**Solution Diagram**

**Solution Description**

The Facial Recognition Attendance System is a software solution that aims to replace the manual spreadsheet system that many schools now use to track attendance. The system makes use of facial recognition technology to identify and label pupils in the classroom.

The system includes a camera that captures the student's face, image processing software that performs facial recognition, a database with labelled images of students and their corresponding student IDs, and a user-friendly interface that allows end-users to interact with the system and receive results.

The camera takes and sends an image of the student's face to the programme. The software then compares the image to the annotated photographs in the database to perform facial recognition. If there is a match, the software pulls the student's ID and name from the database and updates the attendance record, indicating the student as present. The end-user is then shown the outcome via the user-friendly interface. If no match is detected, an error message stating "Student profile not found in database" is presented.

The solution outperforms the present manual spreadsheet system in various ways. For starters, it eliminates the chance of teacher error and adds an extra layer of protection because students must be physically there to sign in. Second, it is more efficient since students can be authenticated and identified quickly and easily. Finally, the method removes the requirement for students to remember and carry ID cards.

**Data Description**

In order to function properly, the Facial Recognition Attendance System requires numerous sorts of data. These are some examples:

* **Student images**: These are photographs of students' faces used for facial recognition. Label the photographs with the correct student ID and name.
* **Student ID number and name:** This information is saved in the database and linked to the matching student photograph. It is used to indicate that the student is present in the attendance record and to display the result to the end user.
* **Record of attendance:** This data is saved in the database and comprises information about each student's attendance status. The software updates the attendance record anytime a student is identified as present.
* **User input:** This data, which comprises of an image of a student's face, is provided by the end-user via the user-friendly interface. The software uses this image to do facial recognition and to assess the student's attendance status.
* **Output:** This data is generated by the software and consists of the facial recognition process's results. The outcome could be a successful match with a student profile in the database or an error message indicating that the student profile could not be found in the database. The user-friendly interface displays this output data to the end-user.

**Solution Motivation**

Many schools now utilise a manual spreadsheet approach to track attendance, which has various problems, including the likelihood of teacher error, the requirement for pupils to remember and carry ID cards, and a lack of security. To address these challenges, we intend to develop a facial recognition software solution that would serve as a school attendance system. We hope to provide an extra degree of protection by employing facial recognition because students will have to be physically there to mark themselves in, eliminating the risk of teacher error. Our approach will be more efficient than the present system because students can be authenticated and identified fast and easily. To train and test our system, we intend to build our own database of tagged photos for supervised learning. Furthermore, we intend to develop a user-friendly interface that will enable end-users to easily test the system by submitting photographs and obtaining results based on the model's label match to the student's ID and name.