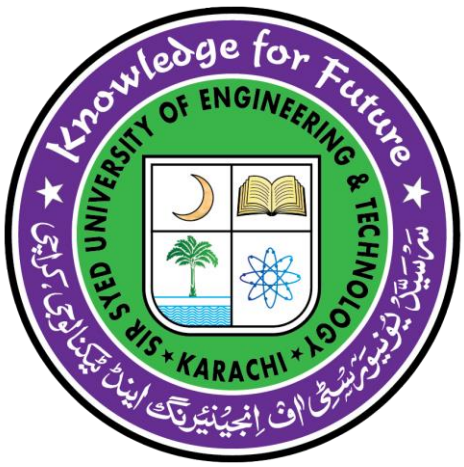
Final Year Project Report

Group No. 61 – Dress Code Detecting and Sounding Buzzer Using Deep Neural Network BS Information Technology, Batch 2018

Rabiya Tahir
Sr. Lecturer
SSUET

Submitted by

2018-IT-036	**Noman Saeed Soomro**
2018-IT-030	**M. Kashaan Siddiqui**
2018-IT-051	**Sarshar Imtiaz**



Department of Computer Science & Information Technology
Sir Syed University of Engineering & Technology
University Road, Karachi 75300
http://www.ssuet.edu.pk

Final Year Project Report

Group No. 61 – Dress Code Detection and Sounding Buzzer Using Deep Neural Network BS Information Technology, Batch 2018

Supervisor

Rabiya Tahir

Sr. Lecturer

SSUET

Submitted by

2018-IT-036	**Noman Saeed Soomro**
2018-IT-030	**M. Kashaan Siddiqui**
2018-IT-051	**Sarshar Imtiaz**

In Partial Fulfillment
Of the Requirements for the degree
Bachelor of Science in Information Technology (BSIT)

Department of Computer Science & Information Technology
Sir Syed University of Engineering & Technology
University Road, Karachi 75300
http://www.ssuet.edu.pk

January 2021 to December 2021

DECLARATION

We hereby declare that this project report entitled **"Dress Code Detection & Sounding Buzzer using Deep Neural Network"** submitted to the "Computer Science/ Information Technology Department", is a record of an original work done by us under the guidance of Supervisor "Ms. Rabiya Tahir" and that no part has been plagiarized without citations. Also, this project work is submitted in the partial fulfillment of the requirements for the degree of Bachelor of Science in Information Technology.

Name : Noman Saeed Soomro	Signature: _____
Name : Muhammad Kashaan Siddiqui	Signature: _____
Name : Sarshar Imtiaz	Signature: _____

Supervisor:	**Signature:**
Rabiya Tahir	_____
Date	_____

ACKNOWLEDGMENTS

First and foremost, we would like to thank our Almighty Allah, for providing us the strength, courage of conviction and the strong sense of dedication to our project that enabled us to take it to the level that it has achieved today. Undoubtedly, we wouldn’t have been now here if it weren't for His Mercy and Blessings.

This work would have been impossible without the copious amounts of help, patience, and encouragement from our kind supervisor Ms. Rabiya Tahir. We would like to thank her for teaching us so much and for inspiring us with the example of hard work, providing great help and key information throughout the time required for the completion of this project report. We are also very thankful to Ms. Razia Nisar for her valuable support as FYP Coordinator in helping us tackling the risk and cost estimation and in testing phase of this project. We would also like to thank the entire faculty members for their able support and encouragement which enable us to complete our project report.

To our family, thank you for letting us do what we want to do, supporting our decisions. My deepest love and gratitude goes to our father and mother who played such a vital role all throughout our lives by always placing our interests ahead of theirs. This project work is dedicated to my parents, thank you for seeing us through every step of the way, for praying for us, and for rejoicing us over every little triumph. During our studies our family constantly provided us the hope that we needed to complete our higher education. Also, thanks to all other member of our family and friends whose love and prayers are with us all the time.

COPYRIGHT

ABSTRACT

Since the COVID-19 Pandemic, everything is preferred automated with less human contact. Using this uniform detecting and attendance system, a small portion of that goal would be achieved. This problem is very significant during these times but even after the pandemic is over, this project would still be useful for the organizations that require less staff and prefer automated systems in their organizations. This project completely automates the work of attendance and dress-code detection for any organization, we used various technologies which resulted in an automated uniform detection system with accurate timestamps that also monitors the time of the detection which acts as an attendance system. It is a Raspberry Pi based model integrated with an RFID reader and programmed with a machine learning algorithm using python programming language, namely SSD which uses deep neural network for object detection. It detects the dress code of the person scanning the RFID card. After scanning, an image of the person is captured via Pi camera on which the object detection is performed, and the decision is taken based on the taken image. If the dress code which is trained in the model is detected, a green light is shown and the timestamps of the entry are emailed as a record to the student along with the captured image, which also specifically mentions if the detected person was in proper uniform or in casual. If a person scans by in a casual dress, a buzzer will be sounded and a red light will be shown, also sending the email to the student, mentioning that the scanned person walked by was in a casual dress with the picture attached as a proof. Each day after 5:00 PM, the record of all the students who passed by scanning the RFID cards is sent to the admin and is deleted within the system. At the end of the semester, the record of the students can be checked by the authorities, and they can decide to issue the students with a fine after deciding upon a specific threshold of not being in a proper uniform.

Table of Content

List of Figures

List of Tables

Chapter 1

Introduction

1.1 Project Background

This project is the combination of Computer Vision, Artificial Intelligence, Machine Learning and Deep Neural Networks where the Data is trained in a model with the help of Object Detection Algorithms.

1.2 Project Objectives

1. To provide a Hardware/Software integrated platform that allows us to check the uniform of a student automatically.
2. To lessen and reduce the human contact due to the Covid-19 pandemic.
3. To reduce the work of overall employees in an establishment by automatically detecting the uniform.
4. To completely rid of disobeying students without the proper uniform code.
5. To generate a record in database for the students in improper uniform and take actions once reached a potential limit.

1.3 Problem Statement

Since the recent COVID-19 Pandemic, everything is preferred automated with less human contact. With this uniform detecting system, the human employee at the entrance will be at ease and would not even be needed unless called with the alarm and the student uniform will be checked automatically. This problem is very significant during these times but even after the pandemic is over, this project would still be useful for the organizations that require less staff, prefer automated systems in their organizations and such.

1.4 Project Scope

This project is based on object detection where we will use deep neural network framework (TensorFlow) to train our model on Google Collaboratory and the algorithm used for object detection is SSD mobilenet V2. Since this model will be trained on the Sir Syed University's uniform dataset, it's scope and value will only be recognized in the university itself. The target audience of our project will be the students and the staffs of the Sir Syed University since both students and the staffs can benefit from it and are also the stakeholders. If this project is deployed at the main entrance, its scope will be huge and can easily work for a few years until a new and better model is deployed. The final physical representation of the product would be a software integrated Raspberry Pi, attached with multiple instruments required for the working of the project, such as Camera, buzzer, RFID rc522, 16x2 Ic2 LCD etc.

Chapter 2

Literature Review

2.1 Existing Systems

2.1.1 Fresh Fruit Detection [1]

This project is based on object detection algorithm which detects and counts the Fruits presented in front of it. It only detects the fruits that are fresh presented in front of it by based on size, shape and color of the fruit.

2.1.2 Fire Alarm System [2]

This project detects the smoke which is generated via the Fire through the camera and generates an alarm if detected. It is a real-time monitoring system which also captures the images via a CCTV Camera if the alarm was set off. This system also reports to the firefighters via a SMS protocol.

2.1.3 Face Recognition Door Lock System [3]

This project recognizes the face which is trained in the model dataset and connects it through a door locking system. If the face that is trained in the dataset found in the camera, the door shall be unlocked, otherwise the door will be remained lock.

2.1.4 Clothing Recommendation for Fashion Recommendation [4]

This project detects and classifies various types of clothing such as upper body, lower body and long clothes and recognizes each type to suggest the users browsing in the fashion website.

2.1.5: RFID based Attendance System [5]

This project uses RFID technology to take student attendance and make students record in the form of excel sheet (CSV file) and track the student's presence with it and can take possible action when students absence limit reaches.

2.2 Comparative Analysis:

Features	Fresh Fruit Detection [1]	Fire Alarm System [2]	Face Recognition on Door Lock System [3]	Clothing Detection for Fashion Recommendation [4]	RFID Based Attendance System [5]	Dress Code Detection and Sounding Buzzer Using Deep Neural Network [6]
Object Detection	✓	✓	✓	✓	✗	✓
Alarm Generation	✗	✓	✗	✗	✗	✓
Radio Frequency Identification	✗	✗	✗	✗	✓	✓
Record Maintenance	✗	✗	✓	✗	✓	✓
Direct Mailing	✗	✗	✗	✗	✗	✓
Daily Report Schedule	✗	✗	✗	✗	✗	✓

Table No: 2.1: Comparative Analysis

Object Detection: This is the primary feature of our project which represents the detection of uniform that is trained in the model and will be detected. Object Detection is always in working phase and keeps restarting once every 3-4 seconds after a student scans their RFID card.

Alarm Generation: This feature works only if the dress-code that is trained in our model is not detected, hence an alarm is generated to call an employee and deal with the student with the improper uniform.

Radio Frequency Identification: This feature allows the model to have a RFID Card reader which is scanned through an RFID Card by the student, which stores all the basic information of the student like Name, Roll Number and Email.

Record Maintenance: This feature allows us to maintain a throughout record of each student that passes by the gate via smart uniform detector and scans their respective RFID Cards. Each information that is stored via Radio Frequency Identification is saved and maintained with the timestamps along with the object scanned (Uniform/Casual).

Direct Mailing: This is a commonly known Automatic Mail Service, which acts as a feature in our project which allows us to send the students their personal record of how they appeared at the gate (Picture, Time, Name, Roll Number, Uniform/Casual) via email after they scan with their RFID cards.

Daily Report Schedule: This feature allows us to pack all the image data into a zip file along with the CSV File which shall have all the record of the students appeared and scanned through RFID and send that data via email to the admin before the closing time of the university specifically 5:00Pm.

Chapter 3

Requirement Analysis

3.1 External Interface Requirements

3.1.1 User Interfaces

Since our project is a Hardware/Software integrated model, there is minimum interaction of the machine and the user so the only way by which the user and the machine connects is through the RFID Card Reader, which is one of the functional requirements of our smart Uniform Detector.

3.1.2 Hardware Interfaces

In this Hardware/Software Integrated project, a lot of hardware is used and integrated with one another. Such as Raspberry Pi, Camera, RFID Reader, LCD, Buzzer, LED. Some of which are connected through USB Interface and some of which via a Veroboard into the Raspberry PI.

Raspberry PI: It is the primary hardware which acts as a CPU into which the algorithm is encoded along with many python libraries. All the sensors and external hardware's are connected to this Pi via GPIO and USB interface.

Camera: It will perform the primary function of the project that is object detection and is connected to the Raspberry Pi via USB interface.

RFID Reader: It is connected to the Raspberry Pi via the GPIO Interface and will be used to read the RFID Cards which is one of the functional requirements of the project.

LCD: This LCD will act as a main instructor to give feedback; it is also connected to the Raspberry Pi via the GPIO interface.

Buzzer: This buzzer will go off once a non-trained object is detected, it is also connected via GPIO interface into the Raspberry Pi.

LED: The LED will also be connected to the Raspberry PI via GPIO Interface and will show different colors for different conditions. Green for a trained detected object and Red for a non-trained object.

3.1.3 Software Interfaces

The primary Software Interface of this project is the Python Programming language which is used thoroughly to implement this project. All the working such as object detection algorithm and all the other work being done by the hardware components such as Camera, Buzzer etc., is interfaced via Python and Python Libraries.
CSV will be used to keep a record of all the student information.
Raspbian Operating System will be used which is one of the OS of Raspberry Pi.
PyCharm and Google Collab will be used as tools.
TensorFlow will be used as the primary library to train model and object detection.

3.1.4 Communications Interfaces

The only communication interface that will be used for the project is SMTP (Service Mail Transfer Protocol). SMTP will send an automated mail every time a student scans their RFID Card through the reader. That email will include the basic information of that student such as their name, roll number, date and were wearing a uniform or in casual. Secondly at the end of the day, the entire record of students who scanned their RFID cards is sent to the admin at 5:00Pm, which is also done by SMTP.

3.2 Functional Requirements

ID	Requirement
REQ-1	**Dress Code should be detected**
REQ-2	**Record of each student should be saved**
REQ-3	**An alarm should go off in case the trained object is not found**
REQ-4	**Daily report should be generated and sent to the admin**
REQ-5	**Email should be sent to each student after scanning RFID Card**

Table No: 3.1: Functional Requirements

3.3 Other Nonfunctional Requirements

3.3.1 Performance Requirements

Our project should be fast and efficient to use without having any unnecessary delay between processes.

3.3.2 Safety Requirements

Our project Design should be safe to use for anyone. The project design itself should not be having any unnecessary wiring and must have proper cable management.

3.3.3 Security Requirements

The Student Data should only be accessible by the admin and must not be leaked since it contains sensitive information.

3.3.4 Software Quality Attributes

Availability: Since our project will be a perfectly functional model, it will execute the tasks it is designed to perform. So, whenever it is requested for us, it shall be always available.

Correctness: Our project is functioned to always perform correctly, whenever required to use by the user. Our model will behave correctly with the encoded algorithms as designed.

Flexibility: Our Model can be flexible in such a way that if any other organization with a different dress code wants to request the same project as us, we can train the data of their dress code and adapt to their organization hence it is flexible.

Maintainability: The maintainability of our model will be easier because any fault or any form of error can be corrected with ease.

Portability: Since our project's location can be changed easily, it can be considered as a portable device and can move from one place to another hence it supports portability.

Reusability: Our project can be updated any time if new features or ideas come up that are suitable hence it can be programmed with new features while keeping the primary modifications same or slightly different.

Usability: Since our project has functions that are efficient and easy to use, it supports usability attribute.

3.4 Cost Estimation

S. No	Project Expenditure	Cost in Rupees
1	**Hardware Cost**	
	• Raspberry Pi 4 Model B ----------→	16,000
	• Raspberry Pi 4 Case with Cooling Fan ---------→	1,000
	• IP Camera with 32GB Memory Card ---------→	6,600
	• Pi Camera ----------→	1,000
	• LCD I2C 20x4. ----------→	600
	• Buzzer and RGB LED ----------→	200
	• Jumper Wires ----------→	200
	• Raspberry Pi Power Supply ----------→	600
	• HDMI Cable ----------→	300
	• Resistors ----------→	20
		Sub Total: **Rs 26,520**

Table No: 3.2: Cost Analysis

3.5 Project Plan with Gantt Chart

Task	Start Date	End Date	No.of Days
Gather Requirements for Project Proposal Defense File.	5-12-2020	2-2-2021	59
Raspberry Pi Configuration and Operating System	15-2-2021	20-2-2021	6
Integration and Working of RFID and LCD	21-2-2021	02-4-2021	43
Data Collection and Augmentation.	03-4-2021	03-7-2021	90
Labeling Images and Converting them into CSV file.	04-7-2021	14-7-2021	10
Configuration of Tensor flow and (DNN) Object Detection Algorithm.	15-7-2021	25-7-2021	10
Model Training on Google Colab and Conversion to Tensor Flow lite.	26-7-2021	06-8-2021	10
Converting Tensor Flow Lite into Coral TPU and testing the trained dataset in different lighting conditions.	07-8-2021	27-9-2021	50
Integration of RFID and Object Detection.	28-9-2021	12-10-2021	14
Working of the Database and SMPT.	13-10-2021	23-10-2021	10
Working for the Logics (Buzzer, LED)	24-10-2021	14-11-2021	20

Table No: 3.3: Project Plan with Gantt Chart

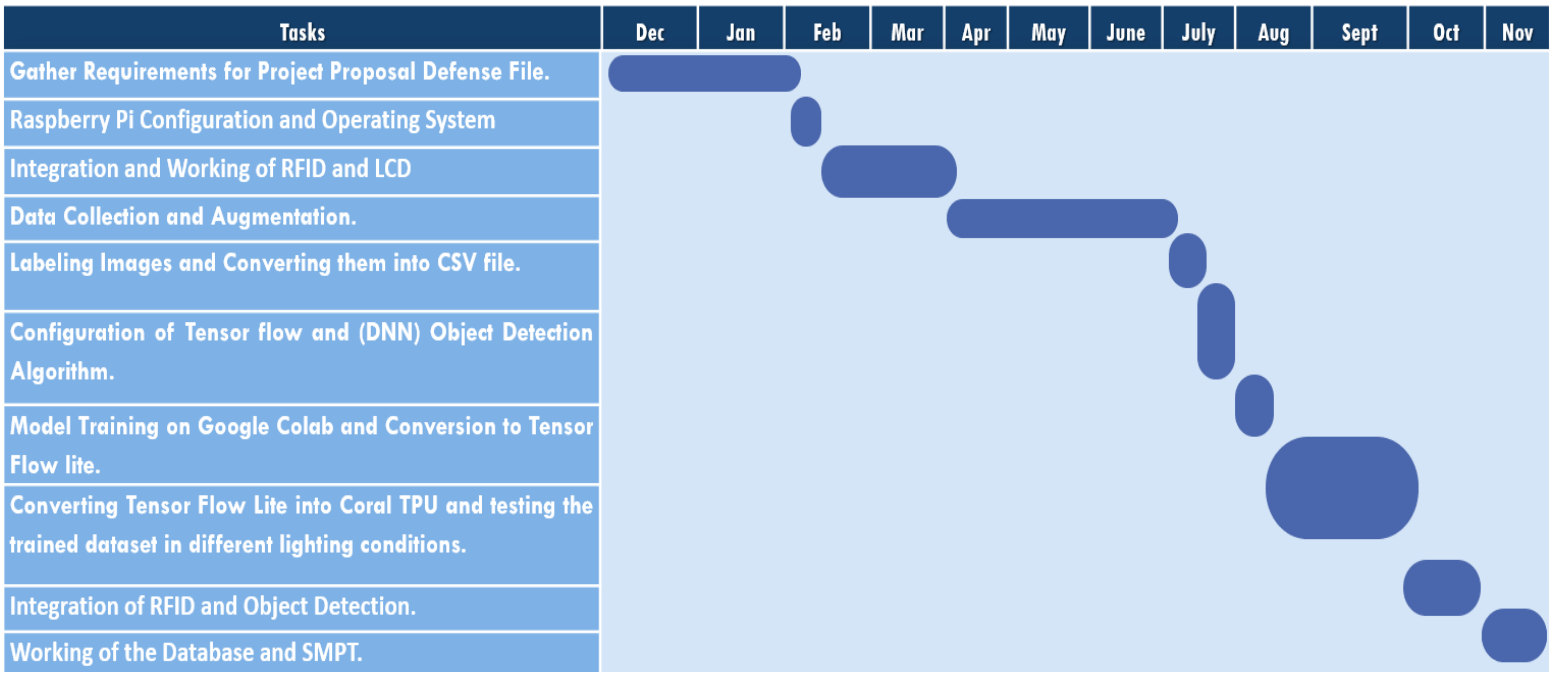


Table No: 3.4: Project Plan with Gantt Chart

Task	Start Date	End Date	No. of Day	Resource Name
Gather requirements for project proposal defense file.	5-12-2020	2-2-2021	60	Sarshar
Raspberry Pi configuration and operating system.	15-2-2021	17-3-2021	30	Noman
Integration and working of RFID and LCD	18-3-2021	02-4-2021	15	Kashaan
Data collection and Augmentation	03-4-2021	03-5-2021	30	Noman, Sarshar, Kashan
Labeling images and converting them into CSV.	04-5-2021	14-5-2021	10	Sarshar
Configuration of TensorFlow and algorithms.	26-5-2021	06-6-2021	10	Noman
Model training on GoogleColab and converting to tensor flow lite.	07-6-2021	27-7-2021	50	Kashaan, Noman
Testing in different lighting conditions,	28-7-2021	12-8-2021	14	Sarshar
Deployment of the trained model with RFID in Raspberry Pi	13-8-2021	23-8-2021	10	Kashaan, Sarshar
Working for the Logics (Buzzer, automated mail)	24-8-2021	14-9-2021	20	Noman

Table No: 3.5: Project Plan

3.6 Software Development Life Cycle Model

For our project, we have considered to use the Waterfall development model because it follows a sequential pattern and is best for mid-sized projects where the requirements are clear, which is the case of our FYP.

Waterfall model is also easy to understand and works in phases where in every phase, a part of project is completed, and we move forward to the next phase. As the first step is requirement analysis, we concluded the requirement of our FYP first and will continue to follow the steps of this model until the last step.

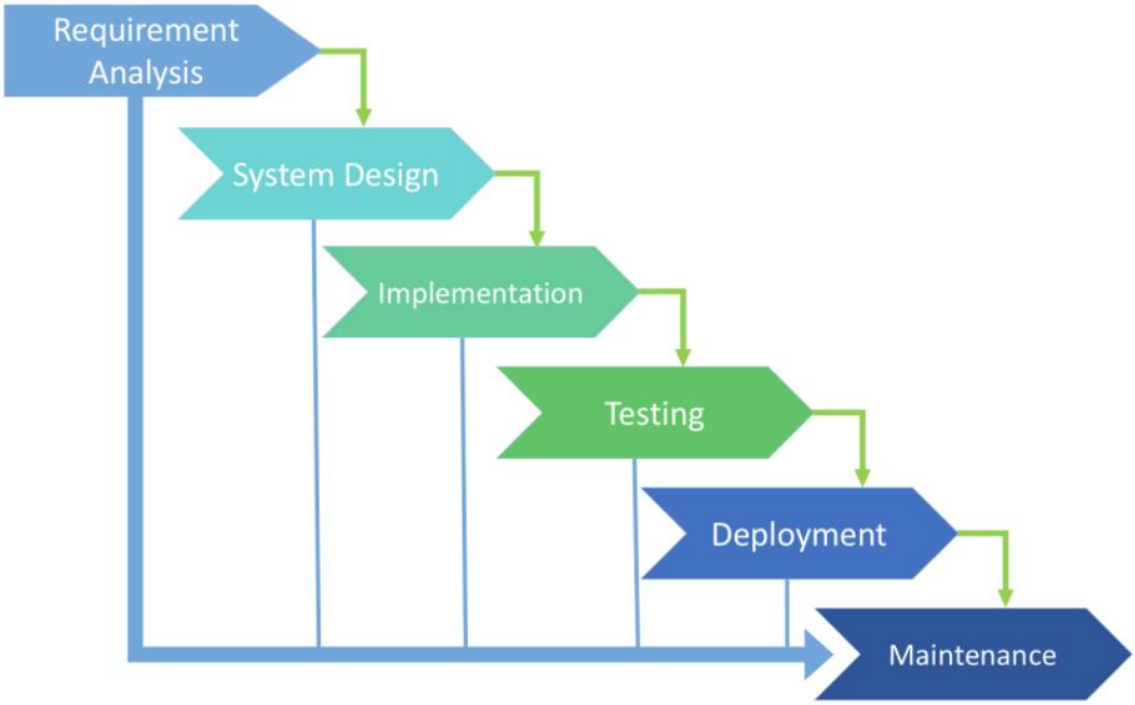


Figure No: 3.6 SDLC

Requirement Analysis: The requirements that needed to be congregated are first well-thought and then written in a paper format, much as like the Proposal Defence.

System Design: The concept of the system design is assumed and then written in a document as the next step. It also gives the idea of the final physical look of the hardwares when integrated together. In this case, the integration of Raspbery Pi, camera, LCD, etc.

Implementation: With the help of the documentation of system design, the project starts to implement physically by assemblimg the components such as Raspery Pi, Camera, LCD etc by intergrating them with jumper wires.

Testing: After the intergration, every component and unit is tested individually and combined to check for any failures. A full testing is also held after the integration of all units.

Deployment: After the entire testing is done, the project is then deployed into the environment to be used by the faculty. In this case, the smart uniform detector is meant to be used by the university in the entrance gate.

Maintenance: Over time, the project is updated with more functions and even with the fixes if they occur in the time of its environmental usage.

Chapter 4

System Design

4.1 System Architecture Diagram

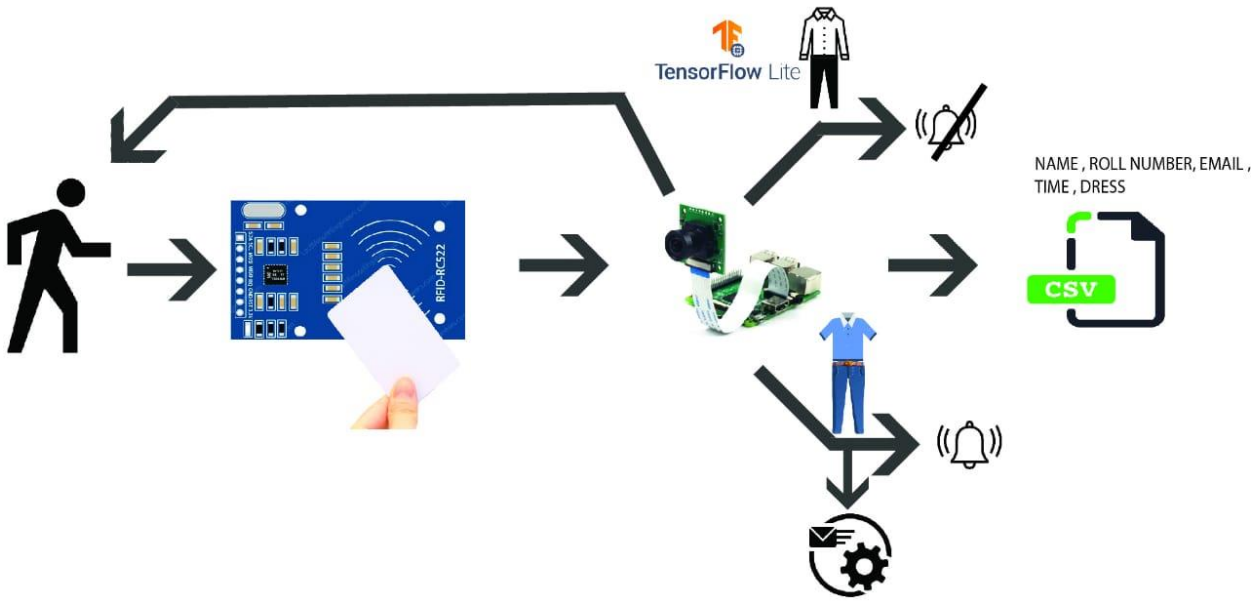


Figure No: 4.1 System Architecture Diagram

As we can see in the System Architecture Diagram, the student will first scan their RFID Card through the RFID Scanner which will enable the camera to capture their picture. After that, the object detection will initiate on the captured image and will show the green light in LED if the proper uniform is detected, otherwise red light will be shown. After the object detection phase, the database of the student is generated which shall include their university details and as well as whether they were in a proper dress or not, all that particular info shall be sent to their respective emails and at the end of the day, each information is sent to the admin.

4.2 System Operations

4.2.1 UML Sequence Diagram

The Project begins in the user Thread, the RFID Card is scanned by the user which moves onto the Device Thread, after being Scanned, the Object Detection starts taking place which moves onto the Database Thread that checks for the object in the trained dataset.
The phase then again moves onto the Device Thread and a Green light will be shown in the LED if the trained object is detected, otherwise a red light will be shown.
After this 4-5 second procedure, the user walks away and at the same time in the Device Phase, the information of that user is stored in the Database, so the project moves again into the Database Thread.
After storing the information, the last phase begins which goes from the Database Thread to the Device Thread in which the Model will email the stored information to the user.

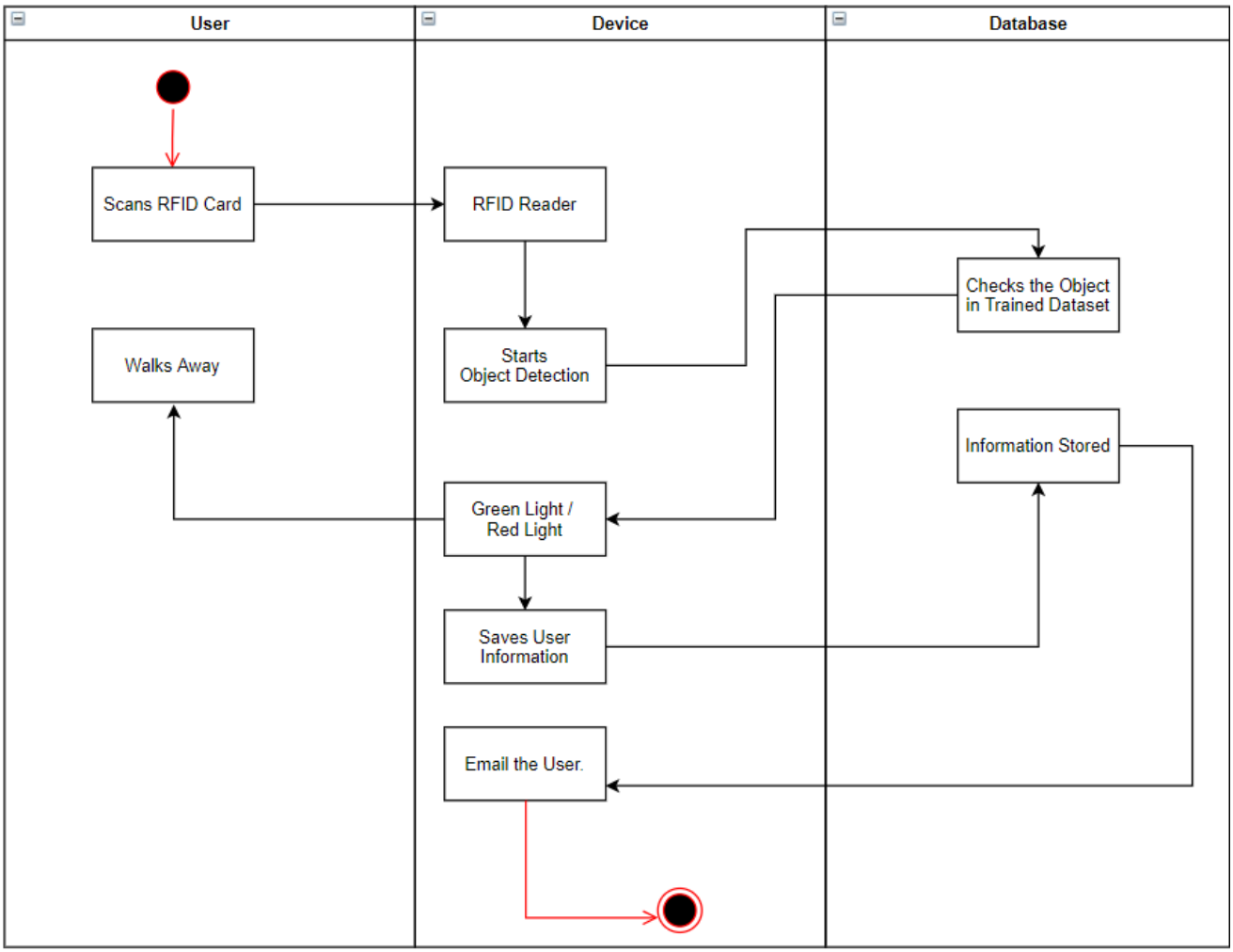


Figure No: 4.2 UML Sequence Diagram

Chapter 5

System Development Methodology

5.1 Implementation Methodology

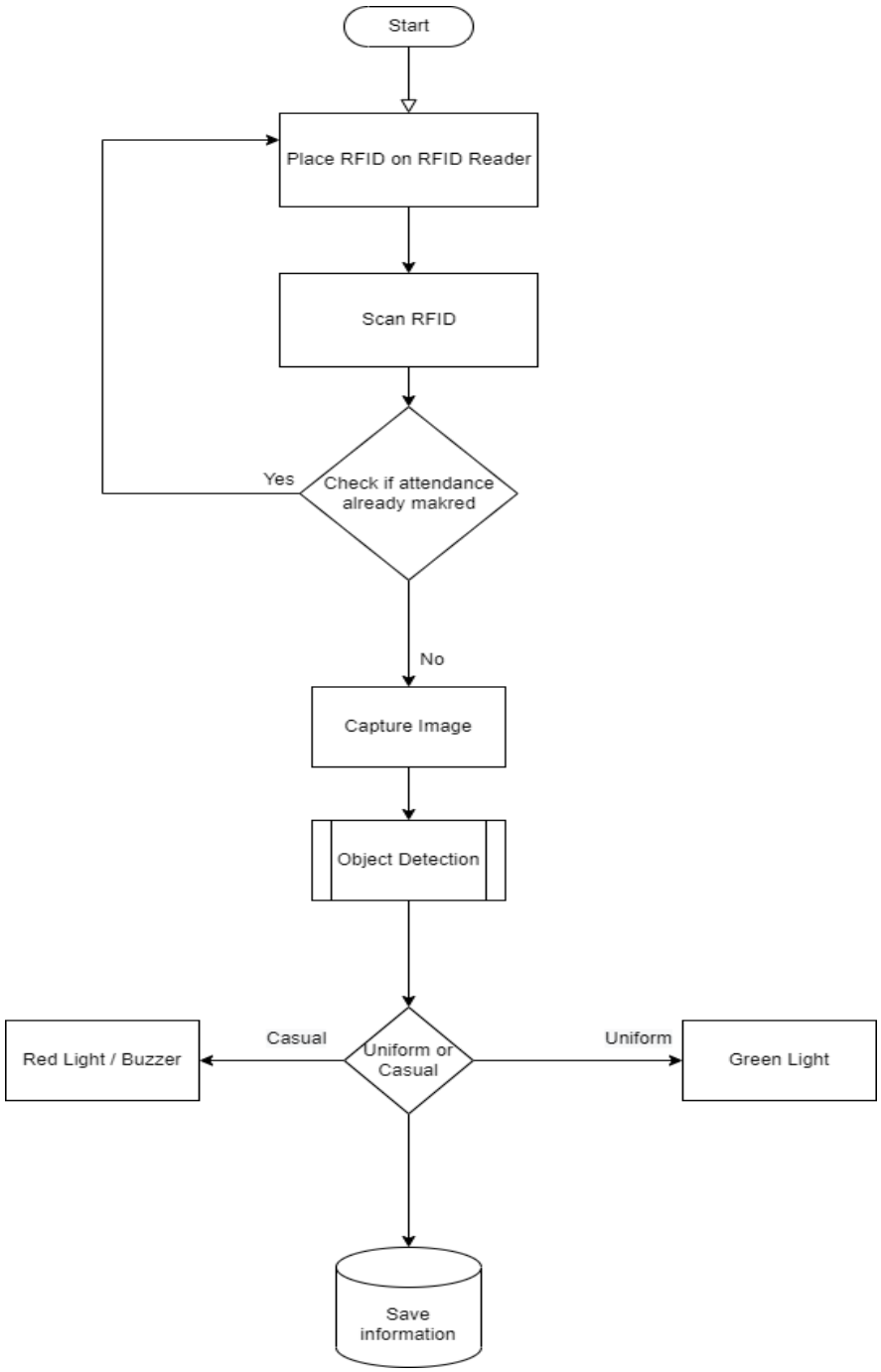


Figure No: 5.1 Implementation Methodology

5.2 Module

Our project has two basic modules.

- **Administrative module:** This is the admin user who has full access to the student's database and student records.

- **User module:** This is a normal user who can only view the email sent to them which contains the information stored in the RFID card.

5.2.1 Administrative Module

This module includes storing and retrieving the details of the data.

- Manage RFID Card.
- Block a student RFID Card.
- Manage User Enquiry through Email
- Manage Student Info

5.2.2 User Module

Since our project does not rely on much user interaction, the user would only have the following two access or features.

- Mark attendance by RFID scanning
- Enquiry to admin via email regarding their concerns.

5.3 Features

Our project contains many features, such as

- RFID ID
- Pi Cam Integration
- LCD Display 20x2
- Object Detection
- Buzzer / LED Lights
- Direct Mailing
- Daily Report Schedule to Administrator

5.4 FEATURES DESCRIPTION

RFID:
RFID Reader is integrated with the Raspberry Pi which is used by the student to scan their respective RFID cards. It is the initial phase of the project after which the camera becomes active.

Pi Cam Integration:
The second feature of the project is the camera, which is integrated with the Raspberry Pi, it takes the picture of the student who has scanned the RFID card, after taking picture, the objective detection phase begins.

Object Detection:
In this phase, the picture taken by the camera is sent to the model onto which object detection is performed. The decision is taken based on the picture captured on the moment and two different decisions can be made. Either the student is wearing proper uniform which is trained in the model, or the casual dress-code which is also trained.

Buzzer / LED Lights:
Buzzer and LED Lights are also integrated and act as one of the features of the project. A buzzer is sounded if the casual uniform is detected, and a red light is shown. If the proper dress-code which is trained in the model was detected, a green light is shown.

Direct Mailing:
This is a commonly known Automatic Mail Service, which acts as a feature in our project which allows us to send the students their personal record of how they appeared at the gate (Picture, Time, Name, Roll Number, Uniform/Casual) via email after they scan with their RFID cards.

Chapter 6

System Implementation and Testing

6.1 Introduction

6.1.1 Purpose

This is a testing document for Dress Code Detection and Sounding Buzzer Using Deep Neural Network System Testing, produced by the FYP members. It describes the testing strategy and approach to testing the team will use to verify that the application meets the established requirements of the business prior to release.

6.1.2 Objectives

- Meets the requirements and specifications.
- Supports the intended project functions and achieve the required software standards.
- Fulfill the scope.

6.2 Test Methodology

To test the project, we will use the Black Box testing methodology since it is the best suited methodology to test the functional requirements of the system.

6.3 Test Plan

We will test all of the following functional requirements mentioned in Table No: 3.2, step by step to ensure the perfect results of the project.

ID	Requirement
REQ-1	**Dress Code should be detected**
REQ-2	**Record of each student should be saved**
REQ-3	**An alarm should go off in case the trained object is not found**
REQ-4	**Daily report should be generated and sent to the admin**
REQ-5	**Email should be sent to each student after scanning RFID Card**

6.4 Test Approach

The strategy and approach we are going to use to test the project is Behavioral Testing Strategy. This testing strategy focuses on how the system interacts and how it is performing rather than the development mechanisms.

This strategy focuses more on the perspective of end-user sight, so the results are more dependable.

6.4.1 Manual Testing

We will perform manual testing in order to check for bugs or any unwanted behavior of the project.

6.4.2 Stages for Manual Testing

Unit Testing

This testing phase consists of testing every single component of the hardware individually. Making sure that every attached hardware is in working condition and integrated properly to perform its task.

Integration Testing

It is the next step which consists of combining all the hardware and software together and make sure that the desired output is still given. In our case, the integration of Raspberry Pi with hardware like LCD, LED etc.

System Testing

In this step, the entire coding, logics, and libraries were tested and made sure that the desire output was given, and all the protocols are working properly.

Acceptance Testing

In the last testing phase, we ensured that the project was ready for use in the real-time environment.

6.5 Test Environment

To test the project, no external hardware or software is required. The project can be manually tested by acting as an end-user.
We will place the RFID Card, and let the model perform the object detection as intended and inspect the results.

6.6 Test Entrance Criteria

The basic testing criteria required is only to make sure that the project is integrated properly, and the wiring s done properly. If the project is in proper working phase, the testing can commence.

6.7 Testing Acceptance Criteria

The testing is considered successful when all the functions requirements are met and working properly.

6.8 Test Cases

Test Case ID	Test Objective	Test Data	Expected Result	Actual Result	Test Status Pass / Fail	Bug ID
TC1	RFID Card Testing	String data such as Name, Roll Number, Email	Attendance Marked	Attendance Marked	Pass	
TC2	RFID Card Testing	String data such as Name, Roll Number, Email	Attendance Already Marked	Attendance Marked	Pass	
TC3	RFID Card Testing	String data such as Name, Roll Number, Email	Attendance Marked or Already Marked	Authentication Error	Fail	1
TC4	Object Detection Testing	Casual Image Data	Casual Wear Detected	Casual Wear Detected	Pass	
TC5	Object Detection Testing	Uniform Image Data	Uniform Detected	Uniform Detected	Pass	

TC6	Object Detection Testing	Uniform Image Data	Uniform Detected	Casual Detected	Fail	2
TC7	Buzzer Testing	Imported library of GPIO Pins and defined condition	Buzzer Sounding if casual detected	Buzzer Sounding if casual detected	Pass	
TC8	LED Lights Testing	Imported library of GPIO Pins and defined condition	Red light for casual and green light for uniform	Red light for casual and green light for uniform	Pass	
TC9	Email Testing to Student	Imported SMTP Protocol and integrated	Students received email after scanning	Students received email after scanning	Pass	
TC10	Email Testing to Admin	Imported SMTP Protocol and integrated	Admin received email after 5:00Pm	Admin received email after 5:00Pm	Pass	

Table No: 6.1: Test Cases

6.9 Bug Reporting

6.9.1 Bug Tracking

- No specific tool can be used to detect bugs in the project, only manual testing can be done.

6.9.2 Bug Severity Definitions

Levels	Definitions
Critical	The defect causes a catastrophic or severe error that results in major problems and the functionality rendered is unavailable to the user. A manual procedure cannot be either implemented or a high effort is required to remedy the defect. Examples of a critical defect are as follows: • Data cannot flow through a business function/lifecycle • Data is corrupted or cannot post to the database
Medium	The defect does not seriously impair system function can be categorized as a medium Defect. A manual procedure requiring medium effort can be implemented to remedy the defect. Examples of a medium defect are as follows: • Form navigation is incorrect • Field labels are not consistent with global terminology
Low	The defect is cosmetic or has little to no impact on system functionality. A manual procedure requiring low effort can be implemented to remedy the defect. Examples of a low defect are as follows: • Repositioning of fields on screens • Text font on reports is incorrect

Table No: 6.2: Bug Severity Definitions

6.9.3 Bug Priority Definitions

Levels	Definitions
High	Must be fixed in any of the upcoming builds but should be included in the release.
Medium	May be fixed after the release / in the next release.
Low	May or may not be fixed at all.

Table No: 6.3: Bug Priority Definitions

6.9.4 Bug Life Cycle

Bug life cycle includes following steps or status as shown in following diagram.

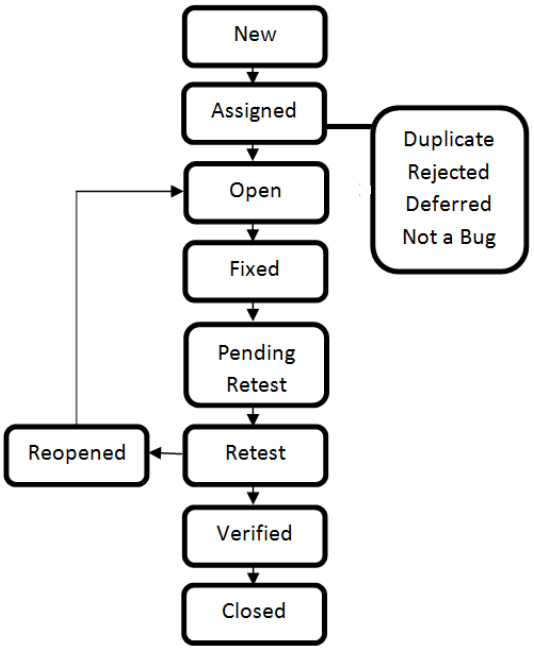


Figure No: 6.9.4 Bug Life Cycle

New: When a defect is logged and posted for the first time. Its state is given as new.

Assigned: After the tester has posted the bug, the lead of the tester approves that the bug is genuine, and he assigns the bug to corresponding developer and the developer team. Its state given as assigned.

Open: At this state the developer has started analyzing and working on the defect fix.

Fixed: When developer makes necessary code changes and verifies the changes then he/she can make bug status as 'Fixed' and the bug is passed to testing team.

Pending retest: After fixing the defect the developer has given that particular code for retesting to the tester. Here the testing is pending on the testers end. Hence its status is pending retest.

Retest: At this stage the tester do the retesting of the changed code which developer has given to him to check whether the defect got fixed or not.

Verified: The tester tests the bug again after it got fixed by the developer. If the bug is not present in the software, he approves that the bug is fixed and changes the status to "verified".

Reopen: If the bug still exists even after the bug is fixed by the developer, the tester changes the status to “reopened”. The bug goes through the life cycle once again.

Closed: Once the bug is fixed, it is tested by the tester. If the tester feels that the bug no longer exists in the software, he changes the status of the bug to “closed”. This state means that the bug is fixed, tested and approved.

Duplicate: If the bug is repeated twice or the two bugs mention the same concept of the bug, then one bug status is changed to “duplicate“.

Rejected: If the developer feels that the bug is not genuine, he rejects the bug. Then the state of the bug is changed to “rejected”.

Deferred: The bug, changed to deferred state means the bug is expected to be fixed in next releases. The reasons for changing the bug to this state have many factors. Some of them are priority of the bug may be low, lack of time for the release or the bug may not have major effect on the software.

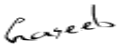
Not a bug: The state given as “Not a bug” if there is no change in the functionality of the application. For an example: If customer asks for some change in the look and field of the application like change of color of some text then it is not a bug but just some change in the looks of the application.

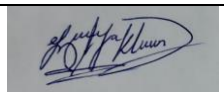
6.9.5 Bug Reports

Bug ID	Test Case ID	Bug Description	Reported By	Status	Fixed by	Severity	Priority
Bg-01	TC3	Authentication Error	Kashaan	Fixed	Noman	Critical	High
Bg-02	TC6	Casual Wear Detected in a Uniform	Sarshar	Fixed	Kashaan	Critical	High

Table No: 6.4: Bug Reports

6.10 Acceptance Testing

User# 1 Review :			
This is a great venture, where ID card are scanned using RFID Technology, which will easily track student presence in proper uniform (dress code), as well as make attendance in easiest manner.			
Name	Haseeb	Signature	

User# 2 Review :			
A great initiative taken, which will not only save times but also helps in maintaining discipline by tracking students in proper uniform. This automated attendance system will not only track students wearing proper uniform but also sends fined challan to indiscipline students.			
Name	Murtaza	Signature	

User# 3 Review :			
Remarkable achievement by creating a smart attendance system, which will not only detect students coming in proper uniform but moreover track those students who were not coming in proper uniform throughout the semester by sending a challan with their fee voucher.			
Name	Shahid	Signature	

Chapter 7

Result and Discussion

7.1 Model Training Results:

The model is trained using SSD algorithm and was fed the dataset of both casual and uniform images. The training is done in thousands of steps using Google Collaboratory.

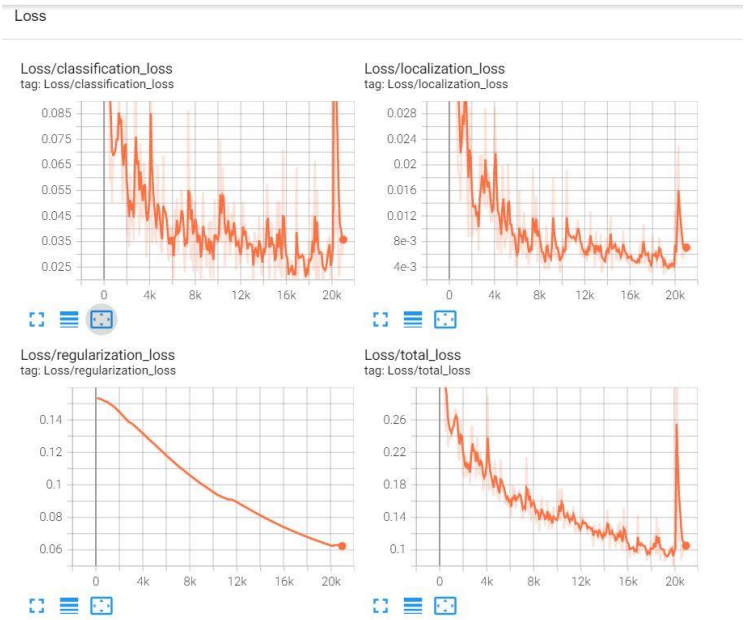


Figure No: 7.1 Model Training Results

7.2 Final Representation

Following is the final representation and results of the model.

Figure No: 7.2.1 Final Representation

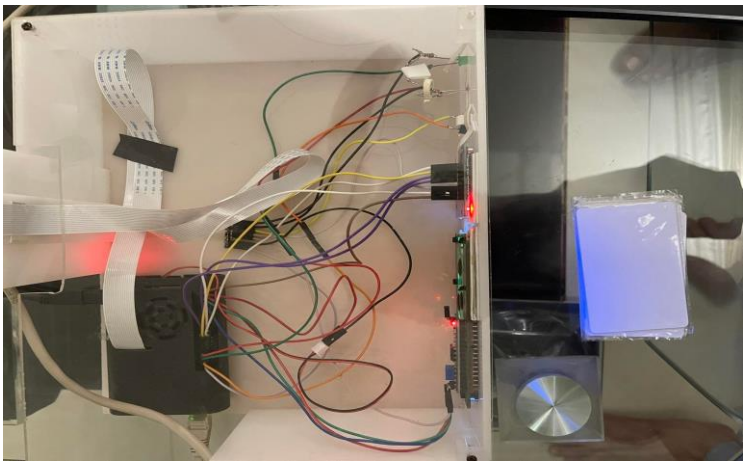


Figure No: 7.2.2 Final Representation

Figure No: 7.2.3 Final Representation

7.3 Real-time Results Object Detection Results

7.3.1 Casual Dress Detection

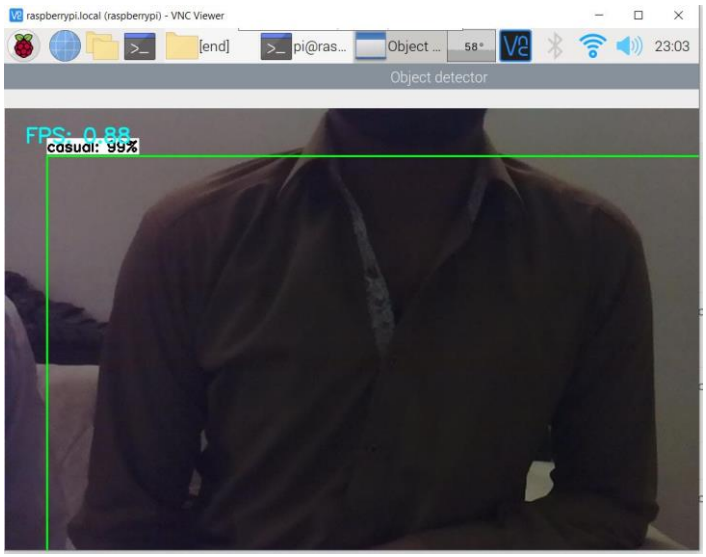


Figure No: 7.3.1 Casual Dress Detection

7.3.2 Dress-Code Detection

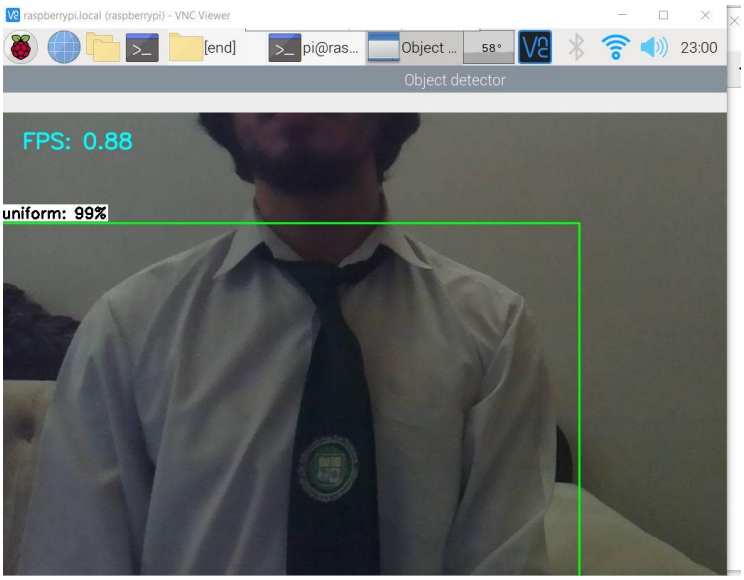


Figure No: 7.3.2 Dress Code Detection

7.4 Email Results

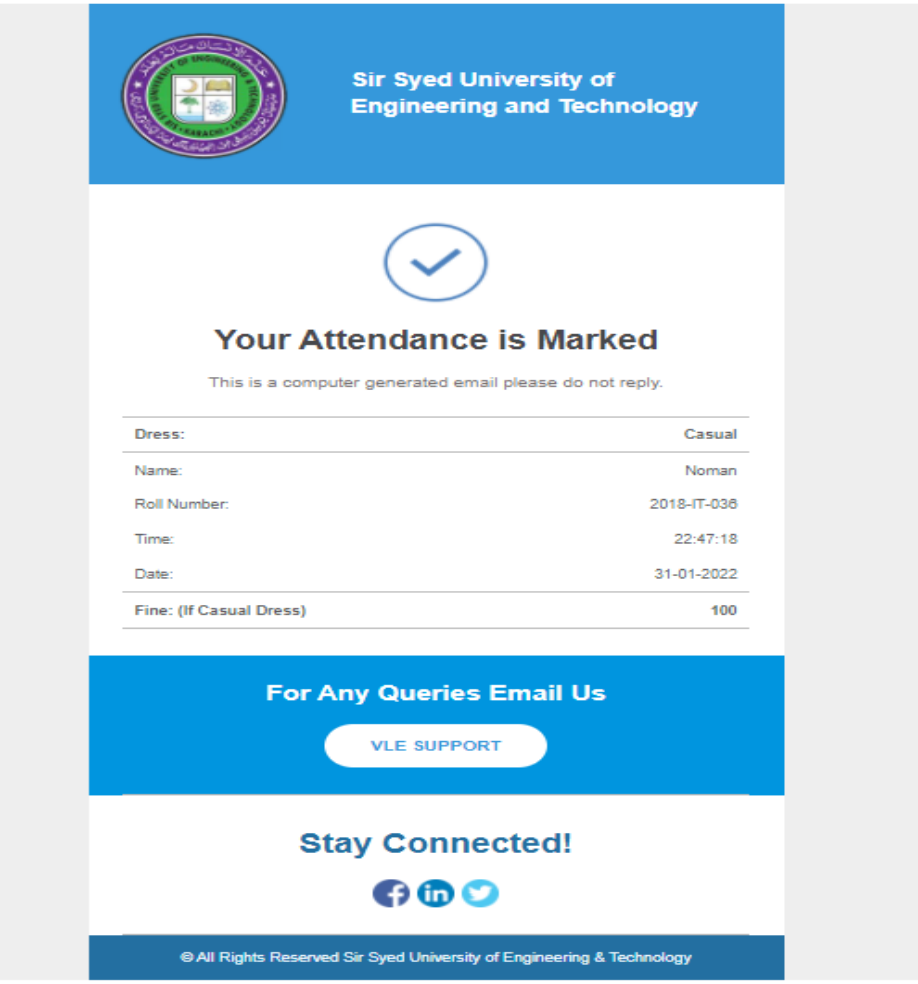


Figure No: 7.4 Email Results

Chapter 8

Future Work and Conclusion

8.1 Future Work

This project is a protype which aims to prove that any organization with a dress-code can have an automated dress-code checking system that also acts as an attendance system. The project still has a lot of room for improvement and a lot of room for many other features. In the future, more data can be collected within the Sir Syed University of Engineering and Technology to improve the accuracy of the project, and the model can be further improved.

8.2 Conclusion

The uniform checking in any organization is something that is done manually. The project **Dress Code Detection and Sounding Buzzer Using Deep Neural Network** has completely automated the dress-code checking work which creates a better impression of the overall establishment. It provides better productivity to the organization, reduce the efforts of staffs and their time and moreover, provide auditable records that are generated via the protocols used.

Chapter 9

User Manual

9.1 User Module

Our Dress Code Detection & Sounding Buzzer using Deep Neural Network, firstly scans the ID Card of students using RFID Technology, during the scanning process, the camera mounted on gate captures the picture of student & checks whether the student is wearing proper uniform or not, for which we have trained our model on Sir Syed University Uniform Datasets (White Shirt, Grey Pant & Green Tie). If a student finds in improper uniform, straight away a buzzer rings down and student won't be allowed to enter & will be charged fine, also an Automatic report schedule is done which will summarizes all those indiscipline students who do not follows university rules & regulation and are not coming in proper uniform.

9.1.1 RFID Scanning:

Figure No: 9.1.1 RFID Scanning

9.1.2 Dress Code Detection:

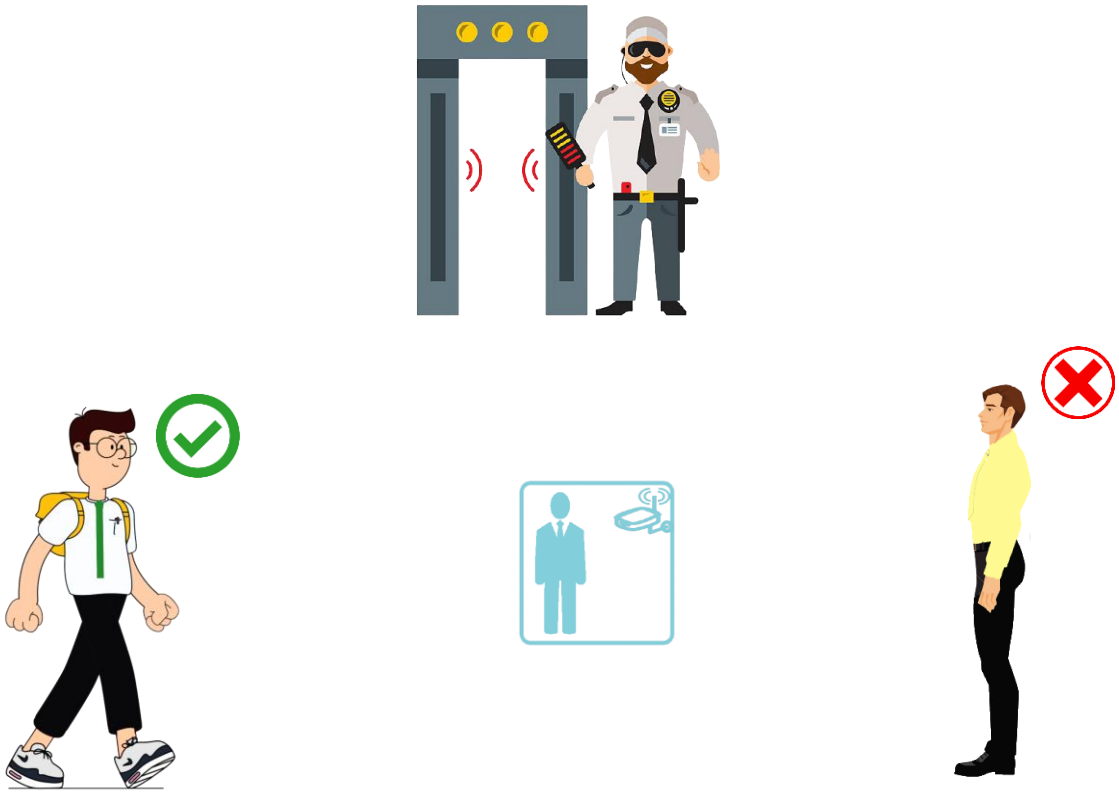


Figure No: 9.1.2 Dress Code Detection

9.2 Administrative Module

9.2.1 Data Collection Website using Flask

After commencing work on our project “Dress Code Detection & Sounding Buzzer using Deep Neural Network”, the main goal of this project was to track proper Dress Code of any organization, likewise in our case we were targeting our own university uniform dress code (White shirt, Grey pant & Green Tie), so therefore it was a bit challenging for our team to collect and gather the appropriate dataset of our university uniform. So, we created a data collection website using Flask and connects it with google storage, whereas we pushed our site on Heroku by creating a URL of it. Where we circulates this links to students where they drop their pictures of wearing uniform, this how our targeted number of dataset completed.

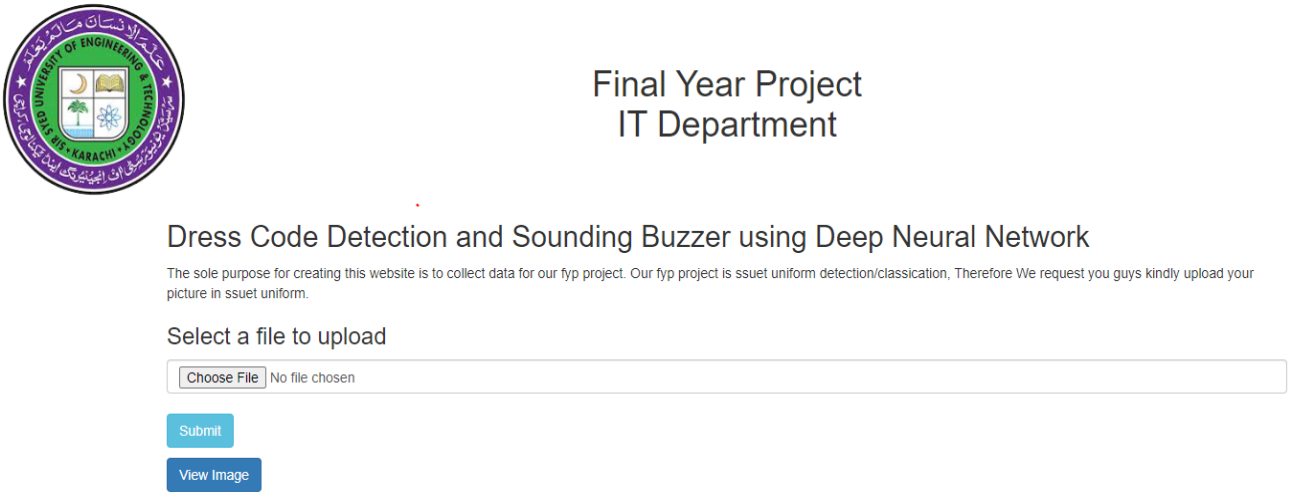


Figure No: 9.2.1 Data Collection Website using Flask

REFERENCES:

[1] Muhammad Syuhami Ab-Rehman, Aminatul Hidayah Asmir, Kasmiran Jumari, “Camera and GSM interfacing system for home security surveillance”, Space Science Institute (ANGKASA) Malaysia, Vol.8(38), Page 1858-1871, June 2013.

[2] Huiping Huang, Shide Xiao, Xiangyin Meng, Ying Xiong, “A Remote Home Security System Based on Wireless Sensor Network and GSM Technology”, Networks Security Wireless Communications and Trusted Computing (NSWCTC), 2010 Second International Conference, Vol.1, Page: 535 – 538, 24-25 April 2010.

[3] Jayasankar, K., Karthika, B., Jeyashree, T., Deepalakshmi, R., & Karthika, G. (2018). Fruit freshness detect ion using raspberry pi. *International Journal of Pure and Applied Mathematics*, *119*(15), 1685-1691.

[4] Imteaj, A., Rahman, T., Hossain, M. K., Alam, M. S., & Rahat, S. A. (2017, February). An IoT based fire alarming and authentication system for workhouse using Raspberry Pi 3. In *2017 International conference on electrical, computer and communication engineering (ECCE)* (pp. 899-904). IEEE.

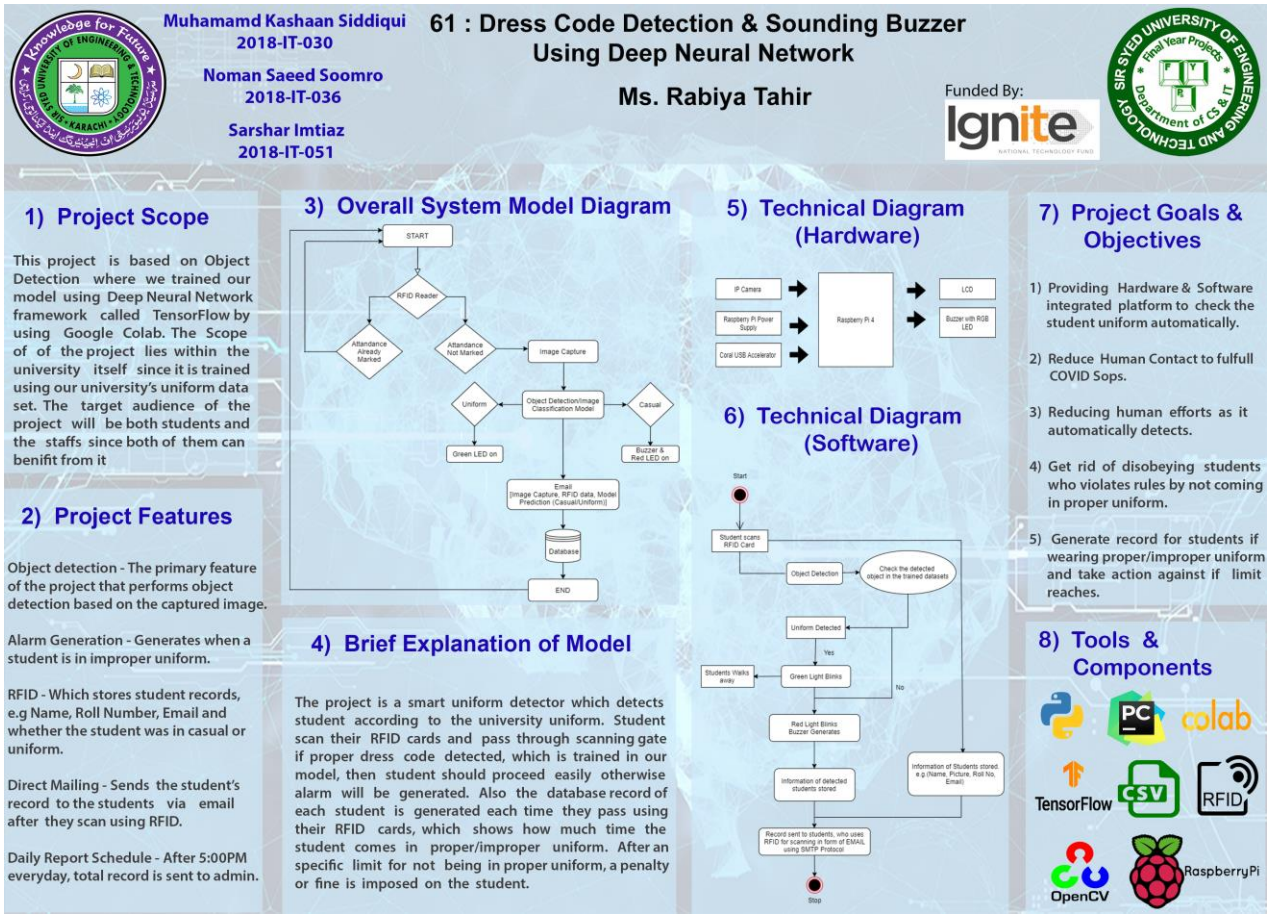
[5] Hussein, N. A., & Al Mansoori, I. (2017, September). Smart door system for home security using raspberry pi3. In *2017 International Conference on Computer and Applications (ICCA)* (pp. 395-399). IEEE.

[6] Kularatne, S. D. M. W., Nelligahawatta, A. N. I., Kasthurirathna, D., & Wickramage, S. A. (2019, November). Deep learning based apparel product development system. In *2019 From Innovation to Impact (FITI)* (pp. 1-6). IEEE.

[7] Lim, T. S., Sim, S. C., & Mansor, M. M. (2009, October). RFID based attendance system. In *2009 IEEE Symposium on Industrial Electronics & Applications* (Vol. 2, pp. 778-782). IEEE.

APPENDEX

- **Wall Poster**



- **Boucher (front)**

- **Boucher (back)**

PROJECT SCOPE

The project is based on Object Detection where we trained our model using Deep Neural Network framework 'TensorFlow' on GoogleColab, The algorithm for object detection is SSD MobilnetV2. The target audience will be our university (SSUET) itself. The model will be deployed at main entrance where both students and staff get benefit from it.The final physical representation of the product will be a software integrated RaspberryPi, attached with multiple instruments required for the working of project, such as Camera, Buzzer, RFID rc522, 16x4 i2c LCD etc.

GOALS & OBJECTIVES

- Providing Hardware/Software integrated platform to check the students uniform automatically.

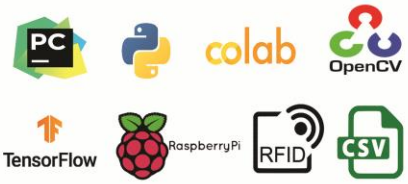
- Reduce Human Contact to fulfill COVID-19 SOP's.

- Reducing human efforts as it automatically detects the uniform.

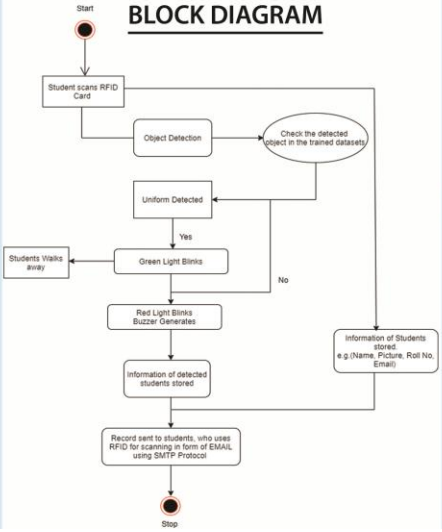
- Get rid of disobeying students who violates rules by not coming in proper uniform.

- Generate record for students wearing proper/improper uniform and take action if limit reached.

TOOLS USED



BLOCK DIAGRAM



PROJECT FEATURES

01

OBJECT DETECTION - Primary feature of our project, which detects the uniform of the student

02

ALARM GENERATION,- Generates when a student is in improper uniform.

03

RFID - Which stores student records like Name, Roll no., Email and Uniform/Casual.

04

DIRECT MAILING - Sends the student records to the student.via email after t hey scanned using their RFID.

05

DAILY REPORT SCHEDULING - After 5:00PM everyday, total record is sent to the admin.

- **Standee**


Dress Code Detection & Sounding Buzzer
Using
Deep Neural Network
Funded By:
Ignite
NATIONAL TECHNOLOGY FUND
GROUP MEMBERS
MUHAMMAD KASHAAN SIDDIQUI
2018-IT-030
kashaansiddiqui@gmail.com
NOMAN SAEED SOOMRO
2018-IT-036
nomiahmad90@gmail.com
SARSHAR IMTIAZ
2018-IT-051
sarshar.samoo@gmail.com
PROJECT FEATURES
Object Detection
Alarm Generation
RFID
Direct Mailing
Daily Report Scheduling
SIR SYED UNIVERSITY OF
ENGINEERING & TECHNOLOGY
Main University Road, Karachi 75300, Pakistan
Call: +92 21 3498-8000
Website: www.ssuet.edu.pk

PAGE FOR REMARKS / COMMENTS

PAGE FOR REMARKS / COMMENTS