacing

J. Developing Code Documentation

The project source code documentation was kept up to date by keeping track of all the features that the code was supporting. This will also enable the future developer to update the modifications on the code and make it simpler to grasp code with the aid of documentation.

III. About Project

The project's primary goal is to monitor the activities of the furnace. It draws inspiration from a requirement for the TATA Steel furnace surveillance project. It will be used for research, associated metrics, and observation of combustion.

Given the nature of the application and the critical safety role flares play in a petrochemical complex, this high-performance grade of product was specified. It can stand up to both the thermal shock, and the continual weather exposure demanded by the nature of this application.

With the aid of this application, a significant amount of resources and labour can be saved during industrial manufacturing. With the advent of this type of application, an innovative monitoring system solution has emerged.

IV. Daily Chore

Due to the fact that my intern was stationed at home, every day we had a standup call where we updated our mentor on the projects we were working on. On a daily and weekly basis, my project mentor gave me different tasks to complete. Additionally, there are group meetings when we listen to team members and get updated on the project and any improvements that need to be made before the assignment deadline, at which point I must present my reports to a mentor with code

documentation. Our project manager prepared our next duties based on the daily task report.

I used to assign everyone of us a chore for the day. My mentor was also really pleased with my practise of accepting responsibility, which ultimately looks to be advantageous for me.

V. Experience

Through this internship, I had a fantastic opportunity to broaden my experience to the sector of industrial development. I've had the chance to acquire and hone my technical abilities during this internship, including JAVA development, working with larger data sets, data transfer, and GUI creation. I have also gained knowledge about how real-world projects are managed during this internship. Working with other team members and gaining knowledge under the direction of my mentor has been quite helpful.

A. Technical Considerations

I have gained a lot of new knowledge during this internship, including data series in Java, working with larger data sets, data sharing, various JAVAFX components, and producing code that is optimized, reusable, and readable.

I've also learned how to use a variety of new developer tools, such as the INNO Setup compiler, Launch4J, and IntelliJ, which aid in bettering programmes. Additionally, this enabled me to improve my development abilities.

B. Managerial Considerations

In addition to my technical skills, I've received knowledge via participating in product meetings with clients, mentors, and team members. I learned a lot and developed my professional experience thanks to this. Discussions with the client and my mentor helped me a lot to understand about how real-world software engineering projects are finished since I had firsthand knowledge with how the project is divided into tasks for team members. I recognised the significance of communication abilities. At a much more professional level, I developed my teamwork skills.

My managerial learning experience also involved meeting the deadline and doing the duties on time.

VI. Future

I gained a lot of knowledge about software project development through this internship, and I'm excited to keep working in the industry. There are numerous firms working in this area of development, and I look forward to finding employment where I can use my skills as a developer.

Acknowledgment

I would like to thank Systems Engineering and convey my sincere gratitude for providing me with this fantastic opportunity to work as a JAVA Developer Intern. I also want to express my gratitude to Mr. P. Bakshe sir for being a very nice and helpful mentor to me and for offering me helpful advice and assistance with a number of projects. I believe that right now I am self-assured enough to contribute to the field of computer science in the near future. The placement coordinators at IIIT Vadodara, Mrs. Madhu Ma'am and Mr. Ashish Phophalia sir, deserve my gratitude for providing us with such wonderful chances.