

FACE MASK DETECTION SYSTEM

Submitted by

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Under the Guidance of

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Asst prof.(Sr.Grade) /Computing techonologies

In partial satisfaction of the requirements for the degree of

**BACHELOR OF TECHNOLOGY
in
COMPUTER SCIENCE ENGINEERING**

with specialization in CSE CORE



**SCHOOL OF COMPUTING
COLLEGE OF ENGINEERING AND TECHNOLOGY
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
KATTANKULATHUR - 603203
JUNE 2022**



SRM INSTITUTE OF SCIENCE AND
TECHNOLOGY
KATTANKULATHUR-603203

BONAFIDE CERTIFICATE

Certified that this lab report titled “**Fac mask detection system**” is the bonafide work done
by _____ who carried out the lab exercises under
my supervision. Certified further, that to the best of my knowledge the work reported herein
does
not form part of any other work.

Staff-in-charge

Dr.T.K.SIVAKUMAR Asst.Prof.(Sr.Grade)

Computing Technologies

University Examination held on

INTERNAL EXAMINAR – 1

INTERNAL EXAMINAR - 2

ABSTRACT

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LIST OF ABBREVIATIONS

Rep	Representative
No	Number
SRMIST	Sri Ramaswamy Memorial Institute of Science and Technology
FP	Function Point
LOC	Line Of Code
KLOC	Thousands Of Line Of Code
EAF	Effort Adjustment Factor
ER	Entity Relationship
DFD	Data Flow Diagram



DEPT. Of NWC

SRM IST, Kattankulathur – 603

203Course Code:

18CSC206JCourse Name: Software

Engineering and Project

Management

Experiment No	1
Title of Experiment	<i>To write the problem statement</i>
Name of the team representative	Suvansh Sharma
Team Members	INDRAYAN MITRA(99),SURYANSH DWIVEDI(103),Sidhartha Dhar(81)
Register Number of Representative	RA2011003010097
Date of Experiment	22-03-2022
Reg No of Team Members	RA 2011003010081- Sidhartha Dhar RA2011003010103 – Suryansh Dwivedi RA2011003010097-Suvansh Sharma RA2011003010099-Insryan Mitra

Mark Split Up

S.No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

TITLE: FACE MASK DETECTION USING RASPBERRY PI

OBJECTIVE:

- 1. ENFORCING THE MANDATE FOR WEARING MASKS IN PUBLIC PLACES USING COMPLICATED DETECTION METHODS.**
- 2. EFFECTIVE PROVIDE A WORKING MODEL FOR ACCURATE MASK DETECTION.**
- 3. UTILIZE IMAGE PROCESSING APPROACHES TO IDENTIFY FACE MASK.**

REAL TIME IMPLEMENTATION:

There are two main approaches for Face Detection:

1. Feature Base Approach
2. Image Base Approach

Feature Base Approach

Objects are usually recognized by their unique features. There are many features in a human face, which can be recognized between a face and many other objects. It locates faces by extracting structural features like eyes, nose, mouth etc. and then uses them to detect a face. Typically, some sort of statistical classifier qualified then helpful to separate between facial and non-facial regions. In addition, human faces have particular textures which can be used to differentiate between a face and other objects. Moreover, the edge of features can help to detect the objects from the face. In the coming section, we will implement a feature-based approach by using OpenCV.

Image Base Approach

In general, Image-based methods rely on techniques from statistical analysis and machine learning to find the relevant characteristics of face and non-face images. The learned characteristics are in the form of distribution models or discriminant functions that is

consequently used for face detection. In this method, we use different algorithms such as Neural-networks, HMM, SVM, AdaBoost learning. In the coming section, we will see how we can detect faces with MTCNN or Multi-Task Cascaded Convolutional Neural Network, which is an Image-based approach of face detection

Face detection algorithm

One of the popular algorithms that use a feature-based approach is the Viola-Jones algorithm and here I am briefly going to discuss it. If you want to know about it in detail, I would suggest going through this article, [Face Detection using Viola Jones Algorithm](#).

Viola-Jones algorithm is named after two computer vision researchers who proposed the method in 2001, Paul **Viola** and Michael **Jones** in their paper, “Rapid Object Detection using a Boosted Cascade of Simple Features”. Despite being an outdated framework, Viola-Jones is quite powerful, and its application has proven to be exceptionally notable in real-time face detection. This algorithm is painfully slow to train but can detect faces in real-time with impressive speed.

Given an image (this algorithm works on grayscale image), the algorithm looks at many smaller subregions and tries to find a face by looking for specific features in each subregion. It needs to check many different positions and scales because an image can contain many faces of various sizes. Viola and Jones used Haar-like features to detect faces in this algorithm.

Face Recognition

Face detection and Face Recognition are often used interchangeably but these are quite different. In fact, Face detection is just part of Face Recognition.

Face recognition is a method of identifying or verifying the identity of an individual using their face. There are various algorithms that can do face recognition but their accuracy might vary. Here I am going to describe how we do face recognition using deep learning.

APPROACH:

Face mask detection using advanced software techniques and a programming language.



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**Course Name: Software
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Experiment No	2
Title of Experiment	<i>Identification of Project Methodology and Stakeholder Description template</i>
Name of the team representative	Suvansh Sharma
Team Members	INDRAYAN MITRA(99),SURYANSH DWIVEDI(103),Sidhartha Dhar(81)
Register Number of Representative	RA2011003010097
Date of Experiment	22-03-2022
Reg No of Team Members	RA 2011003010081-Sidhartha Dhar RA2011003010103–Suryansh Dwivedi RA2011003010097-Suvansh Sharma RA2011003010099-Insrayan Mitra

Mark Split Up

S.No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Stakeholder Register

Project Name: Face Mask detection system.

Prepared by: Suvansh Sharma, Suryansh Dwivedi, Siddhartha dhar, Indrayan Mitra.

Date:21/03/2022

Project Stakeholder Name:	Specific Information needs (Types & Frequency of communication)	Project Interest (Specific area of interest and participation)	Impact on project (Positive, Negative, Influencer,Supporter, Roadblock)	Role
Suvansh Sharma	Presentation of the product and setting up the website.	Development of website frontend and checking the login interface.	Positive impact	Frontend Developer
Suryansh Dwivedi	Dealing with the hardware and making the product	Testing of the hardware and checking the function of product.	Positive impact	Hardware developer.
Indrayan Mitra	Implementation of code in the hardware.	Feeding the code in the hardware and detection the errors.	Positive impact	Sr. Coder
Siddhartha Dhar	Website development and interface making.	Development of the backend and dealing with hardware team.	Positive impact	Backend developer
Sales Agents	Ability to quote Quicker and competitive pricing	Complexity of Sales tools.	Positive impact	User

Fablab	Providing the help in the hardware and hardware development	Adding Additional features like detecting small details of face recognizing.	Positive impact	Sponsor
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Course Code: 18CSC206J

**Course Name: Software
Engineering and Project
Management**

Experiment No	3
Title of Experiment	<i>To streamline all the information and determine the requirements for face mask detection</i>
Name of the team representative	Suvansh Sharma
Team Members	INDRAYAN MITRA(99),SURYANSH DWIVEDI(103),Sidhartha Dhar(81)
Register Number of Representative	RA2011003010097
Date of Experiment	09-04-2022
Reg No of Team Members	RA 2011003010081-Sidhartha Dhar RA2011003010103–Suryansh Dwivedi RA2011003010097-Suvansh Sharma RA2011003010099-Insrayan Mitra

Mark Split Up

S.No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

DESCRIPTION:

There are many features in a human face, which can be recognized between a face and many other objects. It locates faces by extracting structural features like eyes, nose, mouth etc. and then uses them to detect a face. Typically, some sort of statistical classifier qualified then helpful to separate between facial and non-facial regions. In addition, human faces have particular textures which can be used to differentiate between a face and other objects. Moreover, the edge of features can help to detect the objects from the face. In the coming section, we will implement a feature-based approach. Image Base Approach In general, Image-based methods rely on techniques from statistical analysis and machine learning to find the relevant characteristics of face and non-face images.

FUNCTIONAL REQUIREMENTS

- 1.The system must be correctly able to load the face mask classifier model.
- 2.The system must be able to detect faces in images or video stream.
3. The system must be able to extract each face's Region of Interest (ROI).
4. There must not be any object between the system and the face of the user for a successful face detection and hence the face mask detection.
5. The end position of the face must be fit inside the webcam frame and must be closer to the camera.
- 6 Correctly able to detect masks in 'png', 'jpg', 'jpeg', and 'gif' format images.
7. The system must be able to detect face masks on human faces on every frame in a live video.
8. The results must be viewed by showing the probability along with the output of 'Mask' or 'NoMask'.

NON-FUNCTIONAL REQUIREMENTS

- 1.The face should be localized by detecting the facial landmarks and the background must be ignored.
- 2.The system will be implemented in Python script with an accuracy of the model of over 90%.
- 3.The user must not move his/her face out of camera's sight in order to get correct results.
- 4.The background must not be too bright or too dark while detecting the face mask. Product revision
- 5.The system must be portable and can be applied to embedded devices with limited computational capacity (ex., Raspberry Pi, Google Coral, NVIDIA Jetson Nano, etc.).
- 6.The output response operation must be fast and under 5 seconds per person.
- 7.The system must be able to correctly detect more than one face if present, and hence the presence of mask in the frame



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**Course Name: Software
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Experiment No	4
Title of Experiment	Prepare Project Plan based on scope, Find Job roles and responsibilities, Calculate Project effort based on resources
Name of the team representative	Suvansh Sharma
Team Members	INDRAYAN MITRA(99),SURYANSH DWIVEDI(103),Sidhartha Dhar(81)
Register Number of Representative	RA2011003010097
Date of Experiment	03/05/22
Reg No of Team Members	RA 2011003010081-Sidhartha Dhar RA2011003010103–Suryansh Dwivedi RA2011003010097-Suvansh Sharma RA2011003010099-Insrayan Mitra

Mark Split Up

S.No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Project Plan, Effort & Roles-Responsibilities

Key stakeholders and discuss its key components

Project Stakeholder Name	Specific Info Needs	Key Components of Stakeholders	Impact on Project	Role
Suvansh Sharma	Presentation of product and setting up website.	Developments of website frontend and checking the login interface	Positive Impact	Frontend Developer
Suryansh Dwivedi	Dealing with hardware and making the product	Testing of the hardware and checking the function of product.	Positive Impact	Hardware Developer
Indrayan Mitra	Implementation of code in the hardware.	Feeding the code in the hardware and detection the errors.	Positive Impact	Senior Code

Project Stakeholder Name	Specific Info Needs	Key Components of Stakeholders	Impact on Project	Role
Siddhartha Dhar	Website development and interface making.	Development of the backend and dealing with hardware team.	Positive impact	Backend Developer
Pankaj Tripathy	Ability to quote Quicker and competitive pricing	Complexity of Sales tools.	Positive impact	User
Fablab	Providing the help in the hardware and hardware development	Adding Additional features like detecting small details of face recognizing.	Positive impact	Sponsor

Holding a kickoff meeting

- A project team comprises new team members, so a familiarization session is essential for team unity and future project success. This session provides an opportunity for team members to get to know each other, build trust, and promote mutual understanding.
- A kick-off meeting can be of two types:
 1. Internal kick-off meeting
 2. External kick-off meeting

Internal Kick-Off Meeting	External Kick-Off Meeting
An internal kick-off meeting is a meeting with the project manager and the project team members.	An external kick-off meeting is held between the project management team and the client.
The internal kick-off meeting aims to define the ground rules and explain the work culture and project objectives to the team.	The purpose of the external kick-off meeting is to introduce your key team members to the client, listen to their expectations, and inform them about the reporting procedure.

Scope Statement and Scope Baseline

- Though there are some weaknesses of facial recognition system, there is a tremendous scope in India as well as worldwide. This system can be effectively used in exam halls, hospitals, schools, universities, in government sectors and private sectors.
- The scratch materials to achieve the scope statement

1. No. of ext. input : 18 (avg)
2. No. of ext. output : 32 (Simple)
3. No. of int. input : 6 (complex)
4. No. of ext. output (files) : 4 (avg)
5. No. of ext. interface : 3 (simple)
6. Efforts : 40 (avg)
7. Technical Document : 250
8. Cost : 7000/- per month
9. Various Component factor are : 4, 10, 3, 3, 6, 5, 4, 3,
4, 3, 3, 6, 7

	Measurement Parameter	Count	Weighting factor
1.	No. of Ext. inputs	18	* 4 = 72
2.	No. of Ext. Outputs	32	* 4 = 128
3.	No. of Ext. Inquiries	6	* 6 = 36
4.	No. of Int. files	4	* 10 = 40
5.	No. of Ext. files	3	* 5 = 15
Total			291

$$\text{So Sum of all } f(i) = 4 + 10 + 3 + 3 + 6 + 5 + 4 + 3 + 4 + 3 + 3 + 6 + 7 = 61$$

$$\begin{aligned}
 F.P &= \text{Count_total} * [0.65 + 0.01 * \sum f(i)] \\
 &= 291 * [0.65 + (0.01 * 61)] \\
 &= 291 * [0.65 + 0.61] \\
 &= 291 * [1.26] \\
 &= 366.66
 \end{aligned}$$

$$\text{Productivity} = \frac{F.P}{\text{Effort}} = \frac{366.66}{40} = 9.16$$

$$\begin{aligned}
 \text{Total Documentation} &= \text{tech pages} + \text{user pages} \\
 &= 250 + 25 = 275
 \end{aligned}$$

$$\text{Documentation} = \frac{275}{366.66} = 0.75$$

$$\text{Cost per function} = \frac{\text{Cost}}{\text{Prod.}} = \frac{7000}{9.16} = 764.19$$

$$\begin{aligned}
 \text{function point} &= 764.19 * 366.66 \\
 &= 280197.91
 \end{aligned}$$

Given Line of Code = 2800 KLOC

Embedded:

$$\text{effort} = a [\text{KLOC}]^b$$

$$= a [2800]^b$$

$$a = 3.5$$

$$b = 1.5$$

$$= 3.5 (2800)^{1.5}$$

$$\text{Development Time} = c (\text{effort})^d$$

$$= 2.5 (40)^{0.35}$$

$$c = 2.5$$

$$d = 0.35$$

Organic KLOC = 25	Semi-technical KLOC = 2000
$\text{Effort} = a [\text{KLOC}]^b \times \text{EAF}$ $a = 2.4$ $b = 1.05$ $c = 2.5$ $d = 0.38$	$a = 3.0$ $b = 1.12$ $c = 2.5$ $d = 0.55$
$l = 0.82$ $H = 1.14$ $\text{EAF} = 0.9348$	$d = 1.29$ $H = 0.95$ $\text{EAF} = 1.22$
$E = \frac{60 \text{ Person/month}}{11.834 \text{ months}}$	$E = 138 \times 2.4$ $D = 31.41 \text{ Months}$



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Course Code: 18CSC206J

**Course Name: Software Engineering
and Project Management**

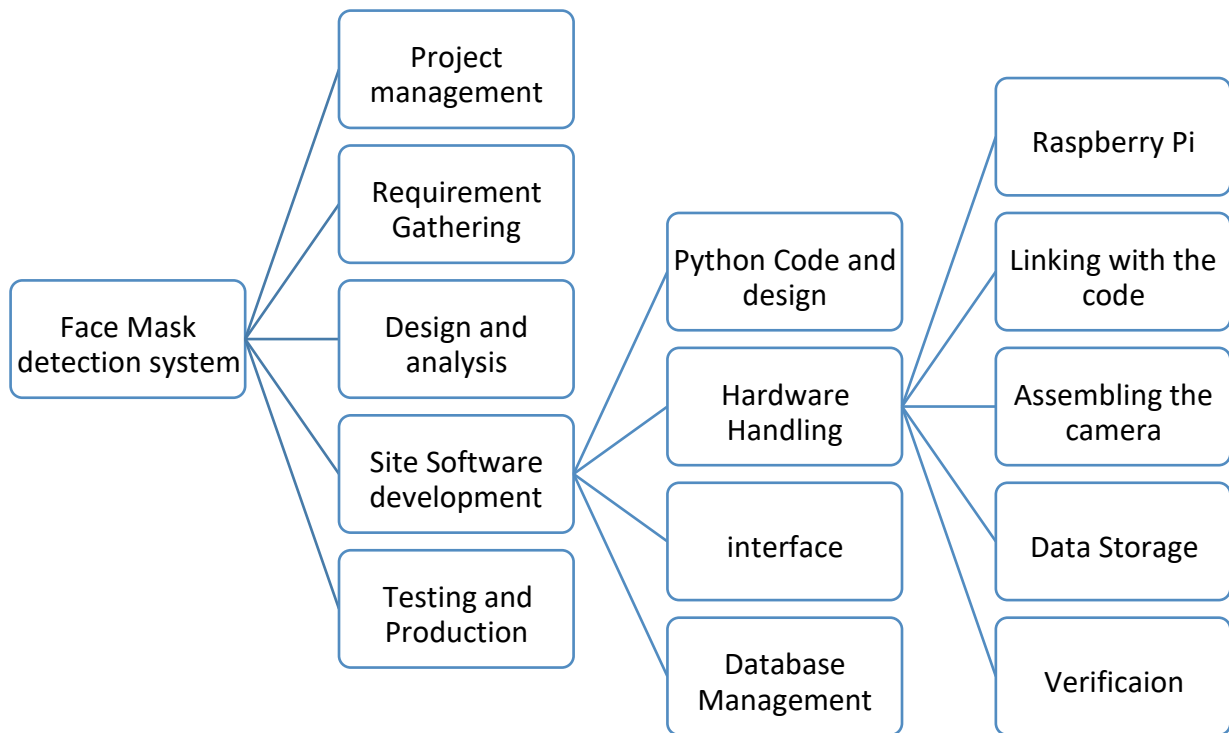
Experiment No	5
Title of Experiment	Prepare Work breakdown structure, Timeline chart, Risk identification table
Name of the team representative	Suvansh Sharma
Team Members	INDRAYAN MITRA(99),SURYANSH DWIVEDI(103),Sidhartha Dhar(81)
Register Number of Representative	RA2011003010097
Date of Experiment	02-May-2022
Reg No of Team Members	RA 2011003010081-Sidhartha Dhar RA2011003010103–Suryansh Dwivedi RA2011003010097-Suvansh Sharma RA2011003010099-Insrayan Mitra

Mark Split Up

S.No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Software Engineering and Project Management - WEEK 5

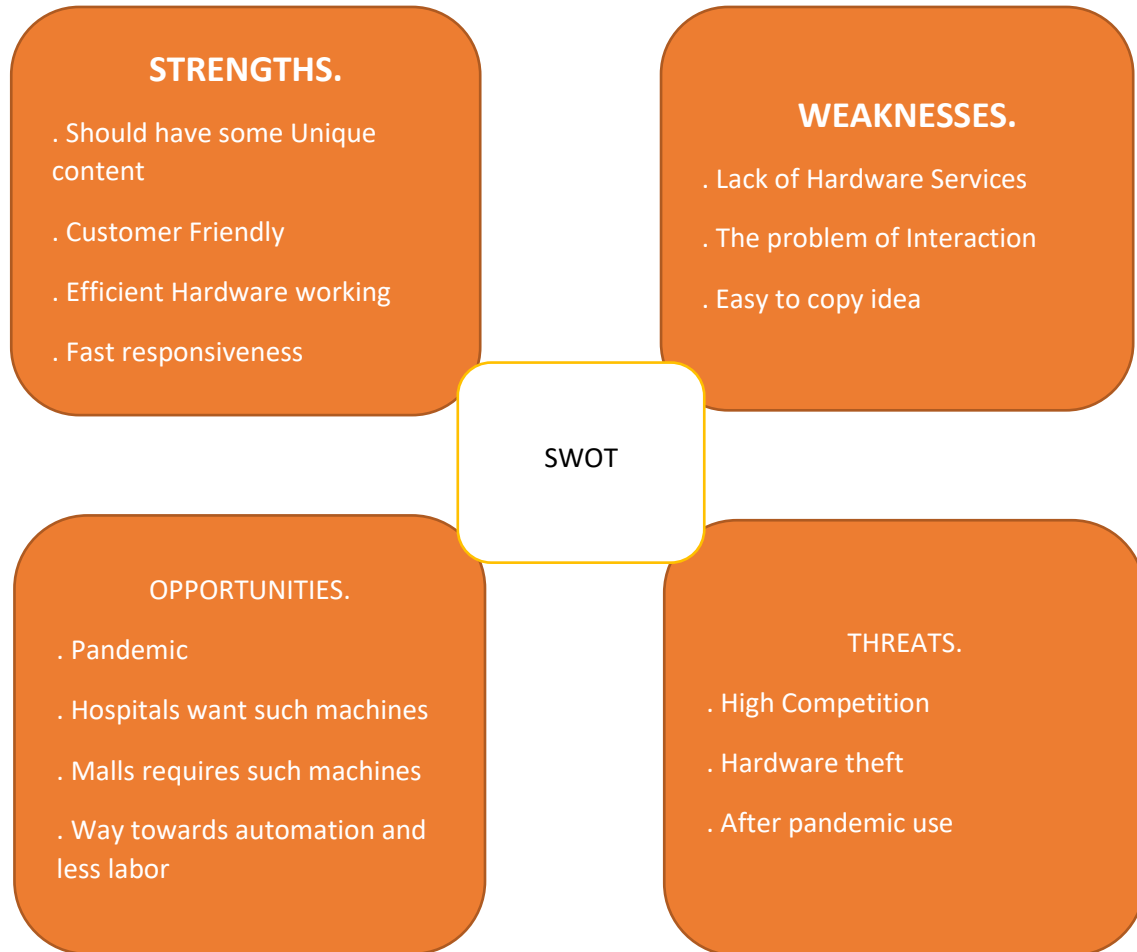
WORK BREAKDOWN STRUCTRE (WBS)



RISK ANALYSIS- RMMM TEMPELATE

Response	Strategy	Examples
Avoid	Risk avoidance is a strategy where the project team takes action to remove the threat of risk or protect from the impact	<ul style="list-style-type: none"> • Extending the schedule • Reducing/removing scope • Changing the execution strategy
Transfer	Risk transference involves shifting or transferring the risk threat and impact to a third party. Rather transfer the responsibility and ownership	<ul style="list-style-type: none"> • Purchasing insurance • Warranties • Performance bonds
Mitigate	Risk mitigation is a strategy where the project team takes an action to reduce the probability of the risk occurring. This does not risk or potential impact ,but rather reduces the likelihood of it becoming real	<ul style="list-style-type: none"> • Increasing testing • Reducing process complexity
Accept	Risk acceptance means the term acknowledges the risk and its potential impact, but decides not to take any pre-emptive action to prevent it. It is dealt with only if it occurs.	<ul style="list-style-type: none"> • Contingency reserve budgets • Management schedule float

SWOT ANALYSIS



Timeline analysis

Sl. No.	Task Name	Start Date	End Date	Duration (no. of days)
1	Initial Assessment	10.04.22	17.04.22	7
2	Project Assessment	20.04.22	27.04.22	7
3	Wireframe design	1.05.22	9.05.22	8
4	Coding	19.05.22	26.05.22	7
5	Framework	28.05.22	31.05.22	3
6	Page template	1.06.22	7.06.22	6
7	Load +edit content	10.06.22	17.06.22	7
8	Testing	20.06.22	25.06.22	5
9	Finalize	27.06.22	30.06.22	3



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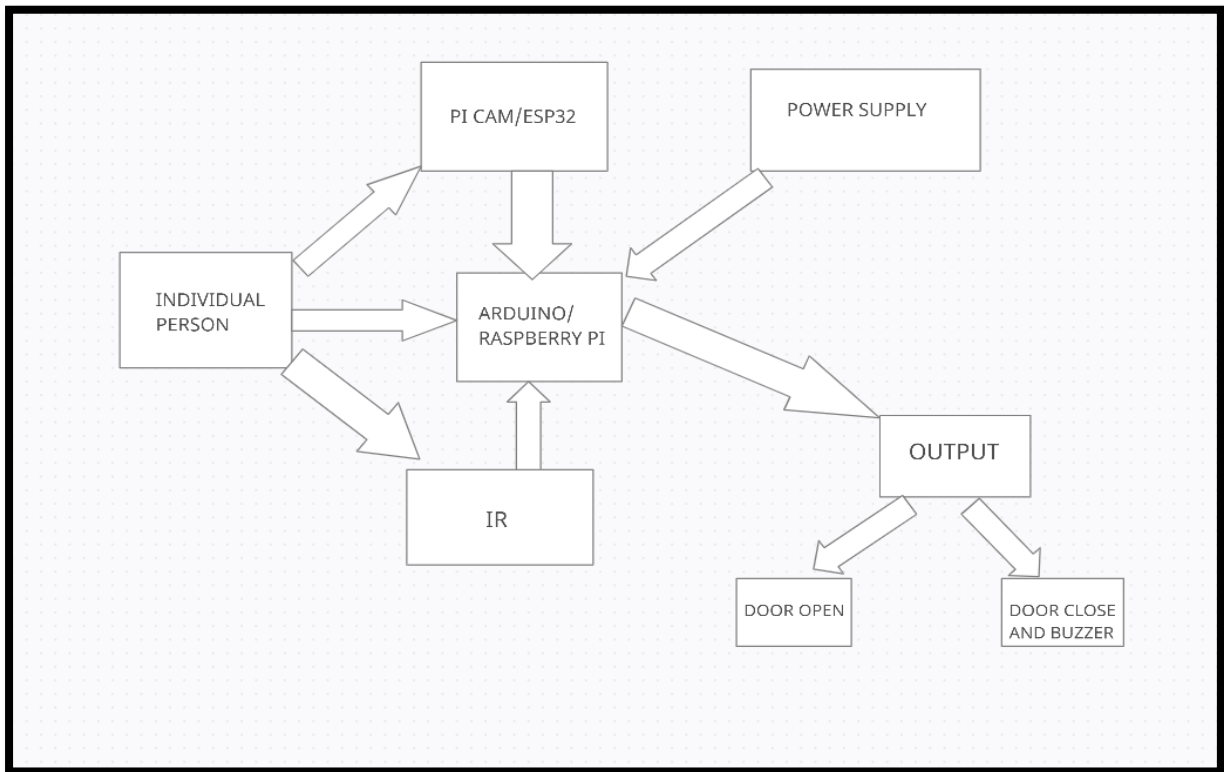
**Course Name: Software
Engineering and Project
Management**

Experiment No	6
Title of Experiment	Design a System Architecture, Use Case and Class Diagram
Name of the team representative	Suvansh Sharma
Team Members	INDRAYAN MITRA(99),SURYANSH DWIVEDI(103),Sidhartha Dhar(81)
Register Number of Representative	RA2011003010097
Date of Experiment	2 May 2022
Reg No of Team Members	RA 2011003010081-Sidhartha Dhar RA2011003010103–Suryansh Dwivedi RA2011003010097-Suvansh Sharma RA2011003010099-Insrayan Mitra

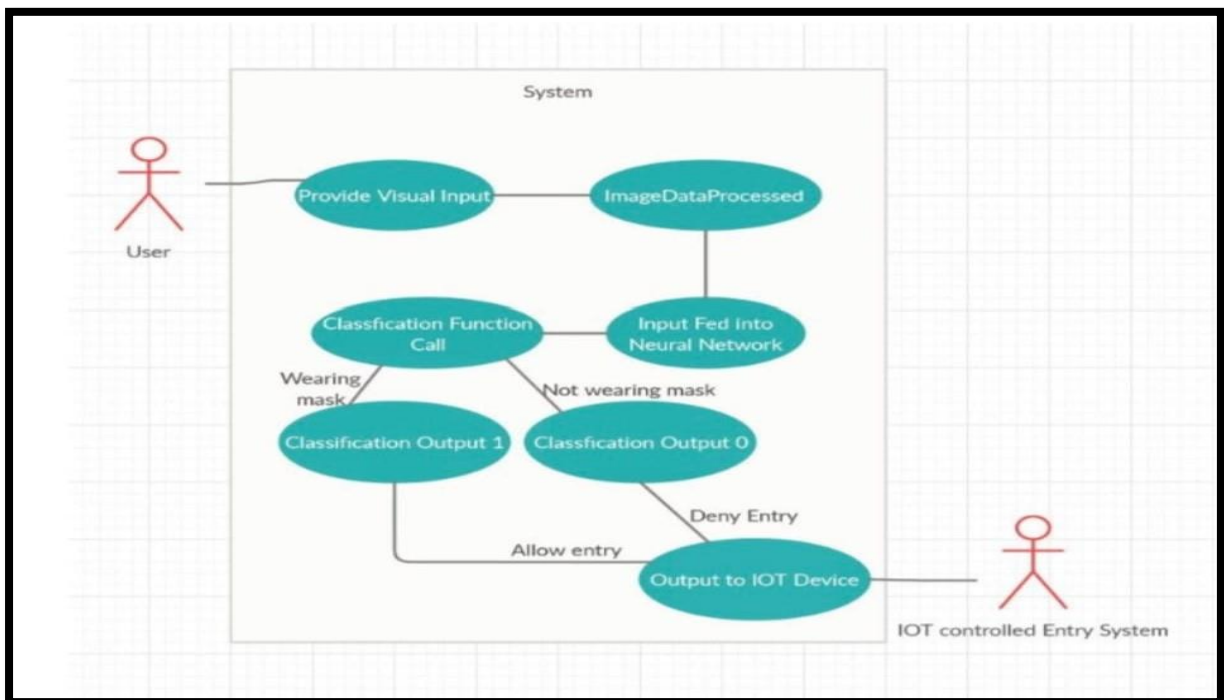
Mark Split Up

S.No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

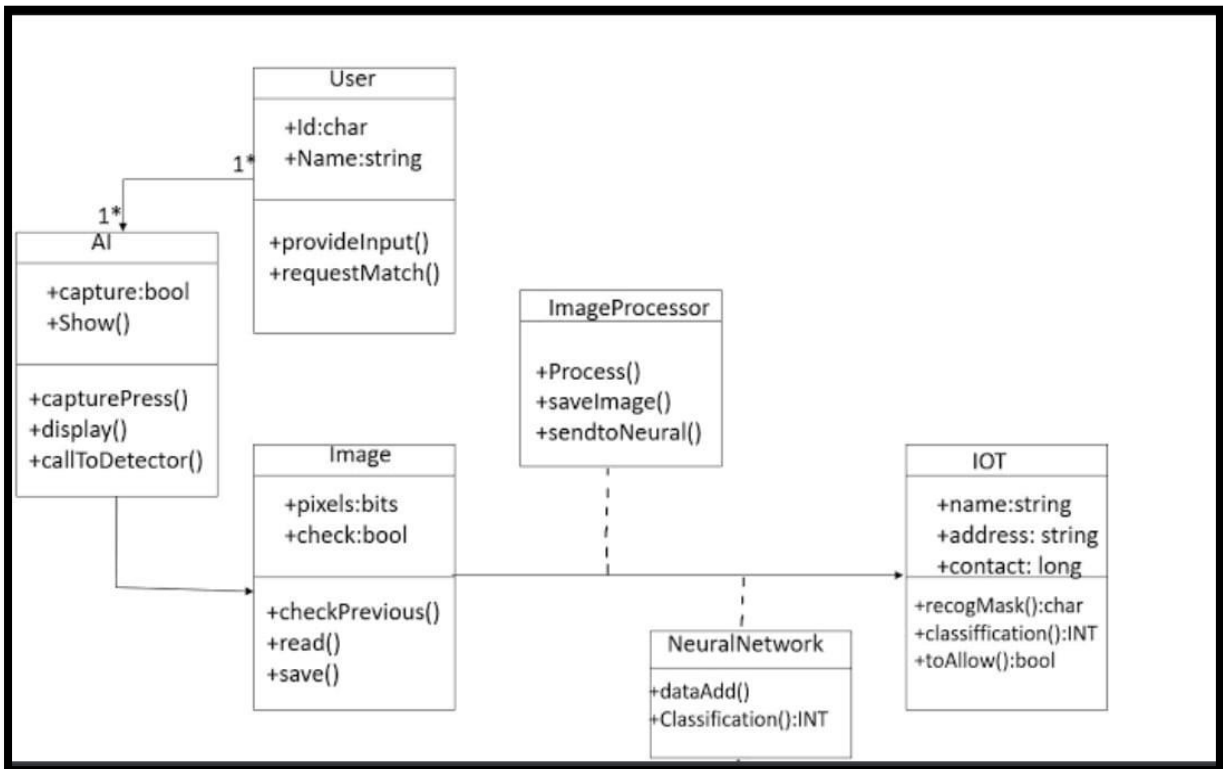
System Architecture



USE CASE DIAGRAM



CLASS DIAGRAM





School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	7
Title of Experiment	Design a Entity relationship diagram
Name of the candidate	SUVANSH SHARMA
Team Members	INDRAYAN MITRA(RA2011003010099) SIDDHARTHA DHAR(RA2011003010081) SURYANSH DWIVEDI (RA201100301010103)
Register Number	RA2011003010097
Date of Experiment	6/6/2022

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Staff Signature with date

Aim

To create the Entity Relationship Diagram

Team Members:

S No	Register No	Name	Role
1	RA2011003010097	SUVANSH SHARMA	Rep
2	RA2011003010099	INDRAYAN MITRA	Member
3	RA2011003010103	SURYANSH DWIVEDI	Member
4	RA2011003010081	SIDHARTHA DHAR	Member

<ER Diagram >

***/ ER Diagram, Notation and Example What is ER Diagram?**

- ER Diagram stands for Entity Relationship Diagram, also known as ERD is a diagram that displays the relationship of entity sets stored in a database. In other words, ER diagrams help to explain the logical structure of databases. ER diagrams are created based on three basic concepts: entities, attributes and relationships.
- ER Diagrams contain different symbols that use rectangles to represent entities, ovals to define attributes and diamond shapes to represent relationships.
- At first look, an ER diagram looks very similar to the flowchart. However, ER Diagram includes many specialized symbols, and its meanings make this model unique. The purpose of ER Diagram is to represent the entity framework infrastructure.

What is ER Model?

- ER Model stands for Entity Relationship Model is a high-level conceptual data model diagram. ER model helps to systematically analyze data requirements to produce a well designed database.
- ER Model represents real-world entities and the relationships between them. Creating an ER Model in DBMS is considered as a best practice before implementing your database. - ER Modeling helps you to analyze data requirements systematically to produce a well designed database. So, it is considered a best practice to complete ER modeling before implementing your database.

Why use ER Diagrams?

Here, are prime reasons for using the ER Diagram

- Helps you to define terms related to entity relationship modeling

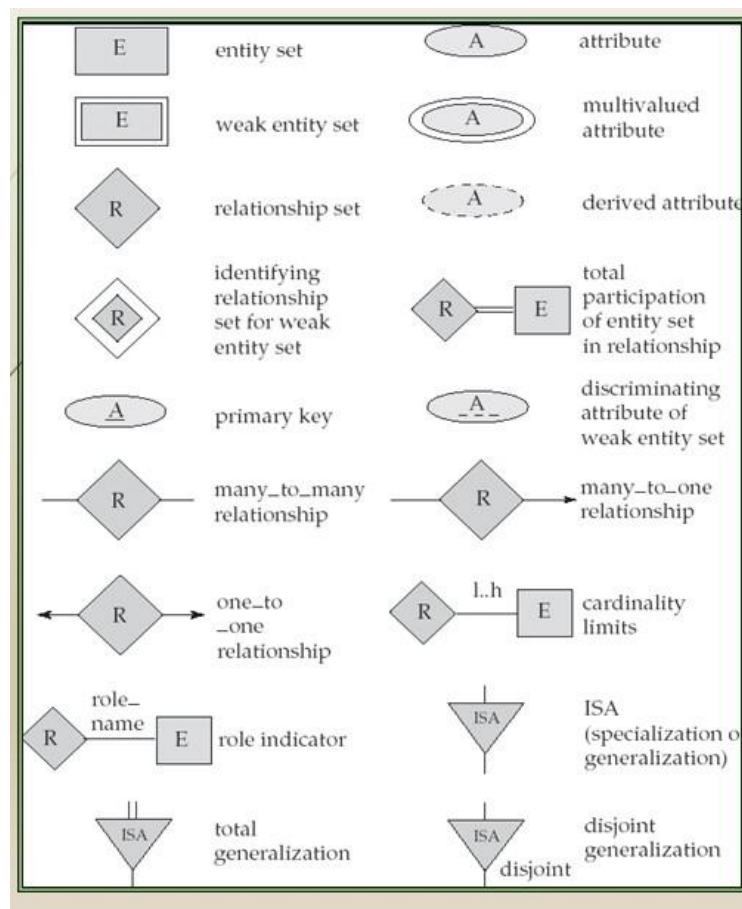
- Provide a preview of how all your tables should connect, what fields are going to be on each table
- Helps to describe entities, attributes, relationships
- ER diagrams are translatable into relational tables which allows you to build databases quickly
- ER diagrams can be used by database designers as a blueprint for implementing data in specific software applications
- The database designer gains a better understanding of the information to be contained in the database with the help of ERP diagram
- ERD Diagram allows you to communicate with the logical structure of the database to users

Components of the ER Diagram

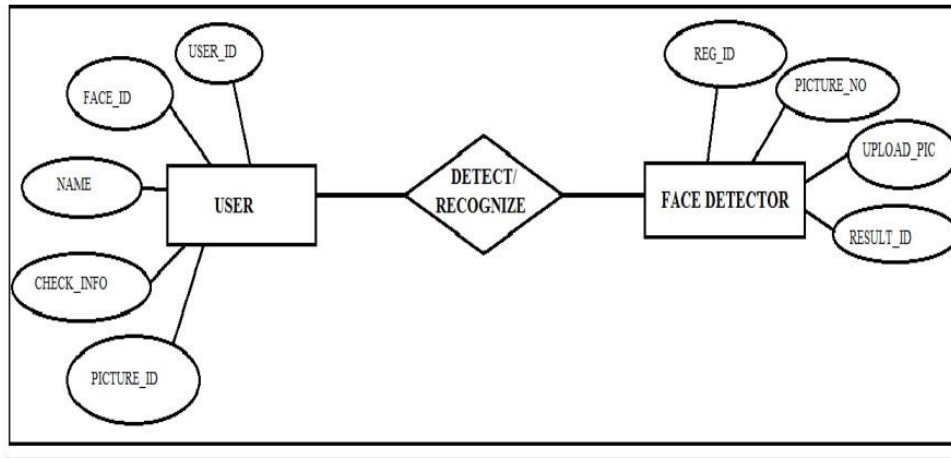
This model is based on three basic concepts: Entities, Attributes, Relationships

ER Diagram – Notations

- Rectangles represent entity sets.
- Diamonds represent relationship sets.
- Lines link attributes to entity sets and entity sets to relationship sets.
- Ellipses represent attributes
- Double ellipses represent multivalued attributes. - Dashed ellipses denote derived attributes.
- Underline indicates primary key attributes



ER Diagram of Face Mask Detection



ADDITIONAL NOTES

- A database can be modeled as a collection of entities, relationship among entities.
- An entity is an object that exists and is distinguishable from other objects. Example: specific person, company, event, plant - Entities have attributes.
Example: people have names and addresses
- An entity set is a set of entities of the same type that share the same properties.
Example: set of all persons, companies, trees, holidays
- Express the number of entities to which another entity can be associated via a relationship set.
- Most useful in describing binary relationship sets.
- We express cardinality constraints by drawing either a directed line (\rightarrow), signifying “one,” or an undirected line ($—$), signifying “many,” between the relationship set and the entity set.
- An entity is represented by a set of attributes, that is descriptive properties possessed by all members of an entity set.
Example: customer = (customer-id, customer-name, customer-street, customer-city) loan = (loan-number, amount)
- Domain – the set of permitted values for each attribute - Attribute types:
 1. Simple and composite attributes.
 2. Single-valued and multi-valued attributes
E.g. multivalued attribute: phone-numbers
 3. Derived attributes-Can be computed from other attributes
E.g. age, given date of birth

Cardinality

- For a binary relationship set the mapping cardinality must be one of the following types:

1. One to one

A customer is associated with at most one loan via the relationship borrower. A loan is associated with at most one customer via borrower

2. One to many

A loan is associated with at most one customer via borrower, a customer is associated with several (including 0) loans via borrower

3. Many to one

A loan is associated with several (including 0) customers via borrower, a customer is associated with at most one loan via borrower

4. Many to many

A loan is associated with several (including 0) customers via borrower, a customer is associated with several loans (including 0) via borrower

Weak Entity Set

- An entity set that does not have a primary key is referred to as a weak entity set and represented by double outlined box in E-R diagram.

Example : Consider the entity set payment which got three attributes : payment_number, payment_date and payment_amount. Payment numbers are sequential starting from 1 generally separately for each loan. Although each payment entity is distinct, payments for different loans may share the same payment number. Thus this entity set does not have a primary key.

Discriminator

- The discriminator (or partial key) of a weak entity set is the set of attributes that distinguishes among all the entities of a weak entity set

Example: discriminator of weak entity set payment is the attribute payment_number since for each loan a payment number uniquely identifies one single payment for that loan.

Specialization-Generalization-ISA

- E-R model provides means of representing these distinctive entity groupings
- Process of designating subgroupings within an entity set is called specialization depicted by triangle component labelled ISA ("is a")
- Bottom up design process in which multiple entity sets are synthesized into higher level entity set - Generalization
- ISA relationship may also be referred to as superclass-subclass relationship
- Higher and lower level entity sets are designated by the terms superclass and subclass. - Specialization and generalization are simple inversions of each other; they are represented in an E-R diagram in the same way.

Total & Partial Participation

- Total participation (indicated by double line): every entity in the entity set participates in at least one relationship in the relationship set

E.g. participation of loan in borrower is total, every loan must have a customer associated to it via borrower

- Partial participation: some entities may not participate in any relationship in the relationship set

Example: participation of customer in borrower is partial

Cardinality limits

- Cardinality limits can also express participation constraints
- Minimum and maximum cardinality is expressed as l..h where l is the minimum and h is the maximum cardinality
- Minimum value of 1 indicates total participation of entity set in relationship set - Maximum value of 1 indicates entity participates in atmost one relationship set.
- Maximum value of * indicates no limit

Role indicator

- Entity sets of a relationship need not be distinct
- The labels “manager” and “worker” are called roles; they specify how employee entities interact via the works-for relationship set.
- Roles are indicated in E-R diagrams by labeling the lines that connect diamonds to rectangles.
- Role labels are optional, and are used to clarify semantics of the relationship

Disjoint Generalization

- Disjointness constraint requires that an entity belong to more than one lower level entity set.
- Example: account entity can satisfy only one condition for account_type attribute ; entity can either be savings or chequing account but not both.

Result:

Thus, the entity relationship diagram was created successfully.



School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	8
Title of Experiment	Develop a Data Flow Diagram (Process-Up to Level 1)
Name of the candidate	SUVANSH SHARMA
Team Members	SIDDHARTHA DHAR INDRAYAN MITRA SURYANSH DWIVEDI
Register Number	RA2011003010097
Date of Experiment	06-06-2022

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Staff Signature with date

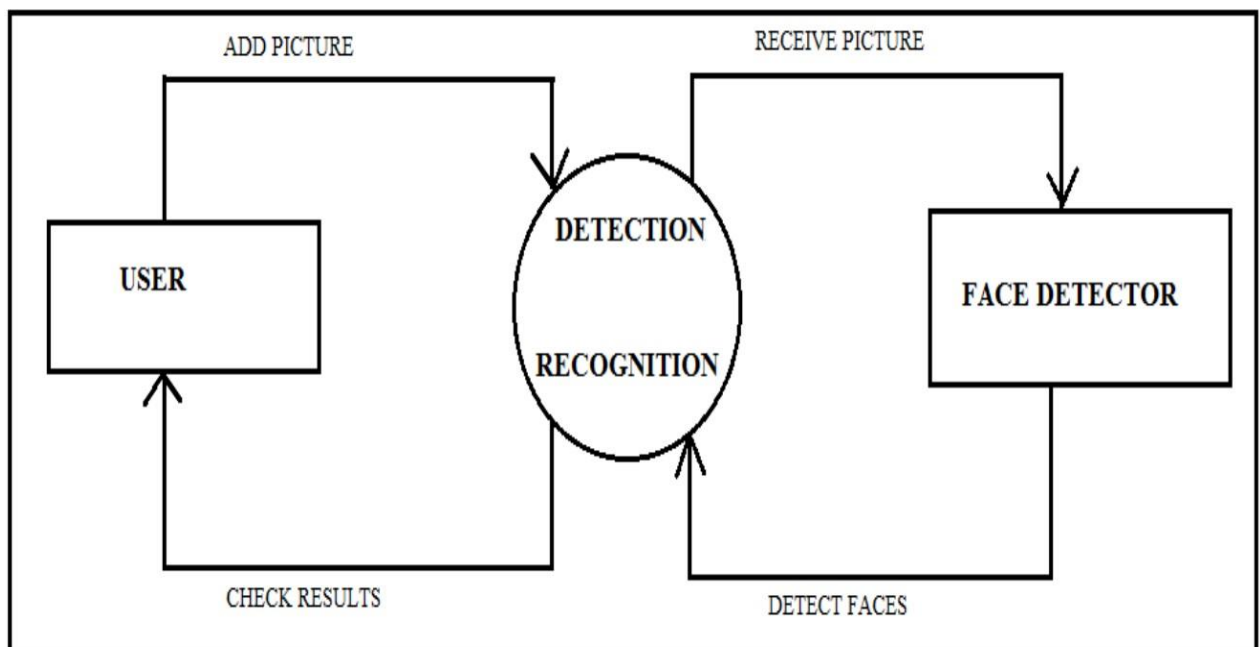
Aim

To develop the data flow diagram up to level 1 for the <project name>

Team Members:

S No	Register No	Name	Role
1	RA2011003010097	SUVANSH SHARMA	Rep
2	RA2011003010099	INDRAYAN MITRA	Member
3	RA2011003010103	SURYANSH DWIVEDI	Member
4	RA2011003010081	SIDHARTHA DHAR	Member

Data Flow Diagram :



Data Flow Diagram

The DFD takes an input-process-output view of a system. That is, data objects flow into the software, are transformed by processing elements, and resultant data objects flow out of the software. Data objects are represented by labeled arrows, and transformations are represented by circles (also called bubbles). The DFD is presented in a hierarchical fashion. That is, the first data flow model (sometimes called a level 0 DFD or context diagram) represents the system as a whole. Subsequent data flow diagrams refine the context diagram, providing increasing detail with each subsequent level.

The data flow diagram enables you to develop models of the information domain and functional domain. As the DFD is refined into greater levels of detail, you perform an implicit functional decomposition of the system. At the same time, the DFD refinement results in a corresponding refinement of data as it moves through the processes that embody the application.

A few simple guidelines can aid immeasurably during the derivation of a data flow diagram:

- (1) Level 0 data flow diagram should depict the software/system as a single bubble;
- (2) Primary input and output should be carefully noted;
- (3) Refinement should begin by isolating candidate processes, data objects, and data stores to be represented at the next level;
- (4) All arrows and bubbles should be labeled with meaningful names;
- (5) Information flow continuity must be maintained from level to level and
- (6) One bubble at a time should be refined. There is a natural tendency to overcomplicate the data flow diagram. This occurs when you attempt to show too much detail too early or represent procedural aspects of the software in lieu of information flow.

Result:

Thus, the data flow diagrams have been created for the <project name>.



School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	9
Title of Experiment	Design a Sequence and Collaboration Diagram
Name of the candidate	SUVANSH SHARMA(97),
Team Members	INDRAYAN MITRA(99),SURYANSH DWIVEDI(103) , SIDHARTHA DHAR(81)
Register Number	RA2011003010097
Date of Experiment	8/05/22

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Staff Signature with date

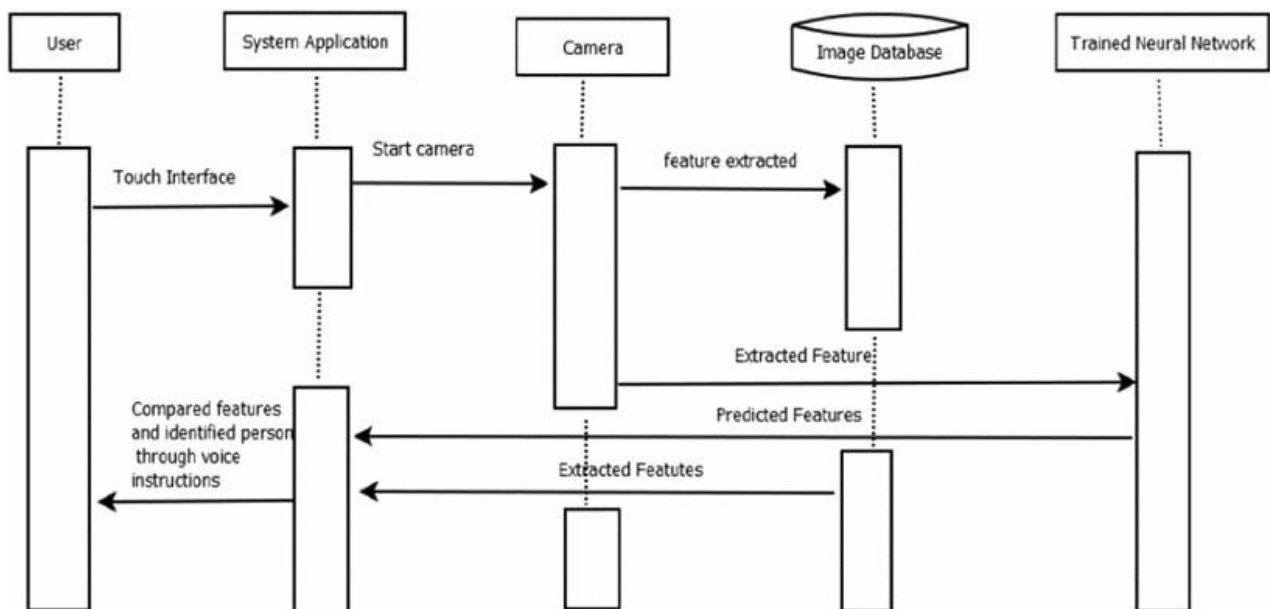
Aim

To create the sequence and collaboration diagram for the <project name>

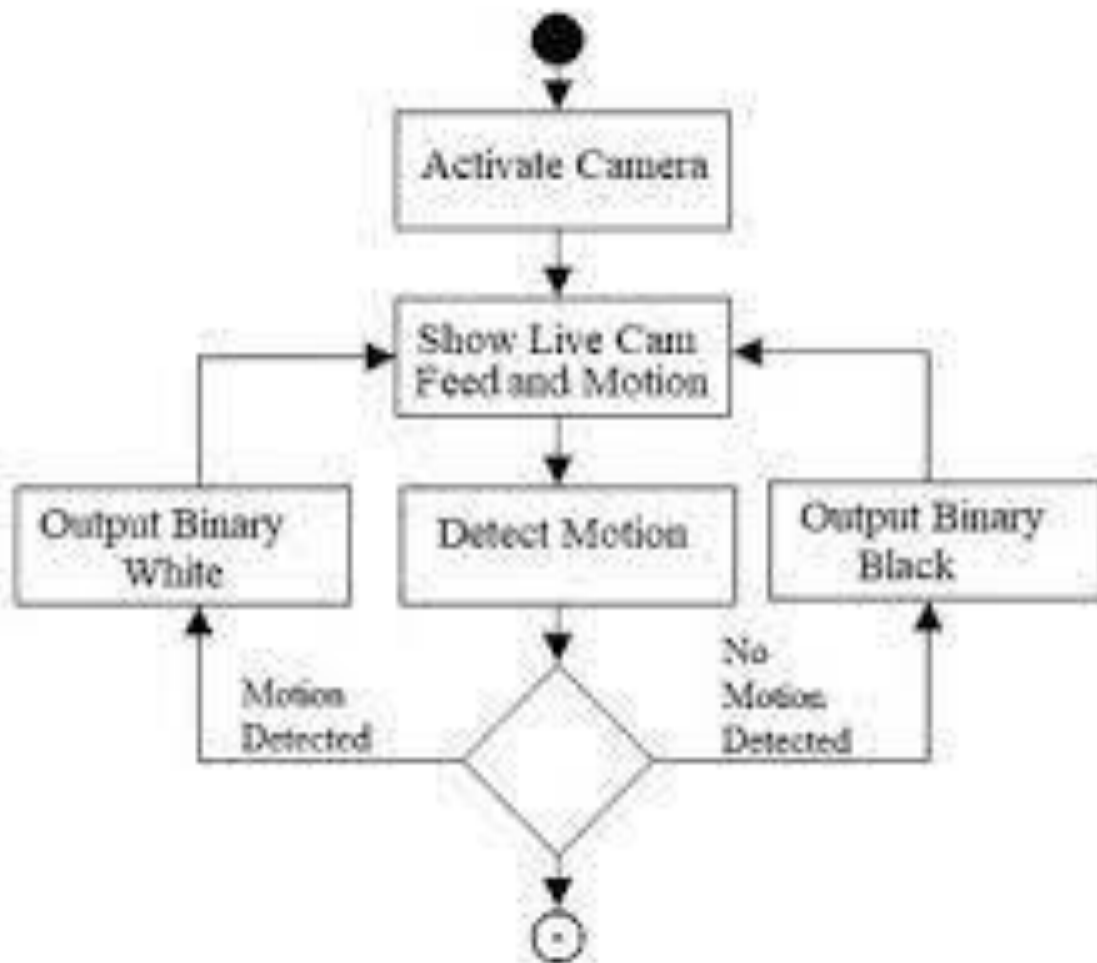
Team Members:

S No	Register No	Name	Role
1	RA2011003010097	SUVANSH SHARMA	LEAD
2	RA2011003010099	INDRAYAN MITRA	Member
3	RA20110030100103	SURYANSH DWIVEDI	Member
4	RA2011003010081	SIDDHARTHA DHAR	Member

SEQUENCE DIAGRAM

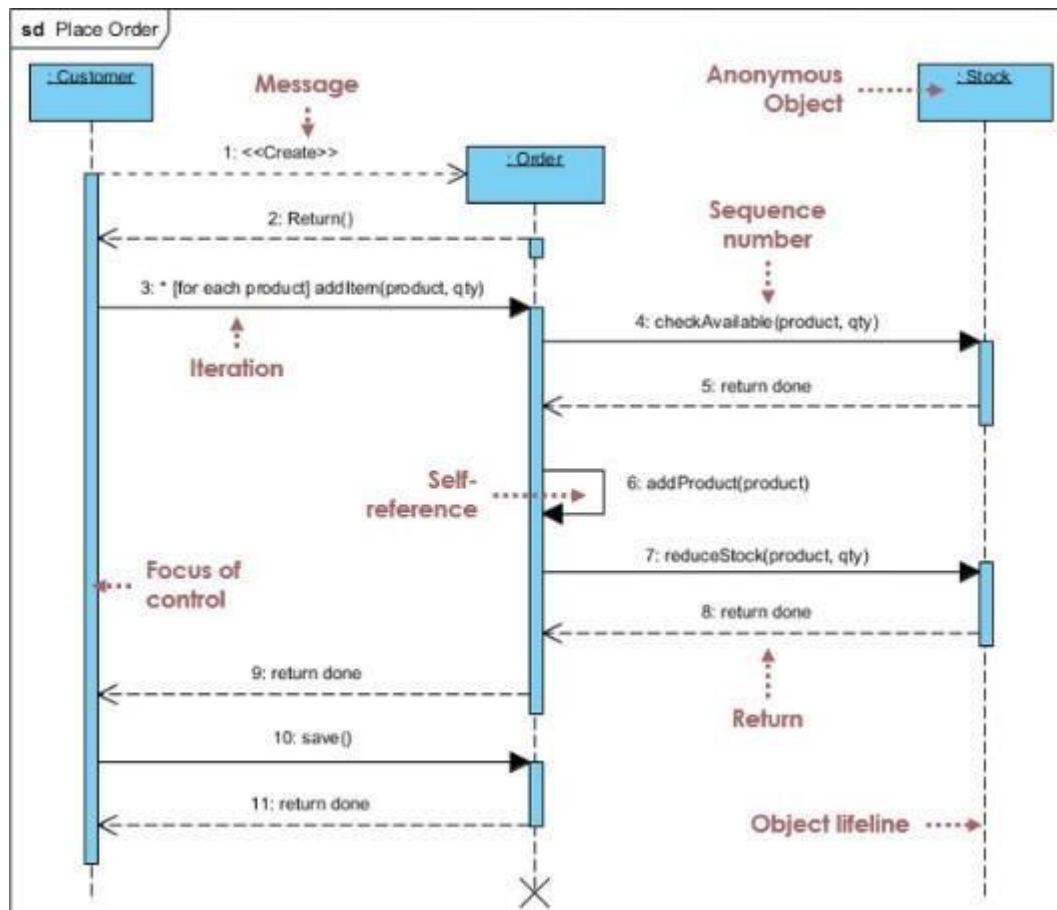


COLLABORATION DIAGRAM

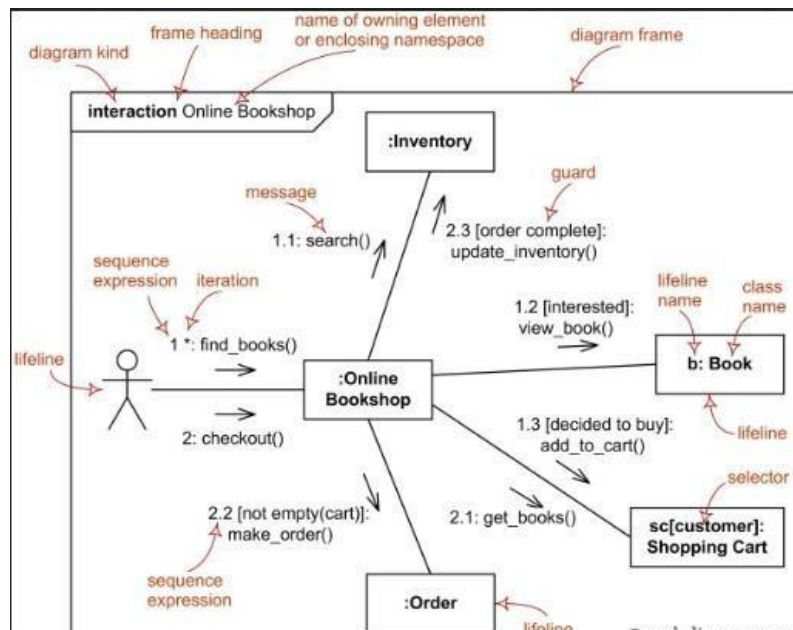


*/ For Example

Sequence Diagram



Collaboration Diagram



Result:

Thus, the sequence and collaboration diagrams were created for the <project name>.



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SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	10
Title of Experiment	Develop a Testing Framework/User Interface
Name of the candidate	SUVANSH SHARMA
Team Members	SIDDHARTHA DHAR, SURYANSH DWIVEDI, INDRAYAN MITRA
Register Number	RA2011003010097
Date of Experiment	14/06/2022

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Staff Signature with date

Aim

To develop the testing framework and/or user interface framework for the Fitness App.

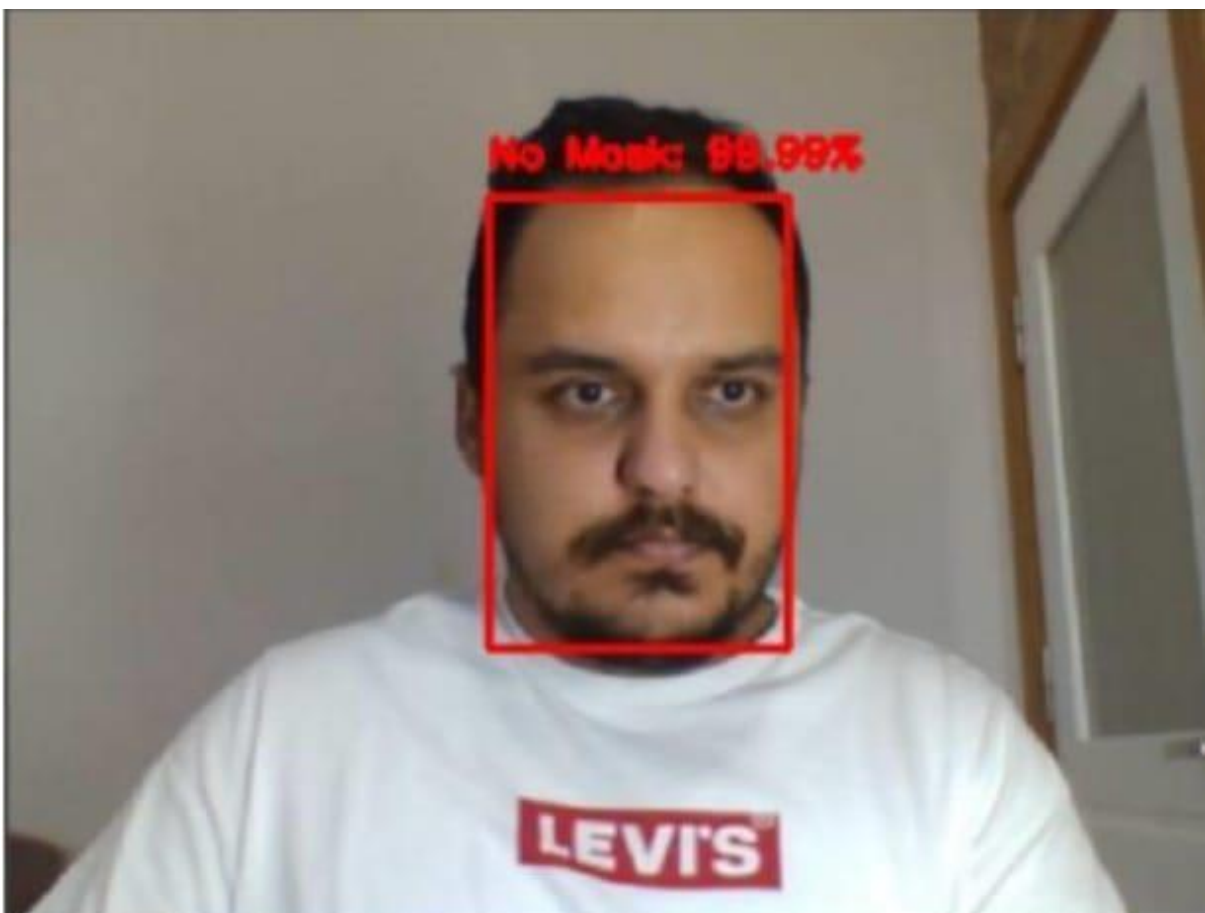
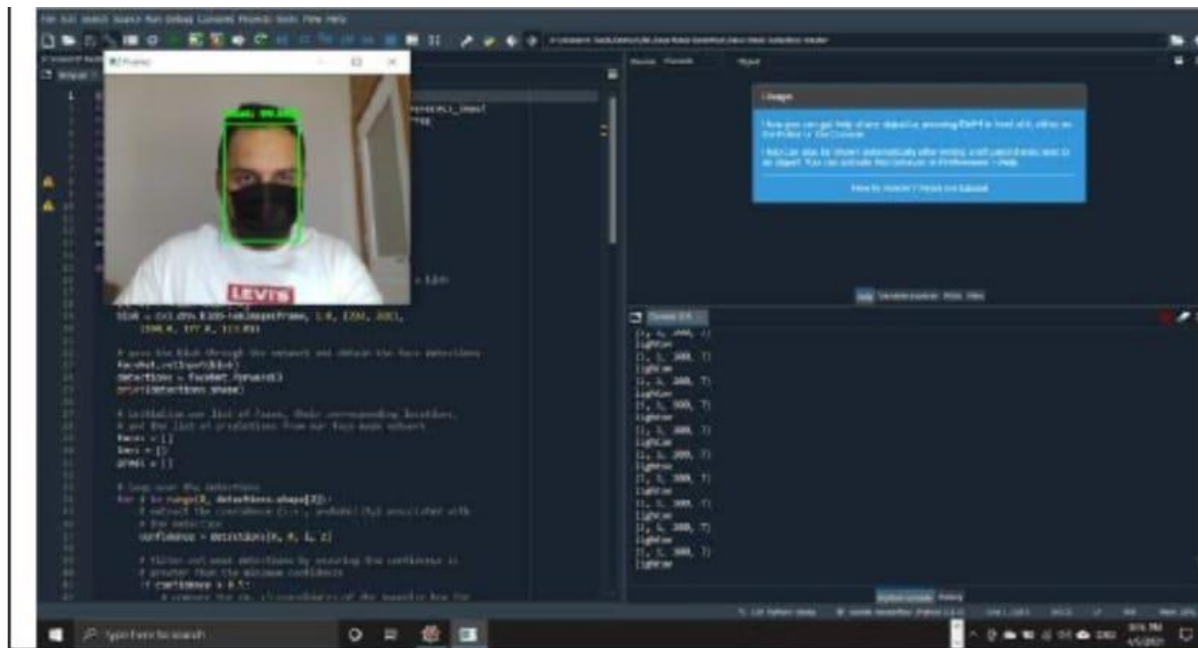
Team Members:

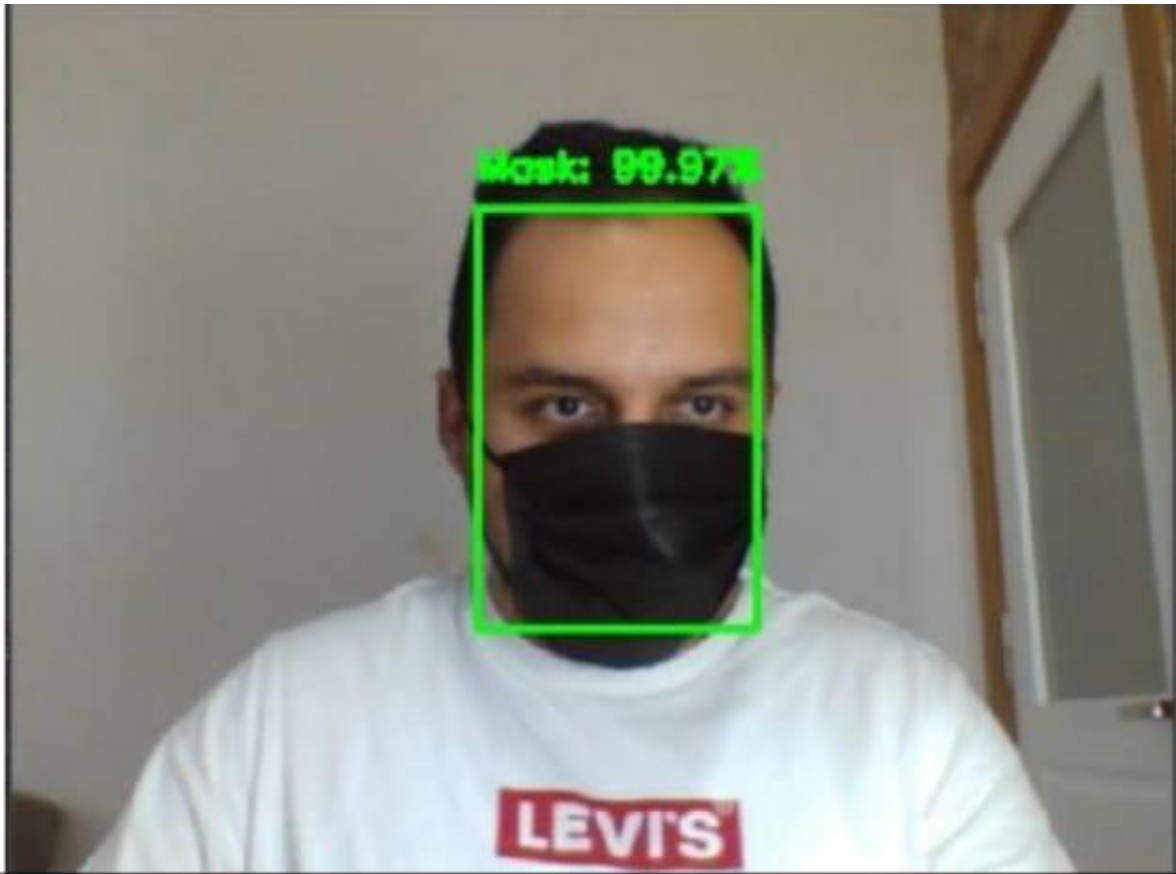
S No	Register No	Name	Role
1	RA2011003010097	Suvansh Sharma	Rep/Member
2	RA2011003010130	Indrayan Mitra	Member
3	RA2011003010134	Sidhartha dhar	Member
4.	RA2011003010103	Suryansh Dwivedi	Member

Executive Summary

The objective of the project is to measure health factors like calories, heart rate, etc. of the user and suggest suitable diet and training routines. The scope of the project is to give the user an interface where he/she can interact with the app. The approach is that we created the user interface on Figma to see how the clients react to it.

User interface





Test Plan Scope of Testing

Functional: All functional modules are covered and they are properly implemented. Automation contains all functional test cases.

Non-Functional: All NFR (Non-Functional Requirements) are covered.

Types of Testing, Methodology, Tools

Category	Methodology	Tools Required
Functional Requirements	Manual	Figma

Result: Thus, the testing framework/user interface framework has been created for the Fitness App.



School of Computing

SRM IST, Kattankulathur – 603 203 Course

Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	11
Title of Experiment	Test Cases
Name of the candidate	SUVANSH SHARMA
Team Members	SIDDHARTHA DHAR,SURYANSH DWIVEDI,INDRAYAN MITRA
Register Number	RA2011003010097
Date of Experiment	14/06/2022

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Staff Signature with date

Aim

To develop the test cases manual for the <project name>

Team Members:

S No	Register No	Name	Role
1	RA201100301097	SUVANSH SHARMA	Rep
2	RA2011003010103	SURYANSH DWIVEDI	Member
3	RA201100301099	INDRAYAN MITRA	Member
4	RA2011003010081	SIDDHARTHA DHAR	Member

Test Case

Functional Test Cases

Test ID (#)	Test Scenario	Test Case	Execution Steps	Expected Outcome	Actual Outcome	Status	Remarks
1	Inputs from wearable		1. All the data from the wearable is synced with the app 2. If data is missing, diagnose the reason	Data is displayed Reason for not showing data is displayed	Data is displayed The following data is displayed : "Wearable not used"	Pass Pass	Success

Non-Functional Test Cases

Test	Test	Test Case	Execution	Expected	Actual	Status	Remarks
ID (#)	Scenario		Steps	Outcome	Outcome		
1	Speed	If data isn't being displayed within a certain time	If data isn't displayed within a certain time, restart the connection	Connection is refreshed	Connection is refreshed	Pass	Success
2	Sync	Checking data sync time.	If data isn't synced frequently, push a notification.	Notification sent	Notification sent	Pass	Success
3	Power consumption	Checking rate of power consumption	If power consumption is high, optimise	Optimised	Optimised	Pass	Success

Result: Thus, the test case manual has been created for the FACE MASK DETECTION.

School of Computing

SRM IST, Kattankulathur – 603 203

Course Code: 18CSC206J

Course Name: Software Engineering and Project Management

Experiment No	12
Title of Experiment	Manual Test Case Reporting
Name of the candidate	Suvansh Sharma
Team Members	Suryansh Dwivedi, Indrayan Mitra, Sidhartha dhar
Register Number	RA2011003010097
Date of Experiment	June 20, 2022

Mark Split Up

S. No	Description	Maximum Mark	Mark Obtained
1	Exercise	5	
2	Viva	5	
Total		10	

Staff Signature with date

Aim : To prepare the manual test case report for the BookMyPass.

Team Members:

S No	Register No	Name	Role
1	RA2011003010097	Suvansh Sharma	Rep
2	RA2011003010099	Indrayan Mitra	Member
3	RA2011003010081	Sidhartha Dhar	Member
4.	RA2011003010103	Suryansh Dwivedi	Member

Current State of Testing: After the development, a series of tests were conducted on the performance of the application. The tests conducted were both functional and nonfunctional.

Functional tests include testing of the login section, notification section, search bar and code file.

Non-Functional requirements like performance testing, speed resting were also conducted.

Present Obstacles:

Current Obstacles include:

- Number of COVID cases are changing daily that is difficult for business point of view.
- Increase in the number of changes occurring in the code.

Category	Progress Against Plan	Status
Functional Testing	Green / Amber / Red	Not-Started / In-Progress / Completed
Non-Functional Testing		
Login	Green	Completed
Response analysis	Green	Completed
Lag detection	Green	Completed
Non-Functional Testing		
Performance	Green	Completed
Speed	Green	Completed

Functional	Test Case Coverage (%)	Status
Module ID	30%	Not-Started / In-Progress / Completed
Module 1 (login)	80%	In-progress
Module 2 (response analysis)	90%	In-Progress
Module 3(lag detection)	100%	Completed

Result: Thus, the test case report has been created for the Face Mask detection system.