KLE Society's
KLE Technological University, Hubballi.

A Minor Project Report

on

NEW GUI (UX) SYSTEM TO GIVE FEEDBACK TO THE MACHINE REGARDING THE FIRST PIECE INSPECTION IN STANDARD ROOM

submitted in partial fulfillment of the requirement for the degree of

Bachelor of Engineering

in

Computer Science and Engineering

Submitted by

Aditya Govanakoppa	01FE20BCS062
Abhinandan Hiremath	01FE20BCS037
Dharesh Amarshetty	01FE20BCS038
Ulhas S Kalasa	01FE20BCS011

Under the guidance of
Prof .Anand Meti

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

Hubballi – 580 031

2022 -23

KLE Society's
KLE Technological University, Hubballi.

2022 - 2023

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

CERTIFICATE

This is to certify that Minor Project titled New GUI (UX) system to give feedback to the machine regarding the first piece inspection in standard room is a bonafide work carried out by the student team comprising of Aditya Govanakoppa (01fe20bcs062), Abhinandan Hiremath (01fe20bcs037), Dharesh Amarshetty (01fe20bcs038), Ulhas S Kalasa (01fe20bcs011) for partial fulfillment of completion of sixth semester B.E. in Computer Science and Engineering during the academic year 2022-23.

Guide

Prof. Anand Meti

Head, SoCSE

Dr. Meena S. M

Viva -Voce:

Name of the Examiners	Signature with date
1.	
2.	

Acknowledgement

We would like to thank our faculty and management for their professional guidance towards the completion of the project work. We take this opportunity to thank Dr. Ashok Shettar, Vice-Chancellor, Dr. B.S Anami, Registrar, and Dr. P.G Tewari, Dean Academics, KLE Technological University, Hubballi, for their vision and support. We also take this opportunity to thank Dr. Meena S. M, Professor and Head, SoCSE for having provided us direction and facilitated for enhancement of skills and academic growth. We thank our guide prof. Anand Meti, SoCSE for the constant guidance during interaction and reviews. We extend our acknowledgement to the reviewers for critical suggestions and inputs. We also thank Project Co-ordinator Mr. Uday N.Kulkarni and Mr. Guruprasad Konnuramath for their support during the course of completion. We express gratitude to our beloved parents for constant encouragement and support.

Aditya Govanakoppa - 01FE20BCS062
Abhinandan Hiremath - 01FE20BCS037
Dharesh Amarshetty - 01FE20BCS038
Ulhas S Kalasa - 01FE20BCS011

ABSTRACT

The software is designed for a company that manufactures automotive parts and needs a reliable way to give feedback to the machine regarding the first piece inspection in a standard room. The GUI system is made to give the inspection room feedback in real time. The system makes use of a user-friendly interface to present data like product details. The system is made to make it simple and quick to get information and to save time. The user needs to enter the information and the part name and in which row the part is manufactured. The entered information is then displayed in another GUI which is present in the standard room. When the part is verified whether it is fit for production or if any changes have to be made, the user in the standard room gives the information if it is ok or not ok for production. If the product is ok then the production should continue if not then changes are made, and the data is stored. Overall our system provides a reliable and user-friendly solution for giving feedback in the inspection room. Our System saves time for the users and removes the requirement of storing data physically in record books.

CONTENTS

LIST OF FIGURES

Chapter 1

INTRODUCTION

The system to give feedback to the machine regarding the first piece inspection in a standard room is a project designed to provide real-time feedback to the inspection team. It involves two graphical user interfaces (GUI), one outside the standard room and the other inside, connected to a system that manages the data collected during the first piece inspection process. The system's primary goal is to ensure that the first piece produced meets the quality standard required, and if not, to identify the cause of the problem and take corrective action immediately. This system makes use of various technologies such as HTML, CSS, JavaScript, and SMTP.js to create a user-friendly interface that allows easy entry of inspection data, transmission of the data, and notification of issues. The feedback system is designed to improve the inspection process's efficiency and reduce the production of defective products.count the number of words

1.1 Motivation

The motivation behind the development of a system to give feedback to the machine regarding the first piece inspection in a standard room is to improve the quality control process in manufacturing. The first piece inspection is a critical step in the manufacturing process that ensures that the product meets the required standards and specifications. In the past, operators have manually performed this process in the standard room, which can be time-consuming, labor-intensive, and prone to errors. Automating this process can improve the accuracy and efficiency of the inspection process, as well as reduce the production of defective products. By implementing a system that provides real-time feedback to the inspection team, corrective actions can be taken immediately if a product fails to meet the required standard. In addition, the system's user-friendly interface makes it easy for operators to enter inspection data, transmit the data, and receive notifications of any issues. This simplification of the inspection process can save time and improve the overall productivity of the manufacturing process.

1.2 Literature Review / Survey

In paper[1] This paper is about a study on the use of models in testing graphical user interfaces (GUIs). The authors propose a study design for evaluating different models used in GUI testing. The study includes a comparison of different modeling techniques, such as finite state machines and activity diagrams, for generating test cases. The study also considers the effectiveness of these models in detecting faults in the GUI. The authors conducted experiments using a real-world application to evaluate the effectiveness of these models. The results of the study show that different models have varying degrees of effectiveness in GUI testing, with some models performing better than others in certain contexts. Overall, the study provides insights into the use of models in GUI testing and can help guide future research in this area.

In paper[2] The paper discusses the development of a graphical user interface (GUI) for real-time monitoring and operation of a computer big data analysis platform. The GUI was designed to provide users with an intuitive and user-friendly interface for monitoring the system's performance, managing the data processing pipeline, and viewing the results of the analysis. The author describes the architecture of the system, which includes a front-end interface, back-end data storage, and various components for data processing and analysis. The paper also provides details on the design and implementation of the GUI, which was developed using a combination of web technologies and Python. The system was tested in a real-world scenario, and the results show that the GUI is effective in providing real-time monitoring and control of the big data analysis platform.

In paper[3] The various methods and procedures for test automation of graphical user interfaces (GUIs) are reviewed in this paper. The author addresses the value of automated testing in the software development process as well as the difficulties that come with GUI testing due to the complexity of GUIs and the need for human interaction.The paper covers various frameworks and methods for GUI test automation, such as model-based testing, keyword-driven testing, and record-and-playback. It also covers the integration of GUI testing with continuous integration and delivery (CI/CD) pipelines and the usage of computer languages like Python and Java for test automation.

In paper[4] The evaluation of graphical user interface (GUI) design utilizing a survey and multivariate testing is covered in this study. The authors carried out a study in which they employed a questionnaire to gather information on how users viewed various GUI designs. They analyzed the data using multivariate testing to determine which design components had the most effects on user happiness.The authors discovered that multivariate testing enabled them to more precisely identify the most crucial design components than they could with more

conventional techniques. They also discovered that a number of elements, such as the layout, colour palette, and usability, had an impact on how consumers perceived the GUI design.

In paper[5] The study on the efficacy of GUI test cases for defect identification in quickly changing software systems is presented in the paper by Memon and Xie. The purpose of the experiment was to compare GUI test cases to unit and integration test cases in terms of how well they detected problems. They applied a mutation testing strategy to a real-world software system and put flaws into it. The GUI test cases were created using capture-replay techniques, and the results demonstrated that they were successful in finding errors that unit and integration test cases had missed.The structure of the GUI and the location of the bugs in the code were two other criteria that the authors looked into as they related to the efficiency of GUI test cases. They also suggested a metric for gauging how well GUI test cases are in finding errors. The study emphasizes the significance of GUI testing and its efficacy in finding errors, particularly in quickly growing software systems where changes to the GUI can impair the system's overall operation.

In paper[6] In this research, a unique method for combinatorial optimization of GUI interfaces is presented. In order to investigate and assess a wide range of design options and trade-offs, the authors present a method that can generate and optimise vast sets of designs. The strategy explores the design space using combinatorial optimization techniques to determine the optimum options based on a number of standards, including efficiency, usability, and beauty. The authors also present a brand-new criteria for assessing GUI designs that takes into account the interface's usability and interactivity in addition to its visual style. The paper offers multiple examples of how the technique might be used to enhance different GUI designs, including those for websites and mobile applications. Overall, this work offers insightful knowledge into the area of GUI design optimization and proposes a viable method for creating and assessing big collections of GUI designs.

In paper[7] introduces a fresh method for gamifying the GUI (Graphical User Interface) testing procedure for web and mobile applications. The authors suggest a metric framework that incorporates many GUI testing quality factors, such as usability, functionality, and aesthetic design, to give readers a comprehensive understanding of the testing procedure. The framework uses a point-based system to make testing more entertaining. Testers can earn points by finding issues, giving feedback, and finishing tasks. The study explains how gamification can boost testers' involvement and motivation, resulting in more productive and effective testing. The authors also point out how gamification might assist in overcoming the difficulties associated with GUI testing, including the subjective nature of usability testing and the low motivation of testers.

In paper[8] In order to present a simulation-based method of teaching user interface (UI) functional design concepts, we created "Through Simulation With Feedback." The authors contend that while there are several methods and tools for teaching UI design, they frequently lack the element of feedback required for efficient learning. With the help of a simulation game, the suggested method enables students to create and test UI prototypes while getting quick feedback on their design decisions. Gamification is a feature of the simulation game that encourages students to actively interact with the course material.The simulation game's concept, implementation, and assessment of how well it teaches UI functional design principles are all included in the article. The evaluation's findings imply that a simulation game with gamification and feedback can considerably increase students' comprehension of UI functional design principles. The proposed approach's potential for adaptation and application to other computer science teaching fields is also covered by the authors. Overall, the study offers a novel method of teaching UI design that overcomes the drawbacks of earlier methods and makes use of the potential of simulation and gamification to improve the educational process.

In paper[9] examines ways to increase the precision and accuracy of GUI manipulation on touch screens. Modern GUIs now frequently use touch screens as an input method, but these screens lack haptic feedback, making it challenging to move GUI objects precisely. By incorporating haptic cues onto touch screens, the authors suggest a novel strategy to improve the user's capacity to control GUI items. The prototype of a haptic touch screen that uses a piezoelectric actuator to give the user's fingertip haptic input is shown in the paper. In addition to giving input on the position and movement of the GUI object, the haptic feedback is utilised to direct the user's finger towards it. The effectiveness of the haptic feedback system was tested by the authors, who also compared it to a conventional touch screen system. The study's findings demonstrated how much the haptic feedback system increased the user's accuracy and dexterity when manipulating GUI items. The haptic feedback system, according to the authors, was successful in lowering errors and shortening task completion times. The study demonstrates that haptic feedback can be a useful technique for improving the accuracy and precision of GUI manipulation on touch screens. The study may have effects on how touch screen interfaces are created for mobile devices, virtual reality, and video games, among other applications.

In page[10] design of graphical user interfaces (GUIs) for teleoperation systems is suggested, using a new technique. The suggested system employs a human-centered design process to customise the GUI interface for each user based on their traits and abilities. The article offers a thorough examination of the user's cognitive functions and suggests a set of design principles for the creation of adaptive GUIs. Two key parts make up the suggested system: a user model and an adaptive GUI generator. The user model uses a number of elements,

such as age, gender, education level, and teleoperation experience to capture the user's traits and abilities. The user model is used by the adaptive GUI generator to create an optimised GUI for each user. By altering the task complexity, user feedback, and the size and placement of the interface elements, the resulting GUI can be made to fit the user's preferences and abilities. The case study in the paper shows how the suggested system was used to create a teleoperation system for a remote-controlled car. The results demonstrate the success of the suggested strategy by showing that the adaptive GUI design considerably enhances user performance and decreases effort. The proposed method, according to the authors, can be used to enhance the usability and effectiveness of various teleoperation systems.

1.3 Problem Statement

The company that manufactures automotive parts needs a reliable way to enter and save the data and give feedback in the standard room. Currently, the feedback process relies on manual entry of the products to be inspected, and the data is stored in notebooks, which is prone to loss of data and is very time-consuming. The company is looking for a solution that can store the data in the system, and increase time efficiency to improve the accuracy and efficiency of the inspection process.

1.4 Objectives and Scope of the project

The major goal of this project is to develop a system that gives the machine feedback on the initial component examination in a typical room. This technique seeks to increase production quality while minimizing mistakes and defects. In order to make sure that the production process is going properly, the system also intends to deliver real-time feedback to the inspection room. The construction of a user-friendly graphical user interface (GUI) with two distinct interfaces—one inside the standard room and another outside—is part of the project's scope. The operator can enter the essential product details using the GUI, such as the name of the producing employee, the date, the time, and the row. The product will then be measured by the system, and it will then give feedback on whether the product complies with manufacturing requirements. The system will also include an alert feature to let the team leader know if there are any problems with a particular row in which the product was made.

1.4.1 Objectives

- To reduce the risk of data loss by storing the data in a computer.
- To reduce the time-consuming work of writing data into the books by entering the data

in our user-friendly GUI.

- To reduce the time-consuming work of collecting the result of the inspection by sending a mail to the team leader directly.

1.4.2 Scope of the project

The goal of this project is to develop a system that gives the machine feedback about the initial piece inspection in the standard room in real time. To record details about the first item created, such as the employee's name, date, time, and row, the system has two GUIs—one outside and one within the standard room. The system presents data and stores information about the inspection results in a user-friendly interface, enabling staff to swiftly and simply assess whether the product complies with the necessary criteria. The method is made to increase the inspection process's accuracy and effectiveness, ensuring that any flaws or problems are found and fixed as quickly as possible.

Chapter 2

REQUIREMENT ANALYSIS

An important element in the software development process is the requirement analysis for a system to provide feedback to the machine regarding the initial piece inspection in the standard room. The main goal is to determine and record the system's functional and non-functional needs. The system's expected behavior is specified by the functional requirements, which also include the ability to record employee information, the date, the time, and the row where the product was generated. Additionally, it allows the employee to enter whether the product is fit for manufacturing or not and inspect the item in accordance with industry standards. In addition, if there is an issue with the product, the system ought to notify the team leader. On the other hand, The properties of the system, such as usability, dependability, and security, are described in the non-functional requirements. A user-friendly interface that exposes information like product descriptions and gives feedback in real time is a requirement for the system. It should also be trustworthy, guaranteeing the precision and excellence of the final work. Additionally, the system must protect user privacy and be safe from outside attacks.

2.1 Functional Requirements

- The system shall use two GUIs, one placed outside the standard room and the other inside the standard room.
- The system should be able to send data from the first GUI to the second GUI inside the standard room.
- The system shall handle empty space and shall display an error.
- The second GUI shall allow the employee to enter if the product is suitable for production or not.
- The system should store the data entered by the employee in the second GUI.
- The system shall send an alert as mail if the product is not ok for production.
- The system shall provide a user-friendly interface.
- The system should be designed to be simple and quick to use, in order to save time.

2.2 Non Functional Requirements

- The system should be efficient and have a fast processing time for displaying the information from GUI1 to GUI2
- The system should respond within a certain amount of time so that the inspection is not delayed
- The system should be available at all times so that it can be used at any point in time.
- The system should be able to work with existing systems.
- The system should be compatible with different operating systems.
- The system should be easy to maintain and update.

2.3 Hardware Requirements

- Computer: A computer with strong computing capabilities can quickly and efficiently process massive volumes of data. It can handle difficult tasks including operating resource-intensive apps, playing top-tier games, and producing visuals with high resolution. It can even conduct sophisticated calculations. These computers can do numerous tasks concurrently without stuttering or crashing thanks to their strong processors and lots of RAM. A computer with strong computational capabilities may effectively perform the most difficult computing jobs with ease and speed, similar to a car with a supercharged engine. for the system.
- Display: two displays to show the GUI interface for the employees outside and inside the standard room.
- Network Connection:A dependable and quick connection between two or more devices that enables smooth data transfer and communication is known as a good network connection. It enables users to access information quickly over the internet and exchange it, such as by sending and receiving emails, streaming videos, or taking part in video conferences. A strong network connection guarantees constant and reliable data transmission with little hiccups or delays and can handle massive amounts of data transfer. Additionally, it offers sufficient security measures to safeguard private data and thwart unauthorised access. A reliable network connection can enhance user experience, productivity, and efficiency.

- Power Supply: Any electronic equipment must have a reliable power supply to operate at its best. It ensures that the gadget obtains the necessary voltage and current for uninterrupted operation by supplying a consistent and dependable flow of power. A decent power supply should be able to provide steady power without any unexpected voltage spikes or drops that can harm the device's internal parts. Additionally, it must to have a high energy efficiency score.To guard against device damage in the event of power surges or other electrical problems, a decent power supply should also contain built-in protection systems including over-voltage protection, over-current protection, and short-circuit protection. All things considered, a reliable power source is essential to the proper operation, durability, and security of any electronic device.

- Alert System: The alert system in the production line is a crucial component that helps to ensure that faulty products are identified and removed from the production line quickly. When the employee in the standard room inspects a product and determines that it does not meet the required quality standards, the system stores this data and sends an alert to the team leader responsible for the specific row. The alert can be sent via email, text message, or other preferred means of communication. A good alert system needs to be dependable, quick, and simple to use. It should also be able to interface with other production system components, such as the data storage and analysis ones, and provide alarms in real time. Overall, a reliable warning system is a crucial part of any production line since it makes it possible to swiftly identify and remove defective products.

2.4 Software Requirements

The platforms and tools required to create and implement the system are provided by these software needs. An easy-to-use interface for coding the system's functionality is offered by VS Code. MongoDB makes it possible to store and retrieve data quickly, while basic HTML gives the system's graphical user interface (GUI) a foundation. The system's operations-related data are stored and managed using MS Excel. Finally, the Windows OS offers a reliable and secure operating system for the system.

- Visual Studio Code (VS Code) - Microsoft created Visual Studio Code, also referred to as VS Code, which is a free and open-source code editor. It offers capabilities including debugging, syntax highlighting, intelligent code completion, and code restructuring and supports a variety of programming languages. Additionally, VS Code offers a sizable library of extensions that can be downloaded and installed to add new features and support for a wide range of programming languages and frameworks. It can be used

with a variety of operating systems, including Windows, macOS, and Linux. Due to its user-friendly interface, performance, and versatility, VS Code has become incredibly popular among developers and is now a top choice for coding and development.

- MongoDB - MongoDB is a popular NoSQL document-oriented database that is used for storing and managing unstructured data. It is a cross-platform, open-source database system that is designed to be flexible, scalable, and high-performance. MongoDB uses a JSON-like document model, allowing it to store data in a way that is more natural and intuitive for developers. It also supports dynamic schemas, which means that data can be added to the database without having to first define a specific schema. MongoDB is widely used for web applications, mobile applications, and other data-intensive applications.

- Basic HTML - HyperText Markup Language, also known as basic HTML, is a straightforward computer language used to build web pages. To structure a web page's content, including headings, paragraphs, lists, graphics, and links, HTML code is written in plain text. Each component of a web page is defined by a tag in HTML, such as h1> for the primary heading, p> for a paragraph, and img> for an image. It serves as the web's framework and is crucial for building any website or web application. Simple static web pages can be made using basic HTML, which is a reasonably simple language to learn. The adoption of additional web technologies like CSS and JavaScript is necessary for more sophisticated features like dynamic content and interactivity.

- Microsoft Excel - a spreadsheet program that is used for storing and managing data in the system. Excel sheets are electronic spreadsheets that allow users to organize, manipulate, and analyze data. They consist of cells arranged in rows and columns, where each cell can contain text, numbers, formulas, or functions. Excel sheets are commonly used for tasks such as budgeting, data entry, financial analysis, and project management. They offer various features like sorting and filtering data, creating charts and graphs, performing calculations, and formatting data to make it visually appealing. Excel sheets can also be shared and collaborated on with others, making them a popular tool for teamwork and data sharing in many industries.

- Windows OS -Windows OS is a family of proprietary operating systems developed and sold by Microsoft Corporation. It is the most widely used operating system for personal computers worldwide. Windows provides a graphical user interface (GUI), a multitasking environment, virtual memory management, and support for many peripheral devices. It also includes various software applications such as a web browser, media player, and office suite. Windows has evolved over the years with various versions and updates, with the latest version being Windows 11, released in 2021. It is compatible with a

wide range of hardware and software and is used in various settings including homes, businesses, and educational institutions.

- SMTP.js- A JavaScript library called SMTP.js enables programmers to send emails from their web applications. For interacting with SMTP servers, which are used to transmit email messages, it offers a simple user interface. Developers can define email recipients, set email headers, and send emails with attachments using SMTP.js. Developers can send emails from authenticated accounts thanks to its support for authentication. To send emails, SMTP.js uses a straightforward syntax, which makes it simple for developers to incorporate email capabilities into their web apps. Both client-side and server-side JavaScript applications can make use of it.

Chapter 3

SYSTEM DESIGN

A two-GUI interface is used in the system to provide input to the machine regarding the first piece inspection in a standard room. The initial GUI, where the employee enters the relevant product information, is situated outside the standard room. The second GUI is located in the standard room, which is where the product is examined to determine whether it is suitable for production. The system is made to give the inspection room real-time feedback and to be user-friendly, making it simple to obtain information and saving time. The software was created using Visual Studio Code and simple HTML, and it runs on a Windows operating system. The system's design also makes use of MongoDB and MS Excel to store data and provide reports.

3.1 Architecture Design

The architectural design for this project can be divided into two main components: the first GUI and the second GUI. The first GUI is placed outside the standard room and is designed to collect product details such as the name of the employee who produced that part, date, time, product id, product name, and name of the row in which it was produced. The collected data is then sent to the second GUI placed inside the standard room for inspection. The second GUI is designed to receive data from the first GUI, present the product details, and allow the employee to enter their inspection result. The data is then stored in the system for further analysis. This project follows a client-server architecture, with the first GUI acting as the client and the second GUI acting as the server. The use of a user-friendly interface and real-time feedback makes the architecture efficient and reliable.

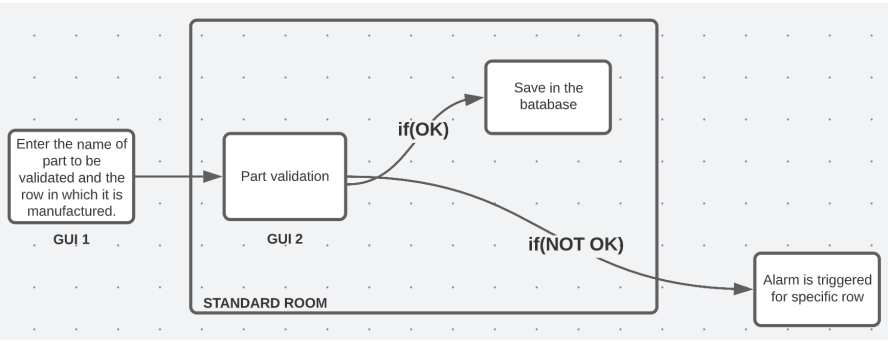


Figure 3.1: Architectural design

3.2 Data Design

A key component of the system's functionality is the data design that will allow it to provide feedback to the machine regarding the initial piece examination in a typical room. The system's main objective is to gather information throughout the first piece inspection process and give the inspection team real-time feedback. To ensure that the feedback given is trustworthy, the data design must be exact and precise. The system's data types, data structures, and data storage techniques are all part of the data design. Data including product specs, inspection findings, and any problems found throughout the inspection process are all collected by the system. This information is kept in a database that both the internal and external GUIs can access. The data design should incorporate validation and verification techniques to guarantee data accuracy. The process of making sure that the data entered into the system is accurate and adheres to the necessary format is known as data validation. For instance, the system can demand that numerical data be submitted in a certain format; if the data is provided in a different format, the system will reject it. By comparing the data collected to predefined standards, verification makes sure that it is correct and trustworthy. In addition, the data architecture should incorporate data security features to guard against unauthorized access or data tampering. To safeguard the data and ensure that only authorised personnel can access it, the system may use authentication and encryption techniques. The data design for this project mainly includes a MongoDB database with two collections: "Production Details" and "Inspection Results". Production Details: Saves the data entered by the employee, such as part name, part id, producer name, date time, and name of the row in which it was produced. The "Inspection Results" collection stores the results of the inspection performed in the standard room. This collection has fields such as "Product ID" and "Inspection Result".

3.3 User Interface Design

The User Interface (UI) of the system to give feedback to the machine regarding the first piece inspection in standard room is designed to be user-friendly and intuitive. The UI is divided into two parts, the first part being the GUI outside the standard room and the second part being the GUI inside the standard room. The GUI outside the standard room is designed for the operator to input the necessary information such as employee name, date, time, and row number. This GUI is made simple and easy to understand. The operator can quickly enter the required information and submit it. The GUI inside the standard room is designed for the inspector to inspect the product and enter if the product is suitable for production or not. This GUI is also made simple and easy to understand. The inspector can quickly input the information and submit it. Both GUIs are designed using basic HTML and CSS

to ensure simplicity and ease of use. The color scheme is kept simple, and the buttons are labeled clearly to avoid confusion

Chapter 4

IMPLEMENTATION

The system has 2 GUI, in which 1 GUI is placed outside the standard room and another GUI inside the standard room, the first piece produced should be bought to the standard room and enter the information, the first GUI includes the name of the employee, date, time, and the row in which the product was produced.(there are a total of 10 rows and each row is named differently for identification) once the employee submits the information the data is sent to the 2nd GUI which is inside the standard room. Then the product is inspected according to their standard measurements and then the employee enters if the product is suitable for production or not, and the data is stored in the system. If the product is ok then the production continues if not then an alert is sent to the team leader of the specific row in which the product was produced and the changes are implemented. Our system uses " write what is used ". Overall, The GUI system is made to give the inspection room feedback in real-time. The system makes use of a user-friendly interface to present data like product details. The system is made to make it simple and quick to get information and to save time. our system provides a reliable and user-friendly solution for giving feedback in the inspection room. Our System saves time for the users and removes the requirement of storing data physically in record books.

Algorithm :

- Start the system and open the first GUI.
- Prompt the user to input their name, date, time, and the row in which the product was produced.
- Once the user submits the information, send it to the second GUI which is inside the standard room.
- Inspect the product according to the standard measurements.
- Prompt the user to enter if the product is suitable for production or not.
- Store the data in the system.
- If the product is OK, continue with production. If not, send an alert to the team leader of the specific row in which the product was produced and the changes are implemented.

- Repeat the process for each product.
- End the system.

In general The implementation of the system to give feedback to the machine regarding the first piece inspection in the standard room involves several steps. The first step is to install and set up the necessary hardware and software components, which include a camera, a computer, a database system, and software tools like VS Code, MongoDB, basic HTML, MS Excel, and a Windows operating system.To give feedback to the machine regarding the first piece inspection, a graphical user interface (GUI) is developed using basic HTML and JavaScript. The GUI presents the inspection results to the operator, who can then provide feedback to the machine based on the results. The feedback can be in the form of accepting or rejecting the inspected piece or adjusting the machine settings to improve the inspection process.Finally, MS Excel can be used to perform data analysis on the inspection results stored in the database system. This can help identify trends and patterns in the inspection data, which can be used to improve the inspection process and reduce the occurrence of defects in future inspections. Overall, the implementation of this project involves the integration of several hardware and software components and the development of a user-friendly GUI for feedback and analysis.

Chapter 5

RESULTS AND DISCUSSIONS

increase the precision and effectiveness of the inspection process of manufactured components in a standard room is the system to offer feedback to the machine on the initial piece inspection in a standard room. The first created component will be automatically detected and inspected by the system, which combines hardware and software components. Any flaws or problems found during the inspection process will be immediately communicated to the machine operator. The system's software component will evaluate the information gathered during the inspection process and give the operator feedback using technologies like VS Code, mongo DB, simple HTML, and MS Excel. Additionally, a Windows operating system will be needed to execute the project's software. This project's overarching objectives are to decrease the number of defective components made during manufacturing, boost production effectiveness, and the data is saved securely in the system.

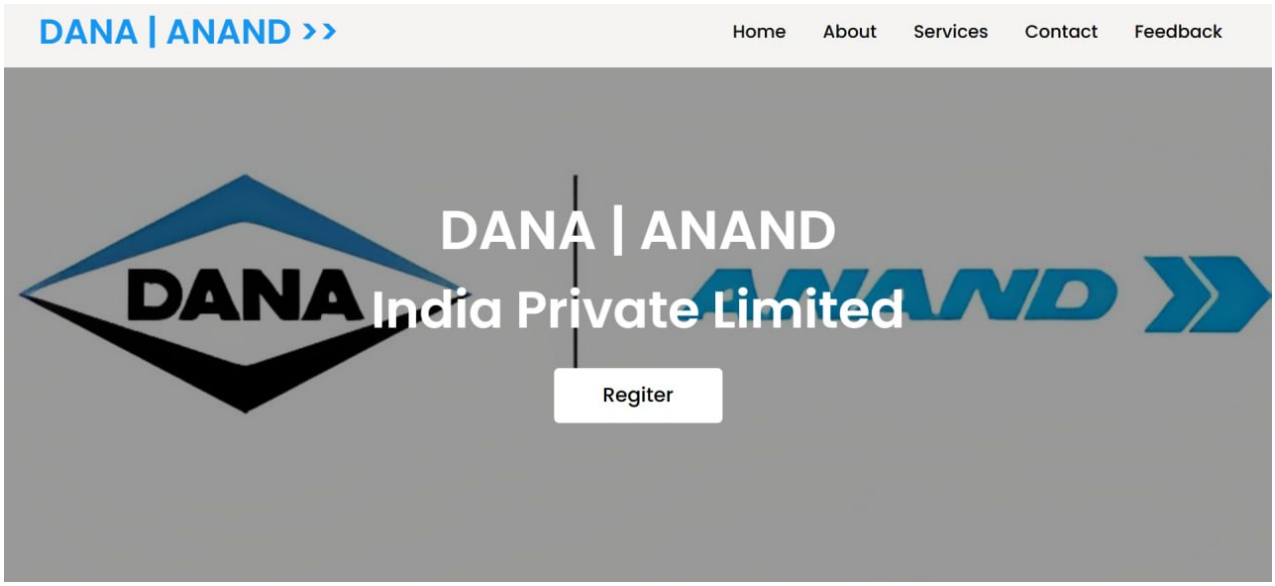


Figure 5.1: GUI 1 front page

As per the paragraph, GUI1 is the first graphical user interface in the system that is placed outside the standard room. It serves the purpose of capturing and recording the information related to the first piece of inspection of the product. Here are ten functional requirements of GUI1:

- GUI1 should allow the employee to enter their name accurately.
- The GUI1 interface should have fields to enter the date and time of production.
- The system should have a mechanism to identify the row in which the product was produced, and the GUI1 interface should allow the employee to enter this information.
- GUI1 should have a user-friendly interface design to allow easy data entry by the employee.
- The GUI1 system should be able to validate the data entered by the employee to ensure that it is accurate and complete.
- The data entered by the employee in GUI1 should be transmitted to the second GUI inside the standard room.
- The GUI1 system should be able to send real-time alerts to the team leader in case of any issues with the product during the inspection.
- The GUI1 system should be able to store the data entered by the employee securely.
- The GUI1 system should be able to generate reports based on the data entered by the employee, such as production statistics for each row.
- The GUI1 interface should be designed to be compatible with different devices such as laptops, tablets, or mobile phones, to allow flexibility and ease of use for the employees.

The figure 5.1 shows the front page of GUI1. The GUI1 is placed outside the standard room and is designed to gather information about the product such as product name, product id, date, time, and name of the employee who produced the part,and name of the row in which the part was produced, after entering the first part produced is submitted in the standard room for inspection. The front page consists of company credential information such as about, services, and contact, and we also have the option to give feedback so that we can rectify the mistakes and change them.

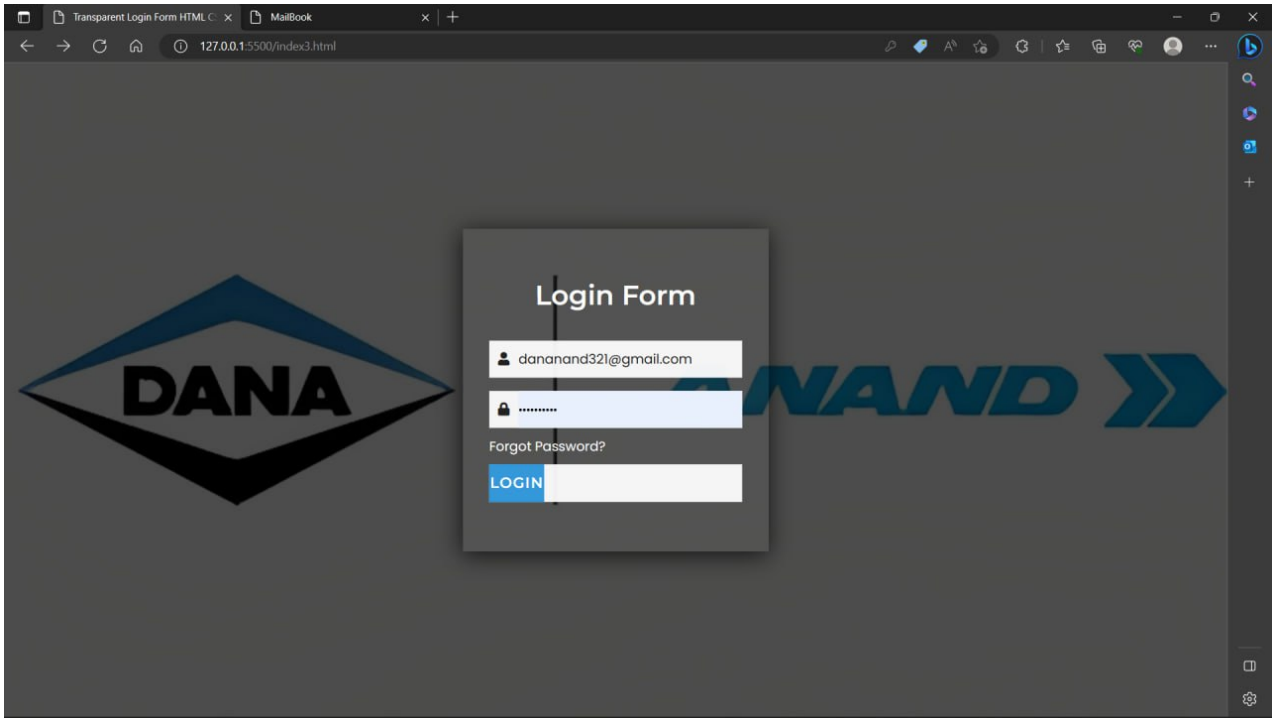


Figure 5.2: GUI1 Login Page

Each employee Will be assigned a unique password, once the employee logins then the employee can enter the part details. We have provided a login page because A login page is a crucial part of many websites, systems, and software programmes. It acts as the user's first point of contact and adds an extra degree of protection to the system. Users normally need to input their username and password on the login screen, which are then checked against a list of authorised users. The system makes sure that only authorised users can access the protected resources or carry out particular operations within the system by establishing a login page. Additionally, it aids in preventing unauthorised access to important data and information. A login page can also offer a customised user experience by letting users access their own settings, preferences, and saved information. In conclusion, a login page is a crucial component of many apps, offering benefits for security, privacy, and personalisation.

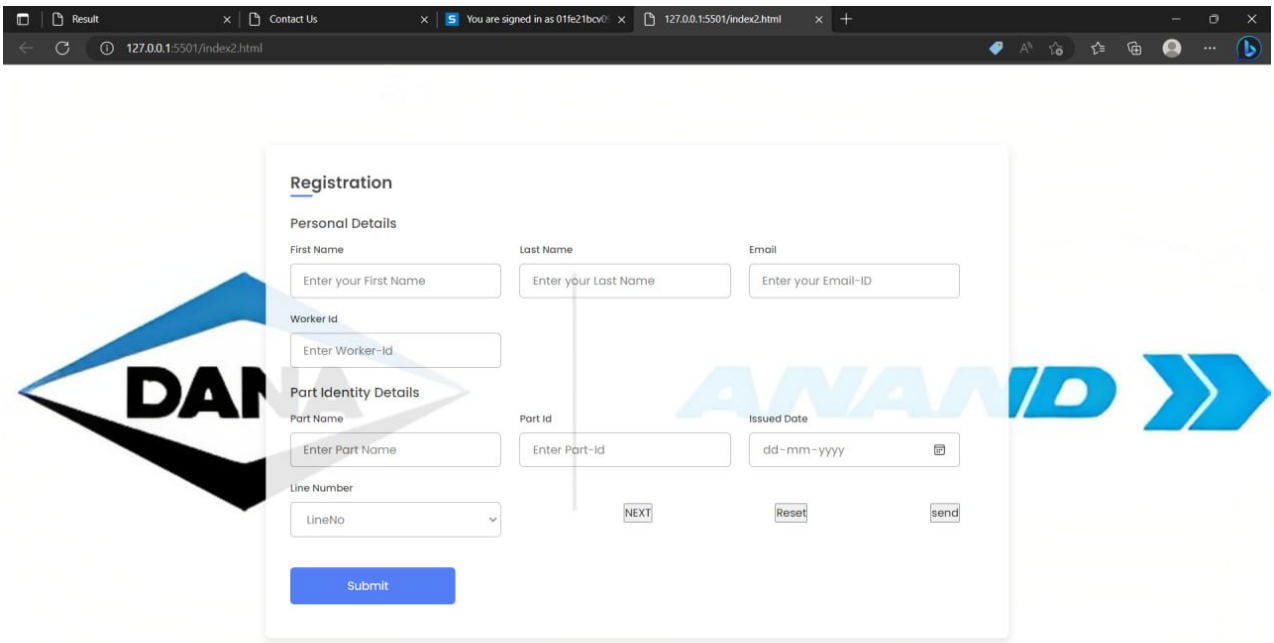
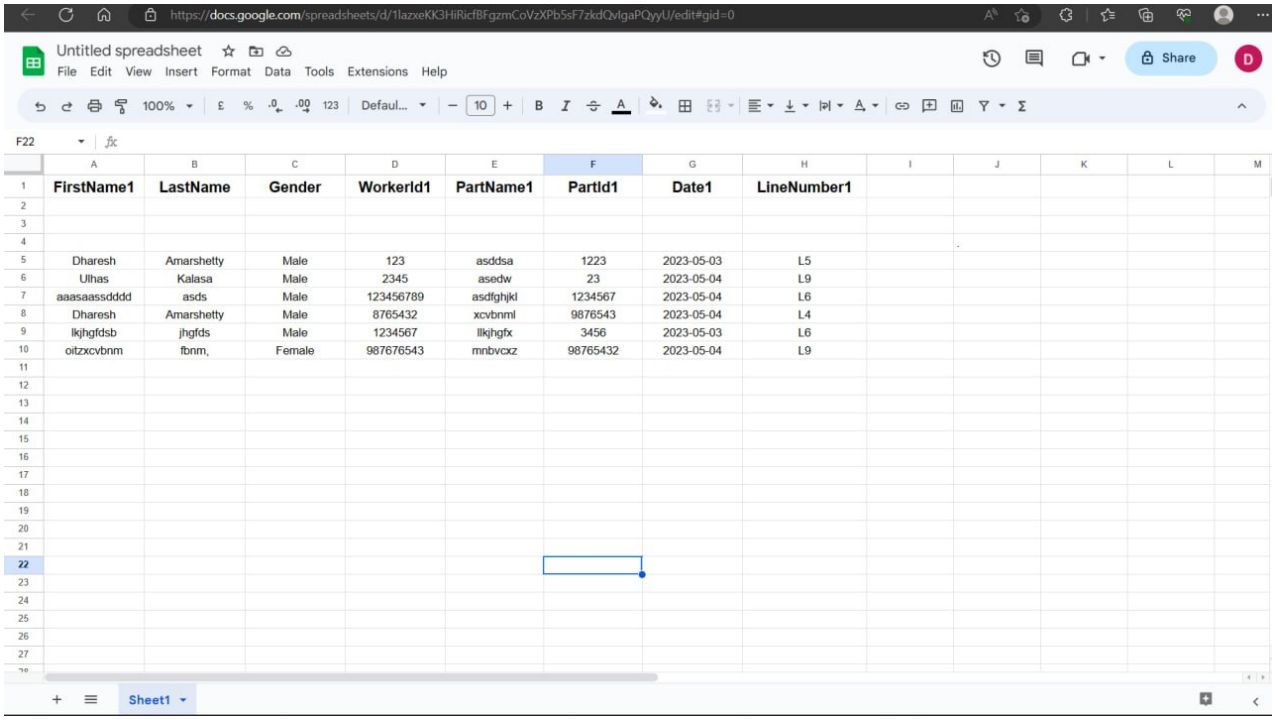


Figure 5.3: Part information

Once the employee logins then part information must be entered, The GUI1 asks for the worker id, name of the employee who produced the part, part id, date, line name in which it was produced, and the machine name in which the product was produced. Next, all this data is stored in MS Excel sheet and MongoDB. Taking product information from the employee in this project is essential for several reasons: Ensuring accuracy: By having the employee enter information about the product, such as the date, time, and row of production, there is a higher chance of accuracy than relying on a separate system to automatically input the data.

- Accountability: By having the employee enter their name as part of the product information, they are held accountable for the quality of the product they produced.
- Identifying trends: By tracking the product information entered by employees, trends can be identified, such as a particular employee consistently producing faulty products or a certain time of day when quality issues tend to arise.
- Quick response: In the event that a faulty product is identified, having the product information readily available can allow for a quick response, such as alerting the team leader of the specific row and initiating a product recall if necessary.



FirstName1	LastName	Gender	WorkerId1	PartName1	PartId1	Date1	LineNumber1
Dharesh	Amarshetty	Male	123	asddsa	1223	2023-05-03	L5
Ulhas	Kalasa	Male	2345	asedw	23	2023-05-04	L9
aaasaassdddd	asds	Male	123456789	asdfghjkl	1234567	2023-05-04	L6
Dharesh	Amarshetty	Male	8765432	xcvbnml	9876543	2023-05-04	L4
lkjhgfdsb	jhgfds	Male	1234567	llkjhgfx	3456	2023-05-03	L6
oitzxcvbnm	fbnm,	Female	98767654 3	mnbvcxz	98765432	2023-05-04	L9

Figure 5.4: GUI 1 Excelsheet

The data entered is saved in an Excel sheet.

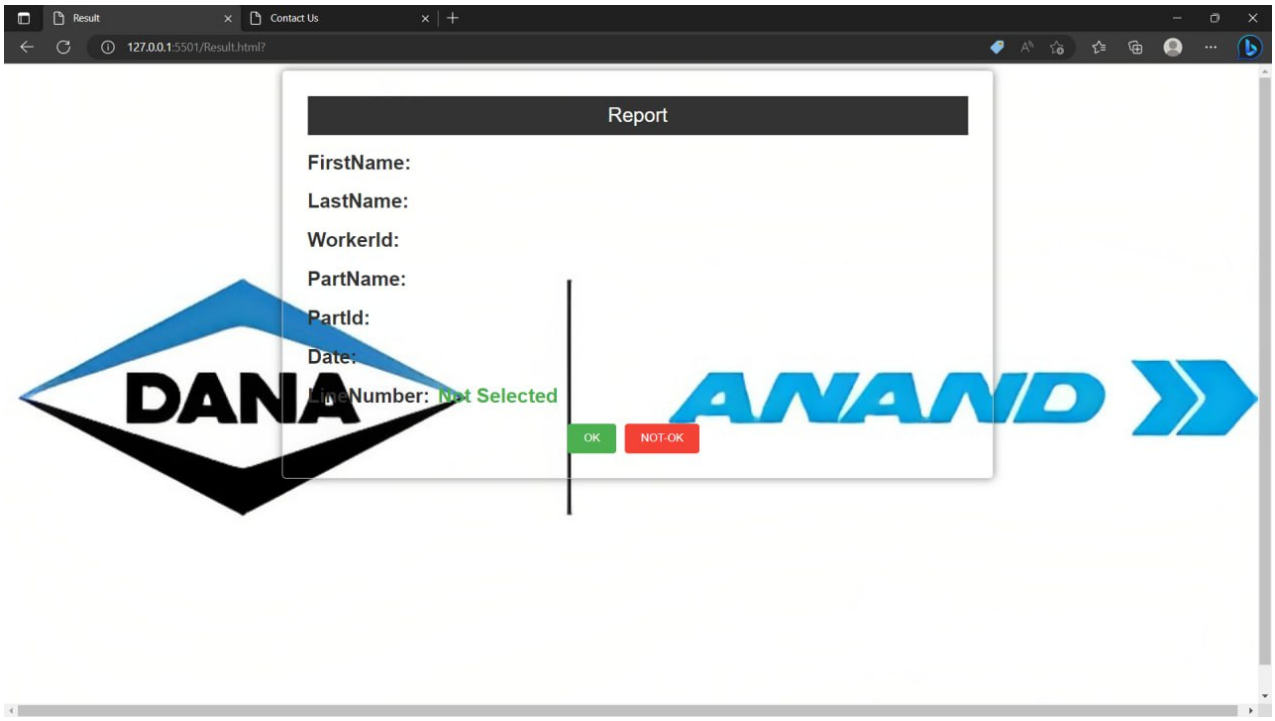


Figure 5.5: GUI 2 display

The second GUI of the system is located inside the standard room and is used to inspect the first piece of the production run. The GUI displays the information entered by the employee through the first GUI, such as the name of the employee, date, time, and row in which the product was produced. The GUI also includes standard measurements for the product, and the employee enters whether the product meets the requirements or not. The system then stores this data and sends an alert to the team leader of the specific row if the product is found to be faulty. The GUI is designed to be user-friendly and easy to use, with clear and organized information presented in an intuitive way. The GUI is also designed to be responsive, allowing for quick input and processing of data. Overall, the second GUI is an essential component of the system as it enables real-time monitoring of product quality and allows for quick decision-making and feedback to ensure high production standards.

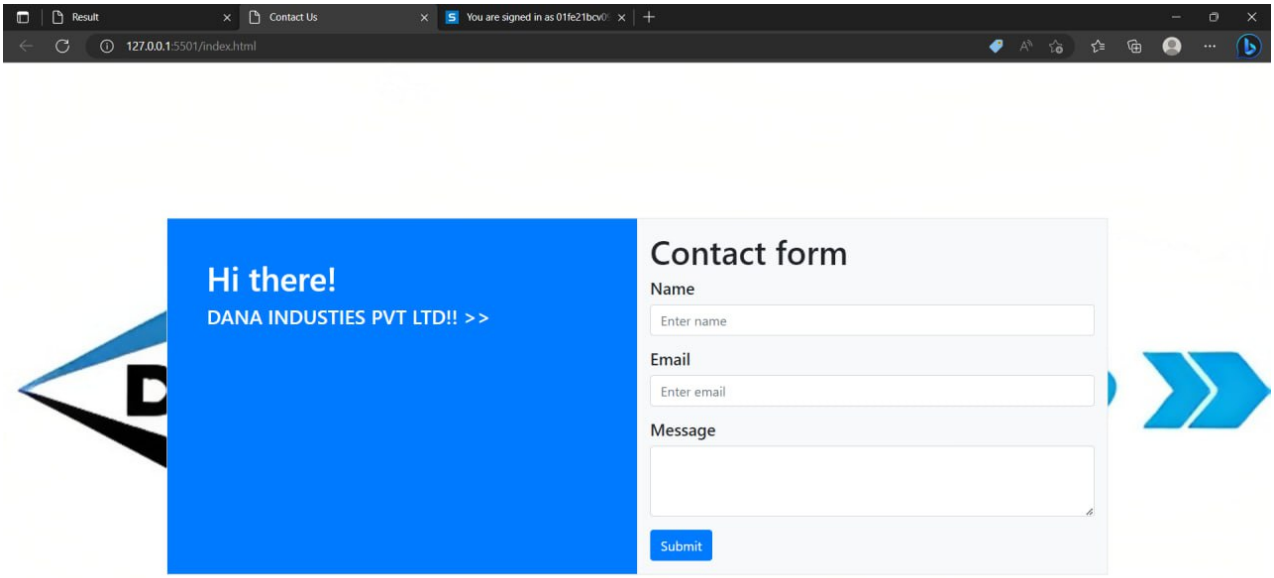


Figure 5.6: GUI 2 mail interface

The entered details from GUI1 are then displayed in GUI2 inside the standard room. Parts are then inspected in the standard room if the product meets the standard Measurements of the company then if there is no fault then the production should continue, if not then an alert will be sent to the team leader via mail stating the fault, After all the process the data is again saved in the system using MongoDB and Excel sheet.

- The second GUI is located inside the standard room.

- The GUI displays information entered by the employee through the first GUI, such as the employee's
- name, date, time, and row where the product was produced.
- The GUI includes standard measurements for the product, and the employee enters whether the product meets the requirements or not.
- The system stores this data and sends an alert to the team leader of the specific row if the product is found to be faulty.
- The GUI is designed to be user-friendly and easy to use, with clear and organized information presented in an intuitive way.
- The GUI is designed to be responsive, allowing for quick input and processing of data.
- The second GUI enables real-time monitoring of product quality.
- it allows for quick decision-making and feedback to ensure high production standards.

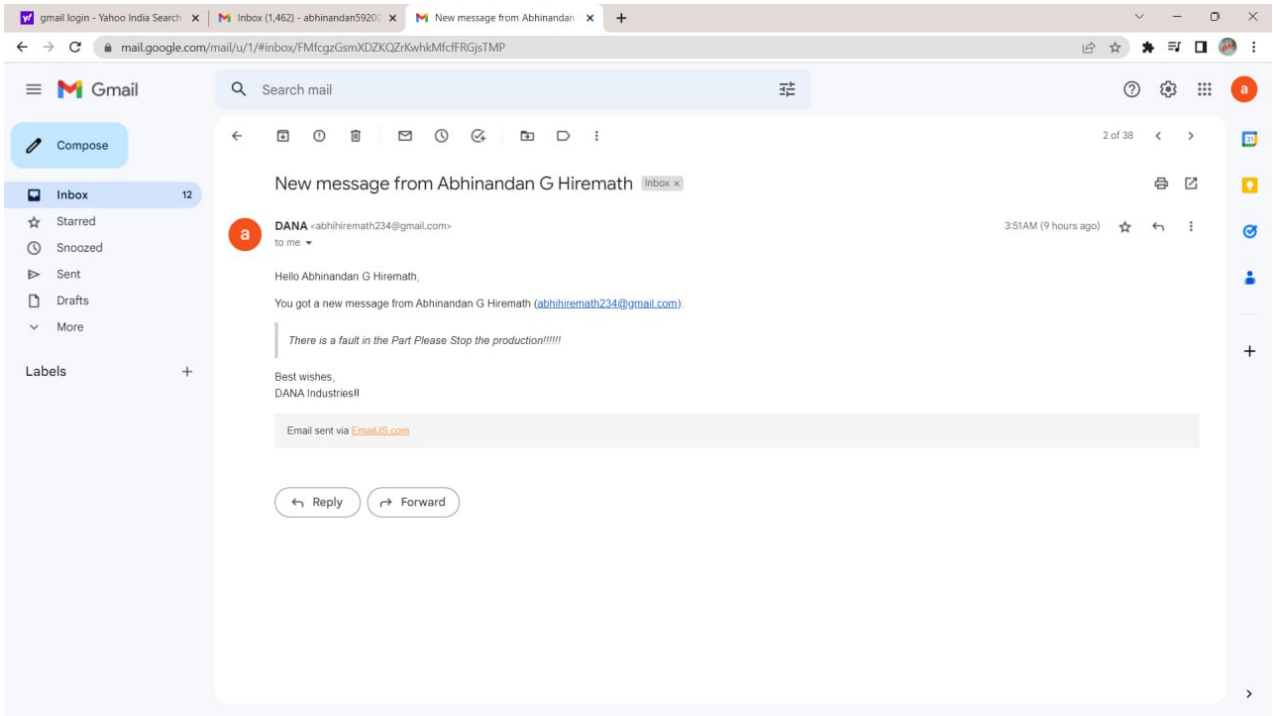


Figure 5.7: GUI 2 received mail

Figure 5.7 The alert mail system in this project is designed to notify the team leader and relevant personnel in real time; if a faulty product is detected during the initial inspection. Once the employee has entered the information regarding the product into the GUI located inside the standard room, the system immediately analyzes the data and determines whether the product meets the required standards or not. If the product is found to be faulty, an alert mail is immediately sent to the team leader of the specific row where the faulty product was produced. The alert mail contains information about the faulty product, including the name of the employee who produced it, the date and time of production, and the specific reason why the product was found to be faulty. The alert mail system is critical to ensuring that production standards are maintained at all times. By providing real-time feedback, the system allows for quick decision-making and corrective actions to be taken, preventing the production of additional faulty products and reducing waste. Additionally, the system ensures accountability by providing a clear record of all faulty products and the employees responsible for their production. This information can be used for further analysis and improvement of the manufacturing process. The alert mail system is designed to be fast, reliable, and easy to use. It is integrated with the overall system and can be configured to send alerts to multiple team leaders or relevant personnel as needed. The system can also be customized to include additional information or to generate different types of alerts based on specific criteria. Overall, the alert mail system is an essential component of this project, providing a powerful tool for maintaining high production standards and ensuring quality control.

Chapter 6

CONCLUSION AND FUTURE SCOPE

In conclusion, the "System to give feedback to the machine regarding the first piece inspection in standard room" project aims to provide a system that gives real-time feedback to the inspection room regarding the first piece inspection of a product. The system is composed of two GUIs, one outside the standard room and the other inside the standard room. The first GUI collects information about the product, such as the employee's name, date, time, and the row where the product was produced. The data collected by the first GUI is then sent to the second GUI inside the standard room for inspection. After inspection, the employee can enter if the product is suitable for production or not. If the product is not suitable, an alert is sent to the team leader of the specific row where the product was produced.The system has ten functional requirements, including the ability to collect data about the product, provide real-time feedback, and store data for future use. The system also needs to be user-friendly, simple to use, and quick to provide information to save time. The system makes use of different technologies, including RFID and a database, to achieve its objectives. Overall, the system to give feedback to the machine regarding the first piece inspection in standard room is a valuable addition to any production process. It helps to minimize defects and waste, saving time and resources. The system is a great example of how technology can be used to enhance and improve manufacturing processes, and it has the potential to revolutionize the way production lines operate in the future. The system could be improved to incorporate more sophisticated measurement techniques, like machine learning or machine vision algorithms, in the future. For a more efficient production line, the system might potentially be connected with other manufacturing procedures. The system might also be enhanced to include analytics and reporting features, enabling managers to learn more about the performance of their operations and pinpoint areas that need improvement.

- Integration with vision-based tools: The system can be further developed to include vision-based tools such as a camera, there will be no requirement for the employee to enter the data of the product it will automatically scanned by the camera and the information would be sent to the standard room

- Integration with machine learning algorithms: The system can be further developed to include machine learning algorithms to enable real-time monitoring of production line data. The machine learning algorithms can analyze the data collected from various

stages of the production process and provide insights that can be used to optimize production efficiency and quality.

- Integration with Internet of Things (IoT) devices: The system can be integrated with IoT devices such as sensors to collect real-time data from various stages of the production process. This data can be used to identify issues or problems in the production line, enabling timely intervention to prevent costly delays or defects.

- Integration with robotic process automation (RPA) tools: The system can be integrated with RPA tools to automate manual tasks, such as data entry and analysis. This can reduce human error and increase the speed and accuracy of data processing. This would take the input from the machine after inspection and it would check whether it is meeting the standard measurements of the company or not and alert would be sent directly without the interaction of the employee

- Implementation of predictive maintenance: The system can be enhanced with predictive maintenance capabilities to prevent equipment failures and minimize downtime. Predictive maintenance involves analyzing data from various sensors to detect potential equipment failures before they occur, enabling timely maintenance and repairs.

- Mobile application: The system can be extended with a mobile application that enables employees to access and input data from their mobile devices. This can increase the flexibility and mobility of employees, allowing them to perform their tasks from anywhere within the production facility.

C15

ORIGINALITY REPORT

7%	6%	3%	5%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	Submitted to B.V. B College of Engineering and Technology, Hubli Student Paper	4%
2	www.ijert.org Internet Source	<1%
3	vufind.katalog.k.utb.cz Internet Source	<1%
4	Submitted to United Colleges Group - UCG Student Paper	<1%
5	Submitted to University of Exeter Student Paper	<1%
6	repository.sustech.edu Internet Source	<1%
7	www.oreilly.com Internet Source	<1%
8	cloud2data.com Internet Source	<1%
9	docplayer.net Internet Source	<1%

10	islameconomics.blogspot.com Internet Source	<1 %
11	medium.com Internet Source	<1 %
12	www.cplgaming.com.au Internet Source	<1 %
13	www.evc.edu Internet Source	<1 %
14	ftp.mi.fu-berlin.de Internet Source	<1 %
15	openxmldeveloper.org Internet Source	<1 %
16	testsigma.com Internet Source	<1 %
17	www.grin.com Internet Source	<1 %

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		

References

1. A. Silistre, O. Kilincceker, F. Belli, M. Challenger and G. Kardas, "Models in Graphical User Interface Testing: Study Design," 2020 Turkish National Software Engineering Symposium (UYMS), Istanbul, Turkey, 2020, pp. 1-6, doi: 10.1109/UYMS50627.2020.9247072.

2. Y. Zhang, "Graphical user interface for real-time monitoring and operation of computer big data analysis platform," 2022 International Conference on Artificial Intelligence in Everything (AIE), Lefkosa, Cyprus, 2022, pp. 550-555, doi: 10.1109/AIE57029.2022.00110.

3. A. Ahmed, "Test automation for Graphical User Interfaces: A review," 2014 World Congress on Computer Applications and Information Systems (WCCAIS), Hammamet, Tunisia, 2014, pp. 1-6, doi: 10.1109/WCCAIS.2014.6916544.

4. C. Kamolsin, F. Pensiri, K. H. Ryu and P. Visutsak, "The Evaluation of GUI Design using Questionnaire and Multivariate Testing," 2022 Research, Invention, and Innovation Congress: Innovative Electricals and Electronics (RI2C), Bangkok, Thailand, 2022, pp. 191-195, doi: 10.1109/RI2C56397.2022.9910292.

5. A. M. Memon and Q. Xie, "Studying the fault-detection effectiveness of GUI test cases for rapidly evolving software," in IEEE Transactions on Software Engineering, vol. 31, no. 10, pp. 884-896, Oct. 2005, doi: 10.1109/TSE.2005.117.

6. A. Oulasvirta, N. R. Dayama, M. Shiripour, M. John and A. Karrenbauer, "Combinatorial Optimization of Graphical User Interface Designs," in Proceedings of the IEEE, vol. 108, no. 3, pp. 434-464, March 2020, doi: 10.1109/JPROC.2020.2969687.

7. F. Cacciotto, T. Fulcini, R. Coppola and L. Ardito, "A Metric Framework for the Gamification of Web and Mobile GUI Testing," 2021 IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW), Porto de Galinhas, Brazil, 2021, pp. 126-129, doi: 10.1109/ICSTW52544.2021.00032.

8. J. Ruiz, E. Serral Asensio and M. Snoeck, "Learning UI Functional Design Principles Through Simulation With Feedback," in IEEE Transactions on Learning Technologies, vol. 13, no. 4, pp. 833-846, 1 Oct.-Dec. 2020, doi: 10.1109/TLT.2020.3028596.

9. K. -U. Kyung, J. -Y. Lee and M. A. Srinivasan, "Precise manipulation of GUI on a touch screen with haptic cues," World Haptics 2009 - Third Joint EuroHaptics conference and Symposium on Haptic Interfaces for Virtual Environment and Teleoperator Systems, Salt Lake City, UT, USA, 2009, pp. 202-207, doi: 10.1109/WHC.2009.4810865.

10. H. Igarashi, A. Takeya, Y. Kubo, S. Suzuki, F. Harashima and M. Kakikura, "Human adaptive GUI design for teleoperation system," 31st Annual Conference of IEEE Industrial Electronics Society, 2005. IECON 2005., Raleigh, NC, USA, 2005, pp. 6 pp.-, doi: 10.1109/IECON.2005.1569207.

11. Journet N, Visani M, Mansencal B, Van-Cuong K, Billy A. Doccreator: A new software for creating synthetic ground-truthed document images. Journal of imaging. 2017 Dec 11;3(4):62.

12. Kieu VC, Journet N, Visani M, Mullot R, Domenger JP. Semi-synthetic document image generation using texture mapping on scanned 3d document shapes. In2013 12th International Conference on Document Analysis and Recognition 2013 Aug 25 (pp. 489-493). IEEE.

13. Garai A, Biswas S, Mandal S, Chaudhuri BB. A method to generate synthetically warped document image. InComputer Vision and Image Processing: 4th International Conference, CVIP 2019, Jaipur, India, September 27–29, 2019, Revised Selected Papers, Part I 4 2020 (pp. 270-280). Springer Singapore.

14. Das S, Ma K, Shu Z, Samaras D, Shilkrot R. Dewarpnet: Single-image document unwarping with stacked 3d and 2d regression networks. InProceedings of the IEEE/CVF International Conference on Computer Vision 2019 (pp. 131-140).

15. Fornés, A.; Dutta, A.; Gordo, A.; Lladós, J. CVC-MUSCIMA: A ground truth of handwritten music score images for writer identification and staff removal. Int. J. Doc. Anal. Recognit. 2012, 15, 243–251

16. Garz, A.; Seuret, M.; Simistira, F.; Fischer, A.; Ingold, R. Creating ground truth for historical manuscripts with document graphs and scribbling interaction. In Proceedings of the 2016 12th IAPR Workshop on Document Analysis Systems (DAS), Santorini, Greece, 11–14 April 2016; pp. 126–131.

17. Mas, J.; Fornés, A.; Lladós, J. An Interactive Transcription System of Census Records using Word-Spotting based Information Transfer. In Proceedings of the 12th IAPR International Workshop on Document Analysis Systems (DAS 2016), Santorini, Greece, 11–14 April 2016.

18. Yin, F.; Wang, Q.F.; Liu, C.L. Transcript Mapping for Handwritten Chinese Documents by Integrating Character Recognition Model and Geometric Context. Pattern Recognit. 2013, 46, 2807–2818

Appendix A

HTML (Hypertext Markup Language) is the standard markup language for creating web pages and web applications. It provides the structure and content of a webpage. CSS (Cascading Style Sheets) is a style sheet language used for describing the presentation of a document written in HTML. It provides the styling and formatting for a webpage. Java is a general-purpose programming language that is used for developing desktop and web applications, mobile applications, and games. It is a popular language known for its scalability, performance, and security. SMTP.js is a JavaScript library that enables sending email directly from a web browser without the need for a server-side code. It uses the Simple Mail Transfer Protocol (SMTP) for sending emails and is commonly used in web applications for sending confirmation emails, notifications, and newsletters.