**PRODUCT DESCRIPTION REPORT**

**Project: AI Customer Analyzer**

**Group: 19**

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| Date: 10, February 2023 |  | | | |
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| **PRINCE2** | | | |  |
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| Document Ref: Product Description Report Group 19 | | | | |

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# 1 Project Description History

## 1.1 Document Location

This document is only valid on the day it was printed.

The source of the document will be found on the project's PC in location

## 1.2 Revision History

**Date of this revision:**

**Date of Next revision:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Revision date** | **Previous revision date** | **Summary of Changes** | **Changes marked** |
| 06-02-2023 |  | First issue |  |

## 1.3 Approvals

This document requires the following approvals.

Signed approval forms are filed in the Management section of the project files.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name** | **Signature** | **Title** | **Date of Issue** | **Version** |
| Dr.Yasas Jayaweera |  | Project Executive |  |  |
| Gunarakulan Gunaretnam | A picture containing text, hydrozoan, night sky  Description automatically generated | Project Manager | 10-02-2023 |  |
| Kishoth Navaretnarajah | Shape  Description automatically generated | Client | 10-02-2023 |  |

## 1.4 Distribution

This document has been distributed to:

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Title** | **Date of Issue** | **Version** |
| Gunarakulan Gunaretnam (2208408) | Project Manager | 10-02-2023 | 1.0 |
| Sangeetha Thangavadivel (2135801) | Startup Manager | 10-02-2023 | 1.0 |
| Haritha Thavarajah (2211320) | Risk Manager | 10-02-2023 | 1.0 |
| Mathumitha Arasakulasoorian (2211336) | Schedule Manager | 10-02-2023 | 1.0 |
| Delaxsan Raj Sathiyanesan (2211294) | Quality Manager | 10-02-2023 | 1.0 |

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## 3 Purpose

This project aims to develop an AI-powered computer vision-based customer analysis system that can accurately count the number of visitors entering DreamSpace's premises and predict their age range, gender, mood, and race. The system will also remind visitors to wear a face mask if necessary. The system will be developed using Python, computer vision, and machine learning libraries such as OpenCV and TensorFlow. This project aims to provide a user-friendly and efficient solution for counting visitors and predicting their characteristics, enabling DreamSpace to gather valuable customer analysis data. Additionally, the system will monitor sales employees' vocals to improve their communication skills in the future. The project will be delivered within ten weeks from the start date, with regular updates and progress reports provided to the client.

## 4 Composition

The system comprises several components, including hardware and software components, assembled to create the final product.

### 4.1 Hardware Components

* A camera: To capture real-time video of the visitors.
* A microphone: To capture real-time audio of the visitors and sales employees.
* A speaker: To communicate with the visitors in Tamil, Sinhala, and English
* A computer or Raspberry Pi: To run the AI algorithms and the backend panel.

### 4.2 Software Components

* Programming Language: Python will be used as a major programming language for the project.
* MogoBD: Database for the system.
* NodeJS / ReactJS: Programming languages for backend panel development.
* Computer Vision Algorithms: To detect visitors and analyze real-time video.
* Deep Learning Algorithms: To predict the age range, gender, and mood of visitors.
* Natural Language Processing Algorithms: To monitor and analyze real-time audio of sales employees.
* **Dependencies and Libraries:**
  + TensorFlow
  + OpenCV
  + Keras
* **Others**
  + Emotion Recognition Algorithm: To detect visitors’ emotions, such as happy, sad, or angry, and adjust the communication strategy accordingly.
  + Race Detection Algorithm: To detect the race of visitors and analyze the data to ensure that the company's customer base is diverse and inclusive.
  + Communication Protocol: To transmit data between the AI system and the backend panel securely and efficiently.
  + Data Analysis Tool: To process and analyze the gathered data and generate insights and reports for DreamSpace's management team.
  + Mobile App: To provide real-time alerts and notifications to DreamSpace's management team about visitor traffic, customer demographics, and other important information.

## 5 Derivation

* Customer Needs and Feedback: DreamSpace has collected customer feedback regarding their needs and expectations for a security bot to analyze customer behavior and provide a mask reminder feature. This feedback may have helped to shape the product's requirements and features, such as the need for accurate visitor counting, age range, gender, and mood prediction, and the mask reminder feature.
* Industry Standards and Regulations: The project team has consulted relevant industry standards and regulations to ensure the product's design and development comply with applicable requirements. For example, they may have consulted health and safety regulations to ensure the mask reminder feature meets relevant requirements.
* Expertise in Computer Vision and Machine Learning: The project team has relied on their expertise in computer vision and machine learning to determine the most appropriate algorithms and libraries to use for visitor counting, age range, gender, and mood prediction.
* Organizational Strategies: The project team may have aligned the project's objectives and requirements with DreamSpace's broader business strategies and objectives. This may have included the company's mission, values, and long-term goals.

## 6 Format and Presentation

* Font type and size - The document should use a professional font, such as Arial or Times New Roman, with a font size of at least 12 points to ensure the text is legible.
* Layout - The document should have a clear and consistent layout that is easy to navigate, with headings, subheadings, and bullet points used where necessary to improve clarity.
* Images and diagrams - Any images or diagrams used in the document should be high-quality, clearly labeled, and relevant to the content.
* Tables and charts - Any tables or charts used in the document should be clearly labeled, with appropriate headings, and easily read.
* Consistency - The document should be consistent throughout, with a clear and logical flow that is easy to follow.
* Professionalism - The document should be presented professionally, with correct spelling, grammar, and punctuation used throughout.
* Use of terminology – Technical language in the document should be explained clearly and concisely to ensure all stakeholders easily understand it.
* Compliance - The document should comply with relevant standards, guidelines, and regulations, including data privacy and security.
* Accessibility - The document should be accessible to all stakeholders, with any necessary accommodations for individuals with disabilities or language barriers.

## 7 Allocation

* Project Manager - Responsible for the overall management of the project, including ensuring that the product is delivered on time, within budget, and to the required quality standard.
* Business Analyst - Responsible for gathering requirements and ensuring that the system is designed to meet the businesses and its customers’ needs.
* Software Developer - Responsible for designing and developing the computer vision-based customer analysis system, including implementing the necessary algorithms and programming languages.
* Machine Learning Engineer - Responsible for developing the machine learning models that are used to predict the age range, gender, and mood of visitors and monitor the sales employees' vocals.
* User Interface Designer - Responsible for designing the system’s user interface, ensuring it's intuitive and easy for visitors and DreamSpace's staff.
* Quality Assurance Engineer - Responsible for ensuring the system meets the required quality standards, including testing the system for bugs, errors, or performance issues.
* Language Expert - Translating the user interface messages to Tamil and Sinhala when welcoming visitors.
* IT Infrastructure and Network Engineer - Responsible for setting up and maintaining the necessary IT infrastructure and network that the system requires, including the servers, hardware, and software.

## 8 Quality Criteria

* Accuracy: The system should accurately count the number of visitors and provide reliable predictions for age range, gender, and mood.
* Usability: The system should have a user-friendly interface that allows easy visitor interaction and a clear backend panel for analysing the gathered data.
* Reliability: The system should operate continuously without frequent crashes or errors.
* Maintainability: The system should be easy to maintain, with clear documentation for its codebase and configuration.
* Performance: The system should handle large volumes of visitors and data without significant lag or delays.
* Security: The system should be designed with appropriate security measures to protect the privacy of visitors and their data.
* Scalability: The system should be designed to be easily scalable to accommodate additional cameras and locations.
* Compliance: The system should comply with all relevant legal and regulatory requirements, such as GDPR and data protection laws.
* Robustness: The system should be designed with appropriate redundancy measures to ensure it can continue operating in case of hardware or software failures.
* Adaptability: The system should be designed to adapt to future business needs and requirements changes.

## 9 Quality Method

* Testing: Regular testing should be conducted to ensure that the system is operating accurately and reliably and to identify and address any bugs or errors.
* User Acceptance Testing (UAT): UAT should be conducted to ensure that the system meets the needs and expectations of its users, including visitors and staff.
* Code reviews: Regular code reviews should ensure the system's codebase is maintainable, well-documented, and adheres to best practices and coding standards.
* Performance testing: Performance testing should ensure the system can handle large volumes of visitors and data without significant lag or delays.
* Security audits: Regular security audits should be conducted to ensure that the system's security measures are appropriate and effective in protecting the privacy of visitors and their data.
* Compliance checks: Regular compliance checks should ensure that the system complies with all relevant legal and regulatory requirements, such as GDPR and data protection laws.
* Continuous Integration/Continuous Deployment (CI/CD): CI/CD should be implemented to ensure that the system's codebase is continuously integrated and deployed, with appropriate checks and balances to ensure that any issues or errors are caught and addressed before they affect the system's operation.
* Documentation: Clear and comprehensive documentation should be created and maintained throughout the project, including for the system's codebase, configuration, and operation, to ensure that the system is maintainable and adaptable to future changes.

## 10 Quality Check Skills Required

* Attention to detail - The ability to pay attention to minor details and identify any system errors, inconsistencies, or anomalies.
* Analytical skills - The ability to analyze data, identify patterns, and draw conclusions about the system's performance and quality.
* Testing skills - The ability to create and execute test cases and scenarios, including functional, non-functional, and regression testing, to ensure that the system performs as expected.
* Communication skills - The ability to communicate effectively with the development team, business analysts, and stakeholders, including reporting any quality issues or concerns promptly and professionally.
* Problem-solving skills - The ability to identify problems and develop creative and practical solutions to ensure the system meets the desired quality standard.
* Technical skills - The ability to understand and work with the various technologies, tools, and programming languages required to develop the system.
* Domain knowledge - Knowledge of computer vision, machine learning, and AI-based systems, including the ability to understand how these technologies are applied in a real-world context.
* Documentation skills - The ability to create and maintain quality documentation, including test plans, test cases, defect reports, and quality metrics, to ensure that the project remains on track and meets the desired quality standards.