Roles of each team member:

- **Front-end** : (i) Varun Samaga B L (21bcs129)
  (ii) Sakshi Kusale (21bcs098)

- **Machine Learning** : (i) Shashank Rajora (21bcs106)
  (ii) Mourya Kakarapu (21bcs049)

- **Back-end** : (i) Sanket Mishra (21bcs100)
  (ii) Vishwateja Peddakapu (21bcs135)

- **Introduction:**
  The purpose of this report is to provide an overview of the software engineering project carried out by the team. The objective of this project was to create an entry exit management system for our college campus, which was later extended to include an outpass system

- **Requirement Analysis and Feasibility Report:**
  The project started with requirement analysis to identify the client's needs and expectations. After gathering the requirements, a feasibility report was created to analyze whether the project could be executed within the given constraints of time, cost, and resources.

- **Use Case Diagram:**
  A use case diagram was created to describe the interactions between the system and its users. It helped to identify the various actors involved in the system and the functionalities that the system should offer.

- **Waterfall Model:**
  Initially, the team attempted to follow the Waterfall model, which is a linear approach to software development. However, it was soon realized that this model had some pitfalls like a working model cannot be produced until late in the process and so it was high risk.

- **Agile Methodology:**
  To overcome the shortcomings of the Waterfall model, the team switched to Agile methodology. The Agile methodology allowed for a flexible and iterative approach to development. The team conducted three parallel sprints for the three teams.

- **Learning Requisite Skills:**
  Each member of the team was assigned a specific task based on their expertise. They then started to learn the requisite skills like Django by the backend team, React, HTML, CSS by the frontend team, and CNN by the machine learning team.

- **Meetings:**

Unlike the Waterfall model, the Agile methodology emphasizes regular communication and collaboration. However, the team did not have a strict schedule for meetings to discuss progress. Since all of the team members were in the campus and connected, everyone was up to date with the progress of each team, and meetings were held whenever there was a need for it.

- **Machine Learning Team Progression:**
  The machine learning team started by learning the required skills and researching the different state-of-the-art models for facial recognition. They decided to use FaceNet, a model developed by Google, which generates 512-dimensional embeddings for the face. However, they faced challenges with the embedding generator and needed a face detector to preprocess the images. After researching multiple face detectors, they finalized MTCNN. For classification, they initially used a two-layer neural network, which broke when the number of samples was large. They then tried basic nearest neighbors, which brought their own limitations. They finally settled on using SVM, which showed good results for the 9-10 people they tested upon.

- **Backend Team Progression:**
  The backend team made three significant changes to the database schema and added new features like the ban system and staff user type for the outpass system. They also converted the backend code to API form to integrate it with the frontend built in React. During the final phase of the project, the team focused on enhancing the security of the system by protecting APIs and securing the authentication system. The team also took inputs from various stakeholders, including the security head, the warden, the student welfare coordinator, and the faculty advisor, to satisfy their requirements.

- **Frontend Team Progression:**
  The frontend team started by creating design layouts and then made prototype designs. After several iterations and modifications, they agreed on a final design template and migrated the code into React.

- **Conclusion:**
  The project was completed ahead of schedule and delivered a functioning entry exit management system and so was extended to include an outpass system. The team faced various challenges, but the agile methodology and the collaborative effort of the team members helped them overcome these challenges. The team also took inputs from stakeholders and made necessary changes to the system to meet their requirements. The project demonstrated the importance of a collaborative effort and a flexible approach in the software development process.