Software Requirements Specification (SRS) Document

Software Part-for Clinical Biosensor

Team 9

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Brief problem statement

The problem at hand involves the development of an algorithm for quantifying color intensity in a clinical biosensor product designed to test blood samples. To address this, we need to create an algorithm capable of accurately assessing the color intensity from provided sample color gradient spots. Additionally, a Human-Machine Interface (HMI) design is required, incorporating various screens and tabs as outlined in the provided scheme, ensuring a user-friendly experience for effective interaction with the biosensor system.

System requirements

Collaboration Tools: Git, GitHub, Google Meet.

Programming Language: Python, Javascript,

Development Environment: Jupyter Notebook, VS Code

Libraries Used: OpenCV, NumPy, PyMongo, React, Node

Hardware requirement : Display, Power supply, Temperature Sensor , Rasberry pie

Users profile

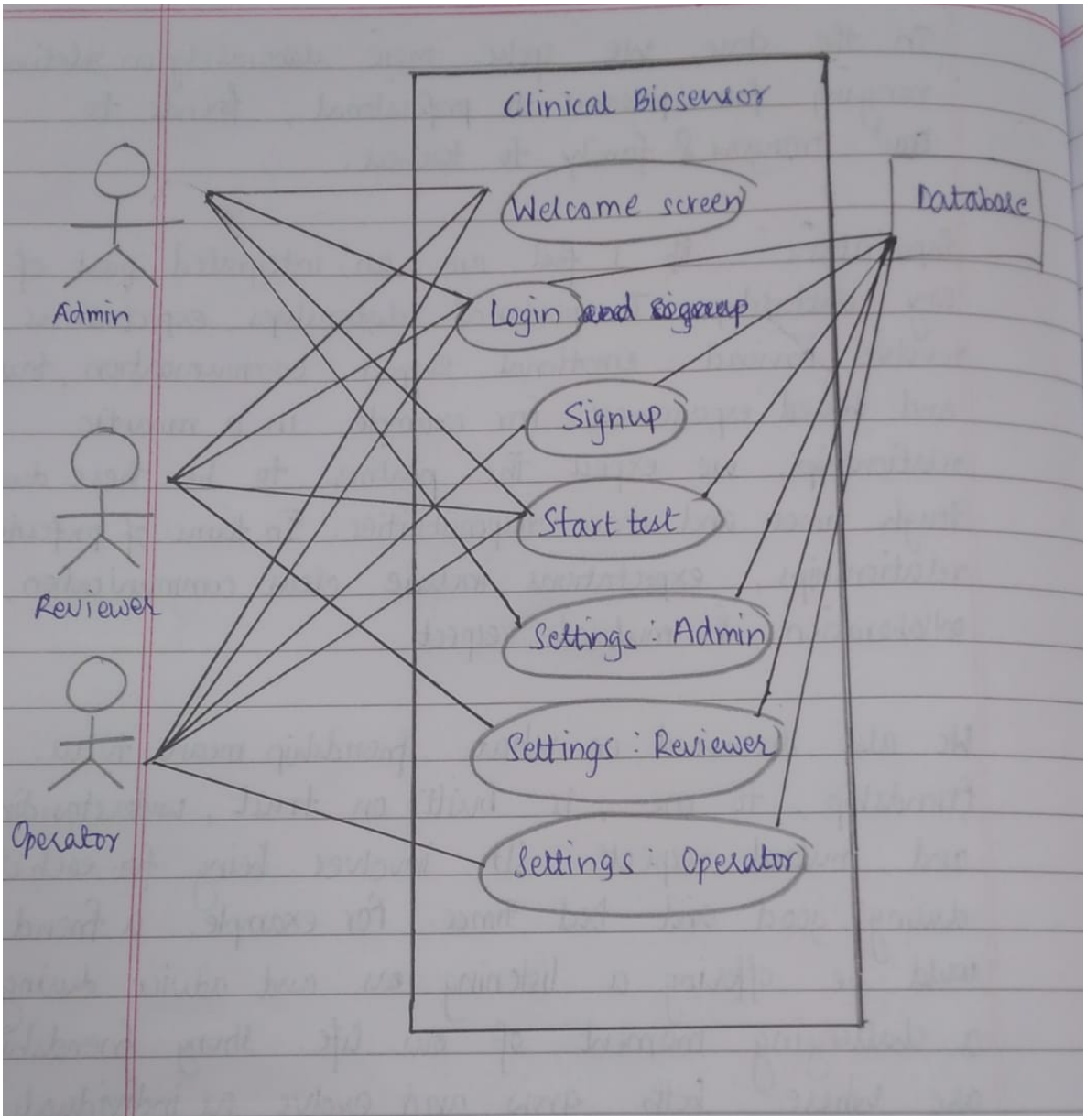
The system is designed to cater to a diverse set of end-users, including doctors, patients, and clinical staff. For doctors, the focus should be on providing a seamless and efficient platform for result interpretation and decision-making. User interfaces should be designed with clarity and accessibility to accommodate medical professionals with varying technical backgrounds. Patients, as end-users, require a user-friendly interface that offers clear communication of results, possibly with simplified language and visual aids. Clinical staff, including laboratory technicians and healthcare administrators, should have a system that streamlines the testing process, integrates smoothly with existing workflows, and provides detailed data for analysis and record-keeping.

According to the system definitions, the doctors are the admins, laboratory staff and healthcare adminstrators are the reviewers and the clinical staff or nurses are the operators.

Feature requirements (described using use cases)

No.	Use Case Name	Description	Release
1.	Welcome Screen	Welcome screen with header containing Battery Percentage, Date, Time. Additionally, the welcome screen should contain a login and a signup button.	R1
2.	Signup	If user using the system for first time, the user registers using this button with a unique username which the user decides and a password which the user assigns for themselves.	R1
3.	Login	The user logins in the system using username and password.	R1
4.	Settings: Admin	The admin will have access to the following settings and permissions: Delete User, Delete Sample, Edit Sample, Create new user (with role), Change Date, Change Time, Display all samples, Display all users	R1
		Display all results, Print Result, Transfer Results, Temperature Sensor Result Transfer	R2
5.	Settings: Reviewer	The reviewer will have access to the following settings and permissions: Edit Sample, Display all samples, Display all users	R1
		Display all results, Print Result, Transfer Data.	R2
6.	Settings: Operator	The operator will have access to the following settings and permissions: Display and Print Result.	R2
7.	Start Test	The sample id,sample type is entered and the testing is started using the image intensity detection algorithm after the sample strip is inserted and the results are displayed. Print the results and transfer data to centralised server	R2

Use case diagram



Use case description

Use Case Number:	UC - 1
Use Case Name:	Welcome Screen
Overview:	Welcome screen with header containing Battery Percentage, Date, Time. Additionally, the welcome screen should contain a login and a signup button.
Actors:	Admin, Reviewer, Operator
Pre-condition:	The application is launched or accessed by the user.
Flow:	Main (success) Flow: 1. User opens the application. 2. Welcome screen with header displaying Battery Percentage, Date, Time, and login/signup buttons is shown.
	Alternate Flows: None.
Post Condition:	The user is presented with the welcome screen containing the specified elements (Battery Percentage, Date, Time, login/signup buttons).

Use Case Number:	UC - 2
Use Case Name:	SignUp
Overview:	If user using the system for first time, the user registers using this button with a unique username which the user decides and a password which the user assigns for themselves.
Actors:	Operator
Pre condition:	The user is not already registered in the system.
Flow:	Main (success) Flow: 1. User clicks on the signup button on the welcome screen. 2. User enters a unique username and password. 3. System validates the uniqueness of the username. 4. User account is created successfully.

	Alternate Flows: 3.a. If the chosen username is already taken, the system prompts the user to choose a different one.
Post Condition:	A new user account is successfully created with the provided username and password.

Use Case Number:	UC – 3
Use Case Name:	Login
Overview:	The user logins in the system using username and password.
Actors:	Admin, Reviewer, Operator
Pre condition:	The user account exists in the system.
Flow:	Main (success) Flow: 1. User clicks on the login button on the welcome screen. 2. User enters their username and password. 3. System validates the credentials. 4. If valid, the user is logged in and taken to the main dashboard.
	Alternate Flows: 3.a If the entered credentials are invalid, the system prompts the user to enter correct credentials.
Post Condition:	The user is successfully logged into the system and directed to the main dashboard.

Use Case Number:	UC - 4
Use Case Name:	Settings: Admin
Overview:	The admin will have access to the following settings and permissions: Delete User, Delete Sample, Edit Sample, Create new user (with role), Change brightness, Change Date, Change Time, Display all samples, Display all users, Display all results, Print Result, Transfer Results, Temperature Sensor Result

	Transfer.
Actors:	Admin
Pre condition:	The user logged in is identified as an administrator.
Flow:	Main (success) Flow: 1. Admin logs into the system. 2. Admin navigates to the settings section and selects one of the options below a) Delete User: • Admin selects the option to delete a user. • Admin selects the user from the list of users. • System verifies the action with a confirmation prompt. • Admin confirms the deletion. • System removes the user from the database. • Confirmation message is displayed indicating successful deletion. b) Delete Sample • Admin selects the option to delete a sample. • System prompts the admin to select the sample to be deleted. • Admin selects the sample from the list of samples. • System verifies the action with a confirmation prompt. • Admin confirms the deletion. • System removes the sample from the database. • Confirmation message is displayed indicating successful deletion. c) Edit Sample • Admin selects the option to edit a sample. • System prompts the admin to select the sample to be edited. • Admin selects the sample from the list of samples. • Admin makes necessary edits to the sample details

	(e.g., Sample Name, Sample Type). • Admin saves the changes. • System updates the sample details in the database. • Confirmation message is displayed indicating successful editing. d) Create New User (with role): • Admin selects the option to create a new user. • Admin fills out the necessary user details such as username, password, and role. • System validates the uniqueness of the username. • Admin submits the form. • System creates a new user with the specified role. • Confirmation message is displayed indicating successful user creation. e) Edit Sample (Similar to Admin flow): • Admin selects the option to edit a sample. • System prompts the admin to select the sample to be edited. • Admin selects the sample from the list of samples. • Admin makes necessary edits to the sample details. • Admin saves the changes. • System updates the sample details in the database. • Confirmation message is displayed indicating successful editing. g) Print Result and Transfer Result: • Admin selects the option to print the result. • System generates the result report. • Admin confirms the printing. • System sends the report to the printer. • Confirmation message is displayed indicating

	successful printing.
	Alternate Flows: 1.a) If admin tries to perform an unauthorized action, the system denies access and displays an error message.
Post Condition:	The admin successfully accesses the specified settings and permissions, allowing them to perform necessary tasks such as changing brightness and printing results.

Use Case Number:	UC - 5
Use Case Name:	Settings: Reviewer
Overview:	The reviewer will have access to the following settings and permissions: Edit Sample, Change brightness, Display all samples, Display all users, Display all results, Print Result, Transfer Data.
Actors:	Reviewer
Pre condition:	The user logged in is identified as a reviewer.
Flow:	Main (success) Flow: 1. Reviewer logs into the system. 2. Reviewer navigates to the settings section. a) Edit Sample (Similar to Admin flow): • Reviewer selects the option to edit a sample. • System prompts the reviewer to select the sample to be edited. • Reviewer selects the sample from the list of samples. • Reviewer makes necessary edits to the sample details. • Reviewer saves the changes. • System updates the sample details in the database. • Confirmation message is displayed indicating successful editing. c) Print Result and Transfer Result: • Reviewer selects the option to print the result. • System generates the result report. • Reviewer confirms the printing.

	• System sends the report to the printer. • Confirmation message is displayed indicating successful printing. • The result is tranferred to the centralised server
	Alternate Flows: 1. a)If reviewer tries to perform an unauthorized action, the system denies access and displays an error message.
Post Condition:	The reviewer successfully accesses the specified settings and permissions.

Use Case Number:	UC - 6
Use Case Name:	Settings: Operator
Overview:	The operator will have access to the following settings and permissions: Change brightness, Print Result.
Actors:	Operator
Pre condition:	The user logged in is identified as an operator.
Flow:	Main (success) Flow: 1. Operator logs into the system. 2.Operator navigates to the settings section and can select one of the following options b) Print Result: • Operator selects the option to print the result. • System generates the result report. • Operator confirms the printing. • System sends the report to the printer. • Confirmation message is displayed indicating successful printing.
	Alternate Flows: 1. a)If operator tries to perform an unauthorized action, the system denies access and displays an error message.
Post Condition:	The operator successfully accesses the specified settings and permissions.

Use Case Number:	UC - 7
Use Case Name:	Start Test
Overview:	Sample Id, Sample Name and Sample type is entered by the user and then the testing is started after the sample strip is inserted and the user clicks a start button. The results are displayed and results are printed.
Actors:	Admin, Reviewer, Operator
Pre condition:	The user is logged into the system and has access to the testing functionality.
Flow:	Main (success) Flow: 1. User navigates to the testing section. 2. User enters Sample ID, Sample Name, and Sample Type. 3. User inserts the sample strip. 4. User clicks on the start button. 5. Testing begins. 6. Results are displayed and can be printed 7. Results can be transferred to the centralised server by the admin and reviewer.
	Alternate Flows: 3.a. If the sample strip is not inserted properly, the system prompts the user to insert it correctly before starting the test.
Post Condition:	Testing begins after the user has provided the necessary information and clicked on the start button.