BACHELOR PROJECT
Railway Automation Crossing System

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Department: Software Engineering
Faculty of Science and Information Technology
April 2020

Project in Brief

Project Title: Railway Project

Undertaken by:

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S.M. Rais Uddin Alvee	**ID: 171 35-1869**

Supervised by: SHEIKH SHAH MOHAMMAD MOTIUR RAHMAN

Date of Started:

Date of Completed:

Tools Used:

1. Monitor: HP 22es 2. CPU (7th) Generation

Operating System: Windows 10 Pro

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Chapter 1
Introduction

1 Introduction

1.1 About the System

Railway Crossing Project is a system which is used to control rail crossing automatically. It will send the Rail crossing data to the server for future use.

1.2 Purpose

To Reduce the Accident which is happen in Rail crossing.

1.3 Scope

Every Rail Crossing in Bangladesh need to control manually. That's the scope for this project. We will use it here.

1.4 Vision

Vision is to reduce rail crossing accident at least 99%.

1.5 Why this system is necessary?

This system is necessary to reduce the accident number which is happened in Rail Crossing.

1.6 Proposed Solution

There are 44 feature in this system and I have done 32 of them. Another 12 feature will be released on next version.

Chapter 2
System Analysis

2. Hardware Analysis

2.1 Hardware:

1. Arduino UNO R3 (2 pieces)
2. Ultrasonic sensor HC- SRO4 (2 pieces)
3. Mini servo SG90 (2 pieces)
4. Arduino Micro SD Card Module (1 pieces)
5. Real Time Clock Module DS3231 AT24C32 I2C (1 pieces)
6. LCD Display 16X2 with Header (2 Pieces)
7. I2C LCD Adapter (2 pieces)
8. 12V 2A AC Adapter (1 pieces)
9. 5V LED Traffic Light Module (2 pieces)
10. 5mm Red LED
11. Bread Board (3 pieces)
12. Jumper Wire, Type: Male to Male
13. Jumper Wire, Type: Male to Female
14. Jumper Wire, Type: female to female
15. Heat Shrink Tube, Size: C
16. Model Train

2.2. Description of Equipment

1. Arduino UNO R3 (2 pieces)

2. Ultrasonic sensor HC- SRO4 (2 pieces)

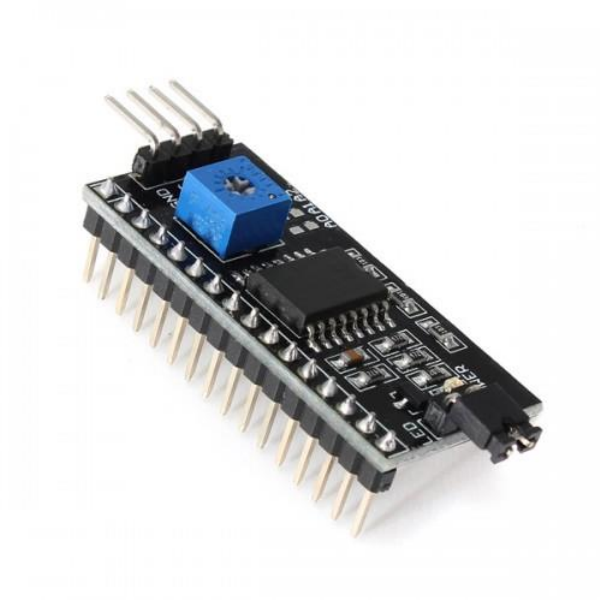
3. Mini servo SG90 (2 pieces)

4. Arduino Micro SD Card Module (1 pieces)

5. Real Time Clock Module DS3231 AT24C32 I2C (1 pieces)

6. LCD Display 16X2 with Header (2 Pieces)

7. I2C LCD Adapter (2 pieces)

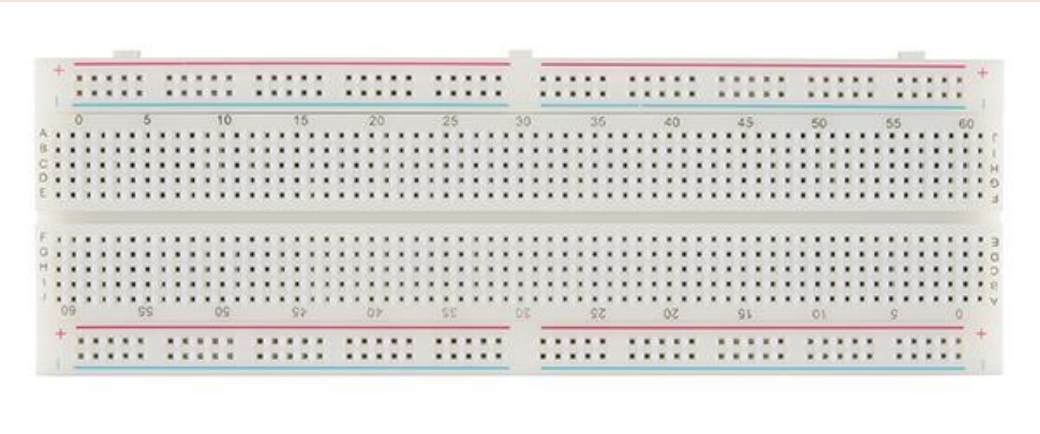


8. 12V 2A AC Adapter (1 pieces)

9. 5V LED Traffic Light Module (2 pieces)

10. 5mm Red LED

11. Bread Board (3 pieces)

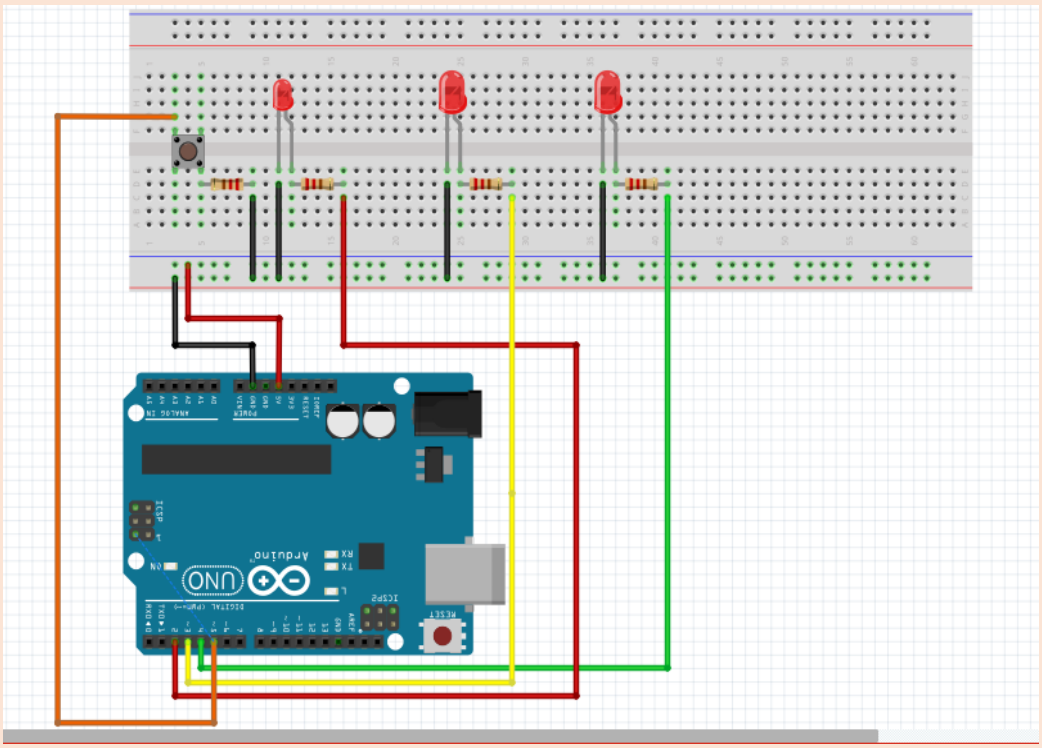


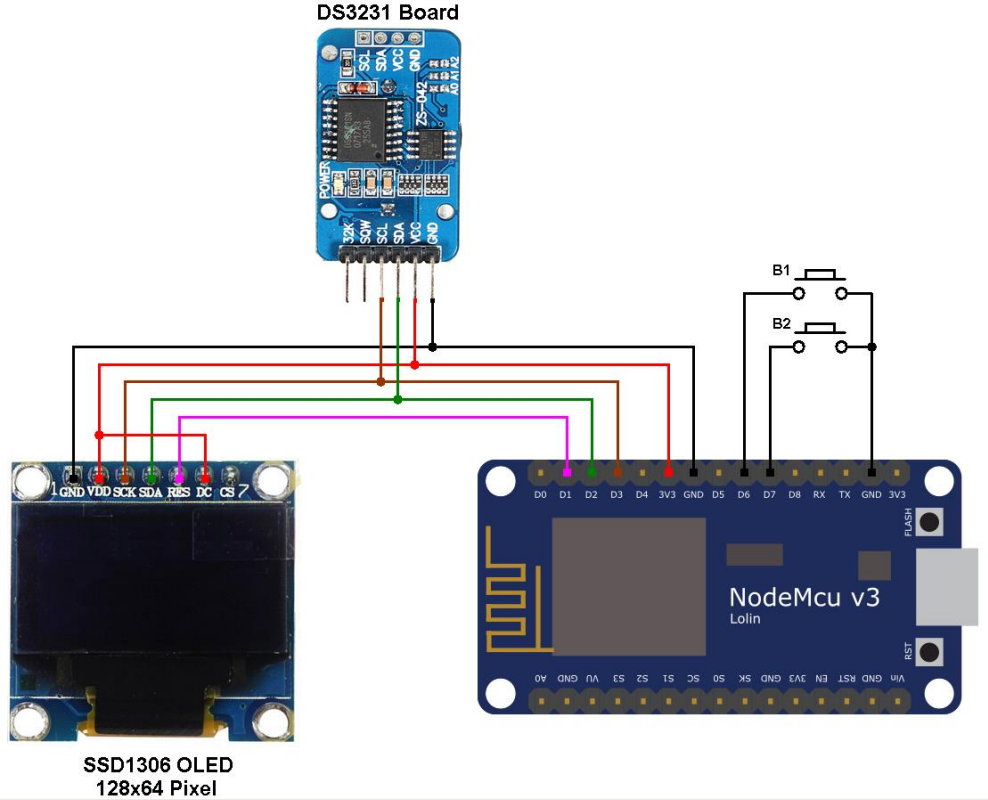
12. Jumper Wire

13. Heat Shrink Tube, Size: C

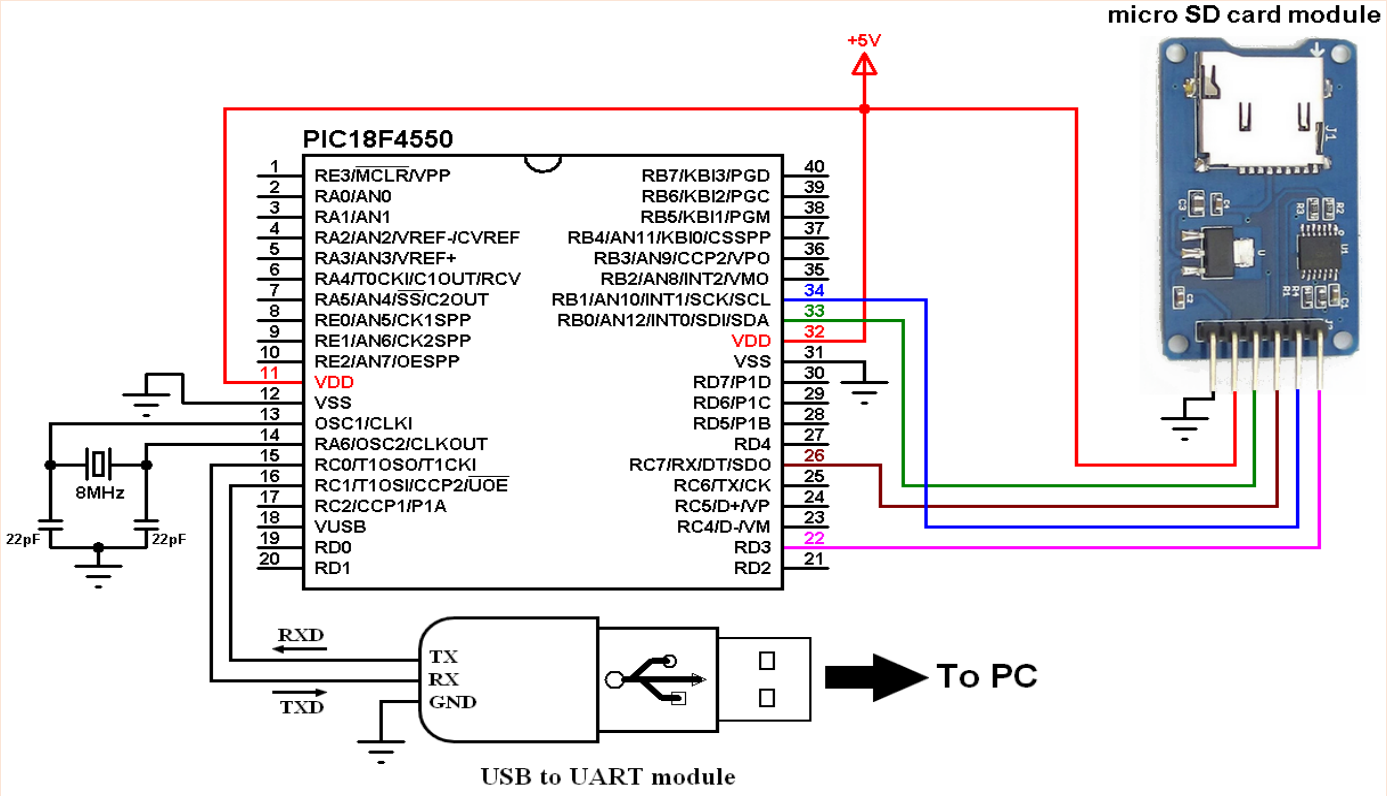
14. Model Train

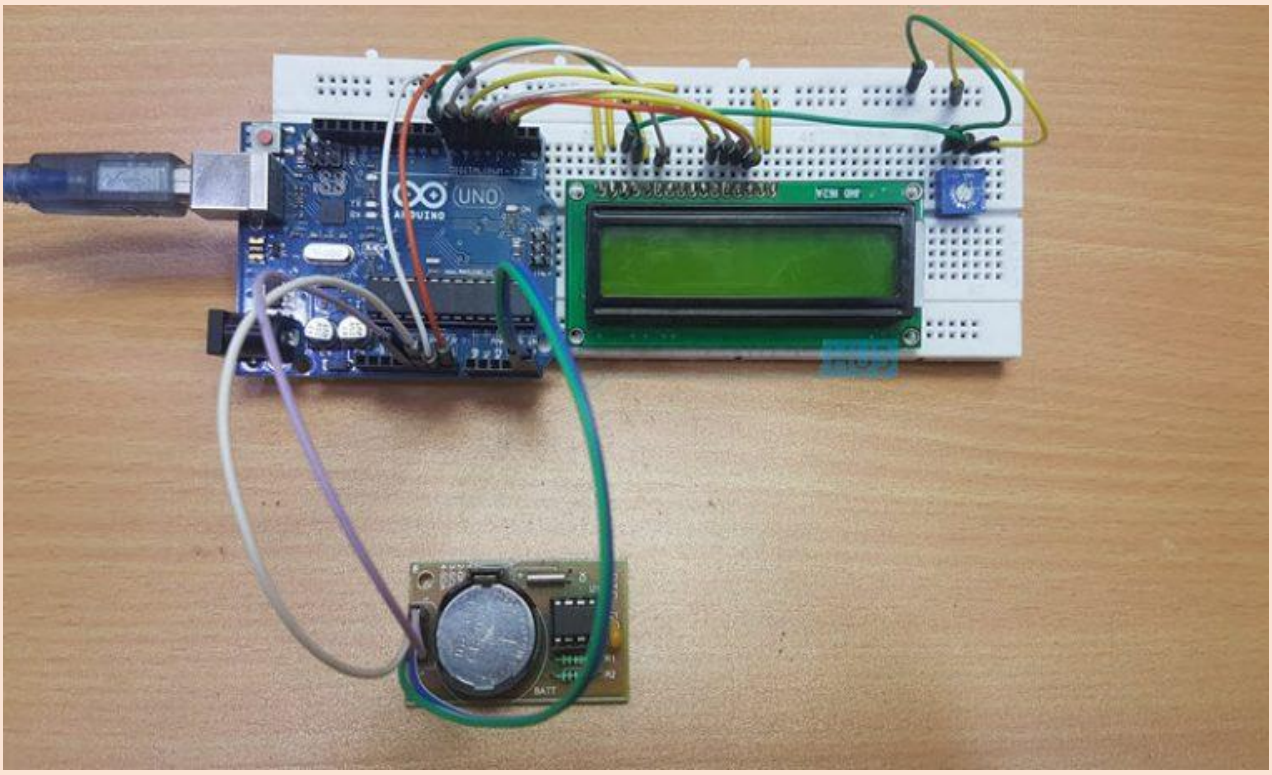
2.3. Circuit Diagram:

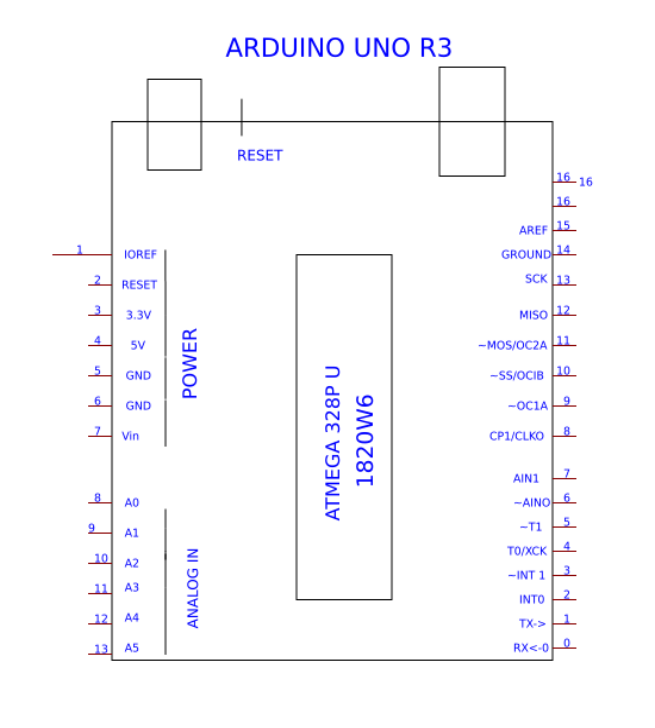



DS3231 Board
B1
B2
NodeMcu v3
Lolin
SSD1306 OLED
128x64 Pixel

SERVO


micro SD card module
+5V
PIC18F4550
1 RE3/MCLR/VPP
2 RA0/AN0
3 RA1/AN1
4 RA2/AN2/VREF-/CVREF
5 RA3/AN3/VREF+
6 RA4/T0CKI/C1OUT/RCV
7 RA5/AN4/SS/C2OUT
8 RE0/AN5/CK1SPP
9 RE1/AN6/CK2SPP
10 RE2/AN7/OESPP
11 VDD
12 VSS
13 OSC1/CLKI
14 RA6/OSC2/CLKOUT
15 RC0/T1OSO/T1CKI
16 RC1/T1OSI/CCP2/UOE
17 RC2/CCP1/P1A
18 VUSB
19 RD0
20 RD1
40 RB7/KBI3/PGD
39 RB6/KBI2/PGC
38 RB5/KBI1/PGM
37 RB4/AN11/KBI0/CSSPP
36 RB3/AN9/CCP2/VPO
35 RB2/AN8/INT2/VMO
34 RB1/AN10/INT1/SCK/SCL
33 RB0/AN12/INT0/SDI/SDA
32 VDD
31 VSS
30 RD7/P1D
29 RD6/P1C
28 RD5/P1B
27 RD4
26 RC7/RX/DT/SDO
25 RC6/TX/CK
24 RC5/D+/VP
23 RC4/D-/VM
22 RD3
21 RD2
8MHz
22pF
22pF
RXD
TXD
TX
RX
GND
To PC
USB to UART module

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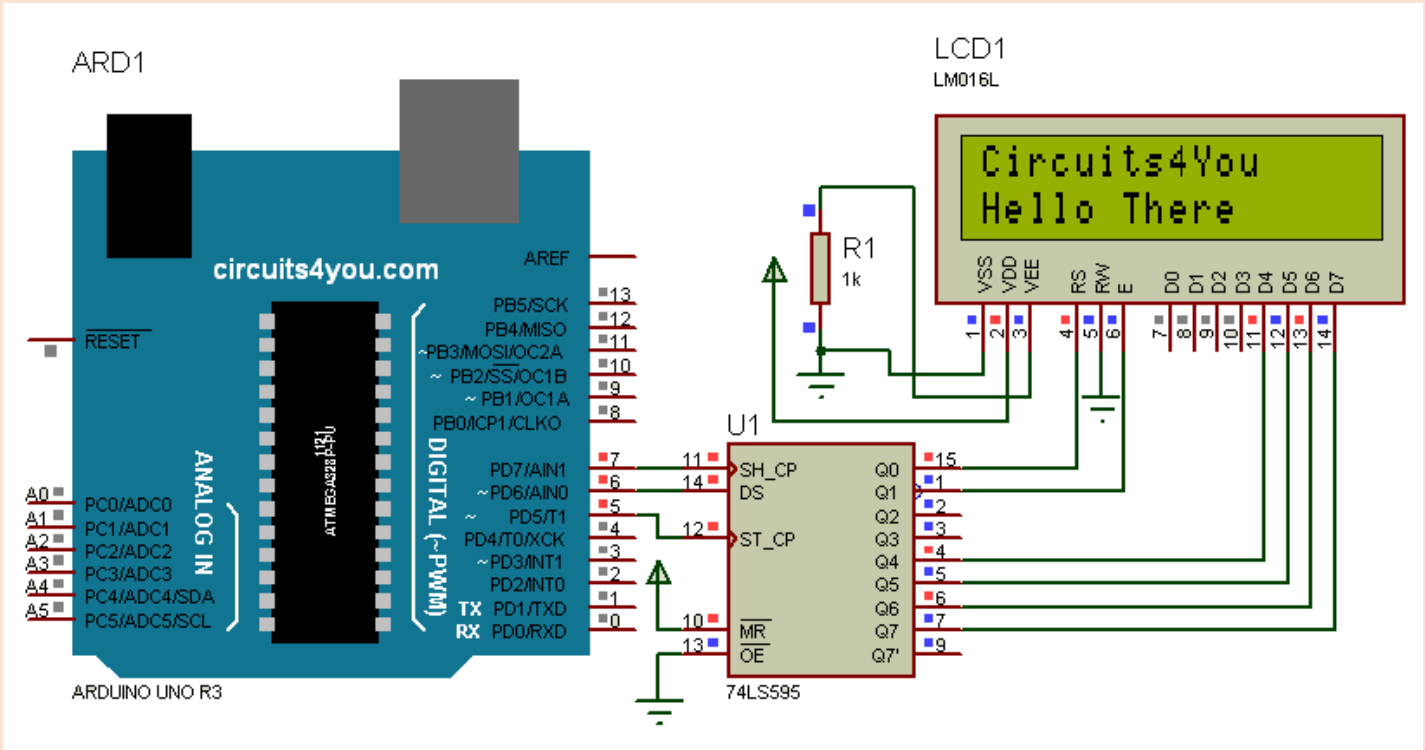
RESET
IOREF
RESET
3.3V
5V
GND
GND
Vin
POWER
A0
A1
A2
A3
A4
A5
ANALOG IN
ATMEGA 328P U
1820W6
AREF
GROUND
SCK
MISO
~MOS/OC2A
~SS/OCIB
~OC1A
CP1/CLKO
AIN1
~AINO
~T1
T0/XCK
~INT 1
INT0
TX->
RX<-0


ARD1
circuits4you.com
RESET
AREF
PB5/SCK
PB4/MISO
~PB3/MOSI/OC2A
~ PB2/SS/OC1B
~ PB1/OC1A
PB0/CP1/CLKO
PD7/AIN1
~PD6/AIN0
~ PD5/T1
PD4/T0/XCK
~PD3/INT1
PD2/INT0
TX PD1/TXD
RX PD0/RXD
DIGITAL (~PWM)
ANALOG IN
A0 PC0/ADC0
A1 PC1/ADC1
A2 PC2/ADC2
A3 PC3/ADC3
A4 PC4/ADC4/SDA
A5 PC5/ADC5/SCL
ARDUINO UNO R3
LCD1
LM016L
Circuits4You
Hello There
VSS VDD VEE RS RW E D0 D1 D2 D3 D4 D5 D6 D7
R1
1k
U1
SH_CP
DS
ST_CP
MR
OE
Q0 Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q7'
74LS595

Chapter 3
System Analysis

3. System Analysis

3.1. Use case:

3.2 Use case of Admin:

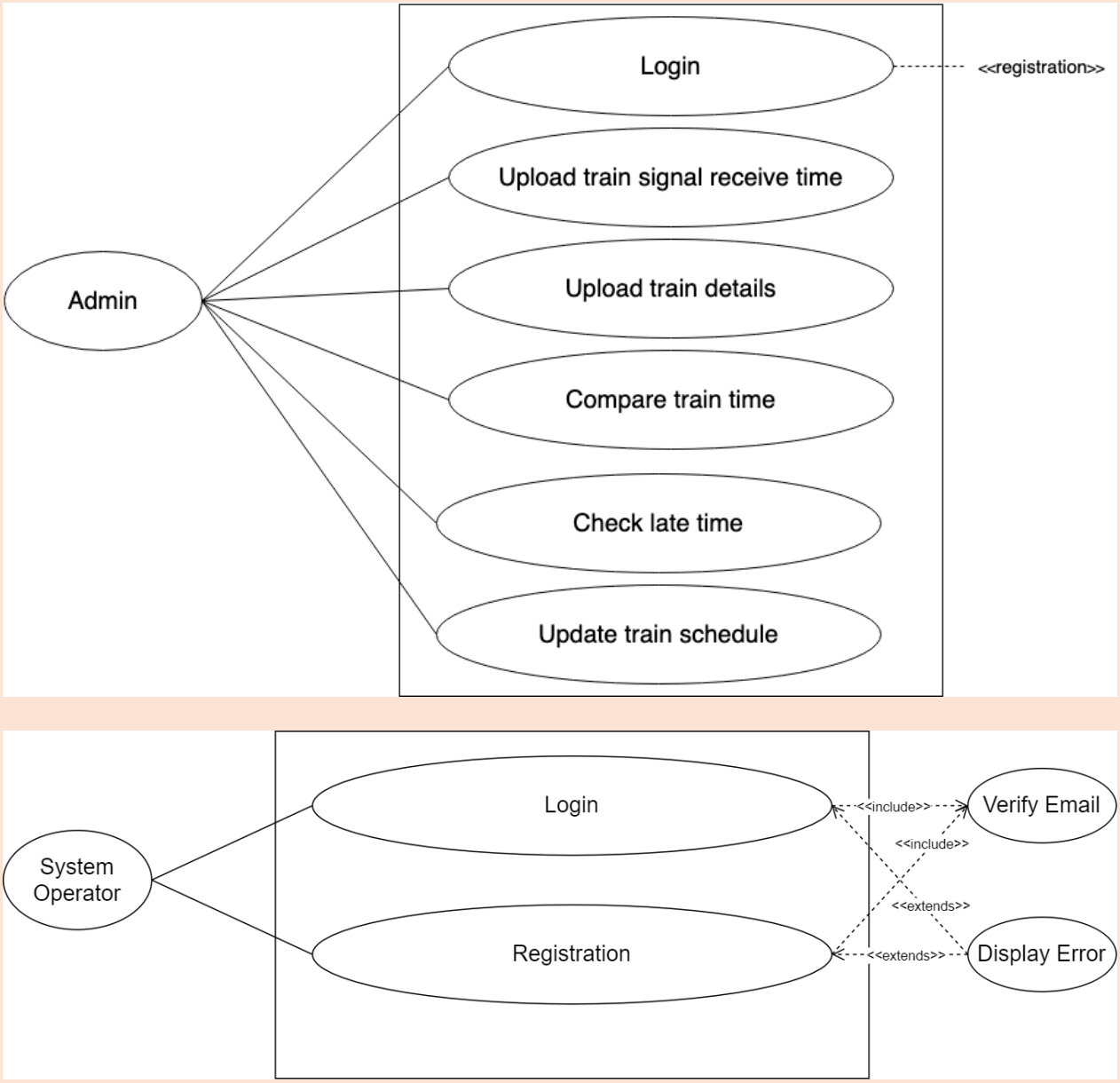


Figure: Use Case Diagram

3.3 Use case description:

3.3.1 Use case Description for Admin:

Use Case ID	1
Name	Login
Actor	Admin
Goal	Ensure flawless security
Main Success Scenario	Admin select Log in option to Log in to the account

Use Case ID	2
Name	Upload train signal receive time
Actor	Admin
Goal	Upload the train signal receive time
Main Success Scenario	Admin can upload the train signal receive time

Use Case ID	3
Name	Upload train details
Actor	Admin
Goal	Upload train details in database
Main Success Scenario	Admin can upload train details

Use Case ID	4
Name	Compare train time
Actor	Admin
Goal	Compare between two or more train time
Main Success Scenario	Admin can compare train time

Use Case ID	5
Name	Check late time
Actor	Admin
Goal	Check the time of a train
Main Success Scenario	Admin can check the train time

Use Case ID	6
Name	Update train schedule
Actor	Admin
Goal	Update train time in database
Main Success Scenario	Admin can see at homepage

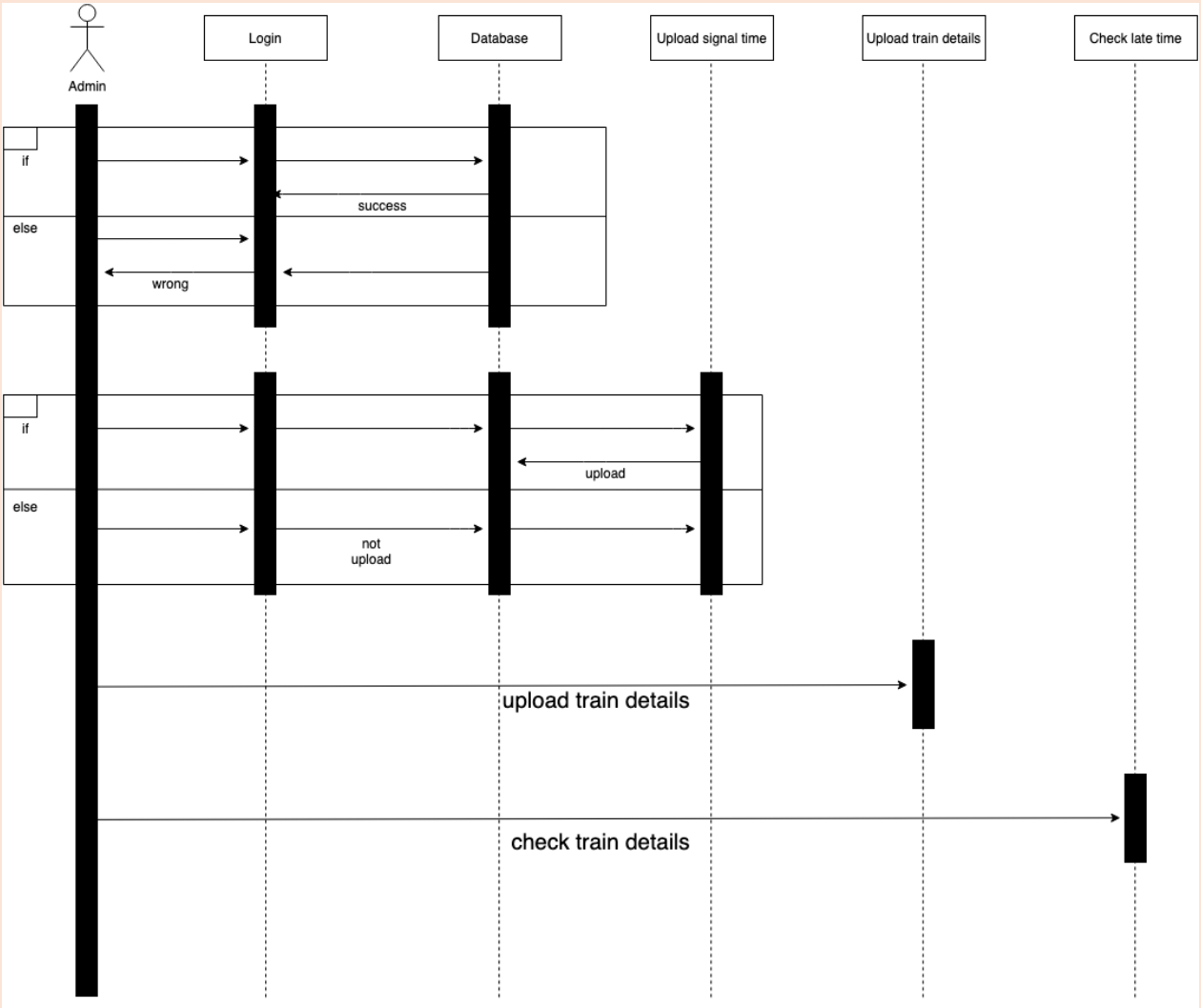
3.3.2 Use case Description for System Operator:

Use Case ID	1
Name	Login
Actor	System Operator
Goal	Ensure flawless security
Main Success Scenario	System Operator select Log in option to Log in to the account
Scenario Extensions	1. If System Operator mistakenly give a wrong user name or password, system will provide 2nd chance to try again. 2. System will not give the access to System Operator, until he/she don't give the correct username or password.

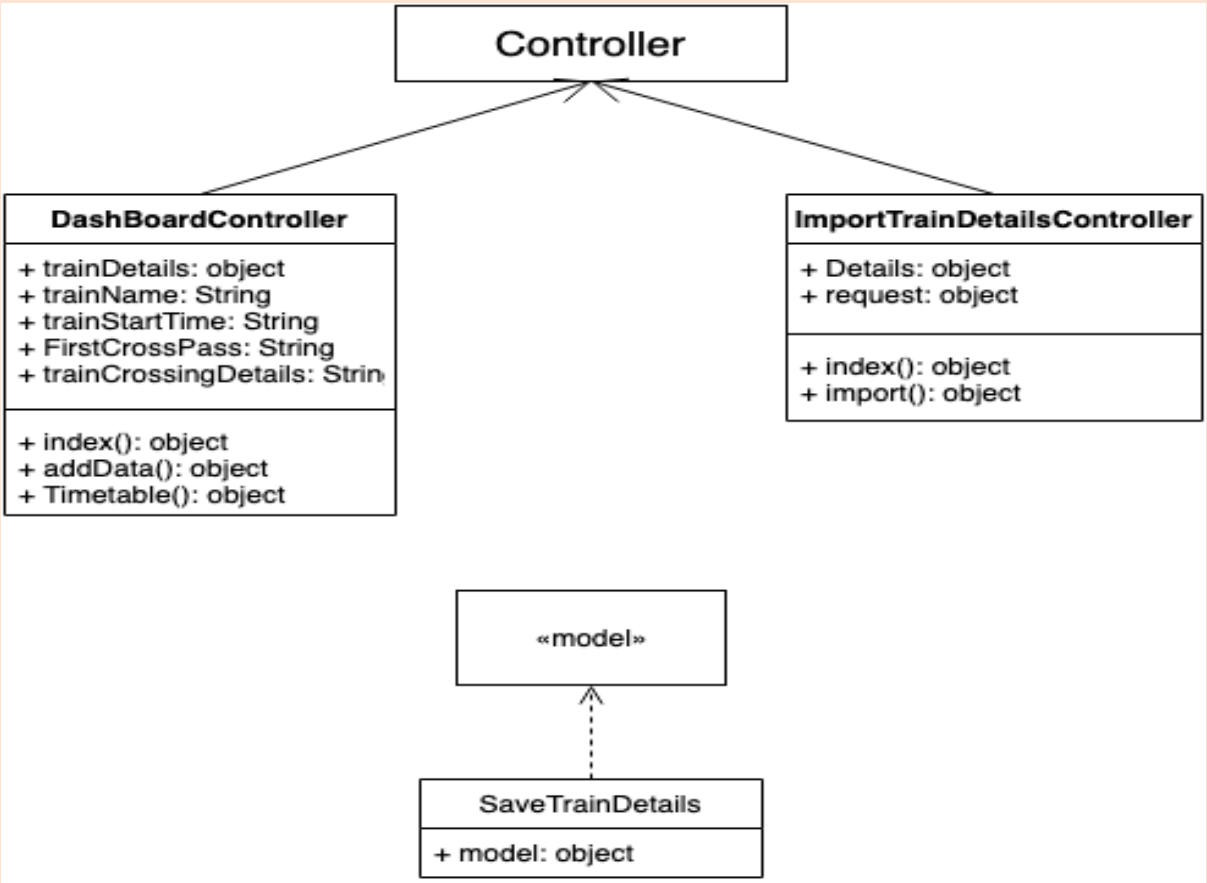
Use Case ID	2
Name	Registration
Actor	System Operator
Goal	To register into the system
Main Success Scenario	System Operator select Registration in option to registration in to the account
Scenario Extensions	1. If System Operator mistakenly give a wrong input of email registration processes will be stopped. 2. System will ask for valid email

Chapter 4
System Design

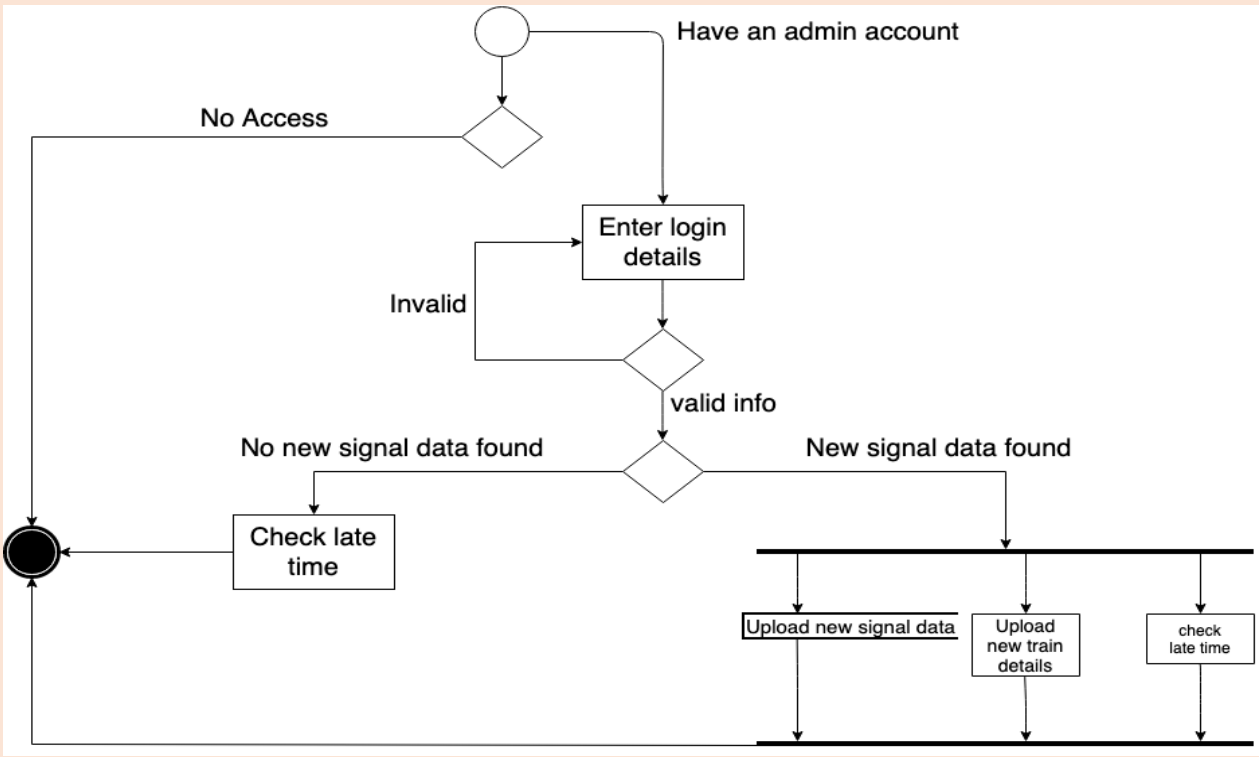
4.1 Sequence Diagram



4.2 Class Diagram



4.3 Activity Diagram



Chapter 5
System Analysis

5. Tools & Technology

- Hardware
    1. Arduino UNO
    2. Ultrasonic Sensor
    3. Servo Motor
    4. Power Supply
    5. Motor Driver
    6. Breadboard
    7. Model Train
    8. Some other component
- Software
    1. AVR dude
    2. AVR studio
    3. Laravel
    4. Atom
    5. Xampp

5.1 Technology:

- **Motherboard:** GIGABYTE
- **Processor:** Intel(R) Core(TM) i3-7100 CPU @ 3.90 GHz
- **RAM:** 16.00 GB
- **Windows 10 (Pro)-(2019) 64-bit**

Chapter 6
System Testing

Software testing: System Testing

6.1 What do you understand by Software Testing?

Software testing is a process, to evaluate the functionality of a software application with an intent to find whether the developed software met the specified requirements or not and to identify the defects to ensure that the product is defect free in order to produce the quality product.

Testing Approaches:

There are three types of software testing approaches.

1. **White Box Testing**
2. **Black Box Testing**
3. **Grey Box Testing**

- **White Box Testing:** It is also called as Glass Box, Clear Box, and Structural Testing. White Box Testing is based on applications internal code structure. In white-box testing, an internal perspective of the system, as well as programming skills, are used to design test cases. This testing is usually done at the unit level.
- **Black Box Testing:** It is also called as Behavioral/Specification-Based/Input-Output Testing. Black Box Testing is a software testing method in which testers evaluate the functionality of the software under test without looking at the internal code structure.
- **Grey Box Testing:** Grey box is the combination of both White Box and Black Box Testing. The tester who works on this type of testing needs to have access to design documents. This helps to create better test cases in this process.

6.2.1 Test Cases

6.2.2 Test case: Sign up as system operator and verify email.

Project: Railway Project

Test case ID	TC 001
Test case manager	Walid Khan
Functional area	Sign up
Test name	Sign up with empty fields and without verification.
Objective	We performed this this test case to ensure that users can't signup leaving any field empty in the form and without verifying email.
Pre-requisite	The application is running and displaying sign up form.
Steps to perform	1. Submit the form with a number of empty fields. 2. Click the sign up button. 3. Not following the link that system sent in the email for verification.
Expected result	Error message for empty fields Verify email to complete signup.
Test result	☑ Pass ☐ Fail

6.2.3 Test case: login as system operator with verification.

Test case ID	TC 002
Test case manager	Walid Khan
Functional area	login
Test name	Login with empty fields and without verifying email.
Objective	The purpose of this test case is to verify email for the user to login to the system.
Pre-requisite	The application is running and login into system.
Steps to perform	1. Login with form with invalid data. 2. Click login button. 3.Not following the link that system sent in the email for verification.
Expected result	Error message for invalid username or password and Verify email to login.
Test result	☑ Pass ☐ Fail

6.2.4 Test case: Upload train signal receive time

Test case ID	TC 003
Test case manager	ABDUL JABBAR GAZI
Functional area	Upload train signal receive time
Test name	Upload other file without csv.
Objective	Purpose of this test case is to verify the file type which is going to upload
Pre-requisite	Must Login
Steps to perform	1. Try to upload jpg file 2. Try to upload doc file 3. Try to upload pptx file
Expected result	Should not upload and will show message to upload csv file.
Test result	☑ Pass ☐ Fail

6.2.5 Test case: Rating teachers

Test case ID	TC 004
Test case manager	ABDUL JABBAR GAZI
Functional area	Upload Train details
Test name	Upload new train details with empty Field
Objective	To verify that Train Data should Valid
Pre-requisite	Must Be logged in.
Steps to perform	1. Try to upload Number 2. Try to upload Symbol 3. Try to upload special Character.
Expected result	Should show error
Test result	☑ Pass ☐ Fail

6.2.6 Test case: Compare train time.

Test case ID	TC 004
Test case manager	ABDUL JABBAR GAZI
Functional area	Compare train time.
Test name	Check Train Crossing time
Objective	To find if the system give wrong info
Pre-requisite	Must be Upload Train Details and Crossing Details
Steps to perform	Check from Different Time zone.
Expected result	Should show same time.
Test result	☑ Pass ☐ Fail

6.2.7 Test case: Update train schedule.

Test case ID	TC 004
Test case manager	SADAYAT SHAKIB
Functional area	Update train schedule
Test name	Update with Wrong time.
Objective	To find The right details
Pre-requisite	Must Be Upload train Data first.
Steps to perform	1. Try to upload Number 2. Try to upload Symbol 3. Try to upload special Character.
Expected result	Should not be update.
Test result	☑ Pass ☐ Fail

Chapter 7
Conclusion

7.1 Good Features of the System

This Railway Crossing system is fully automated. No Human interfere needed. That is the main Strength.

7.2 Limitations of the System

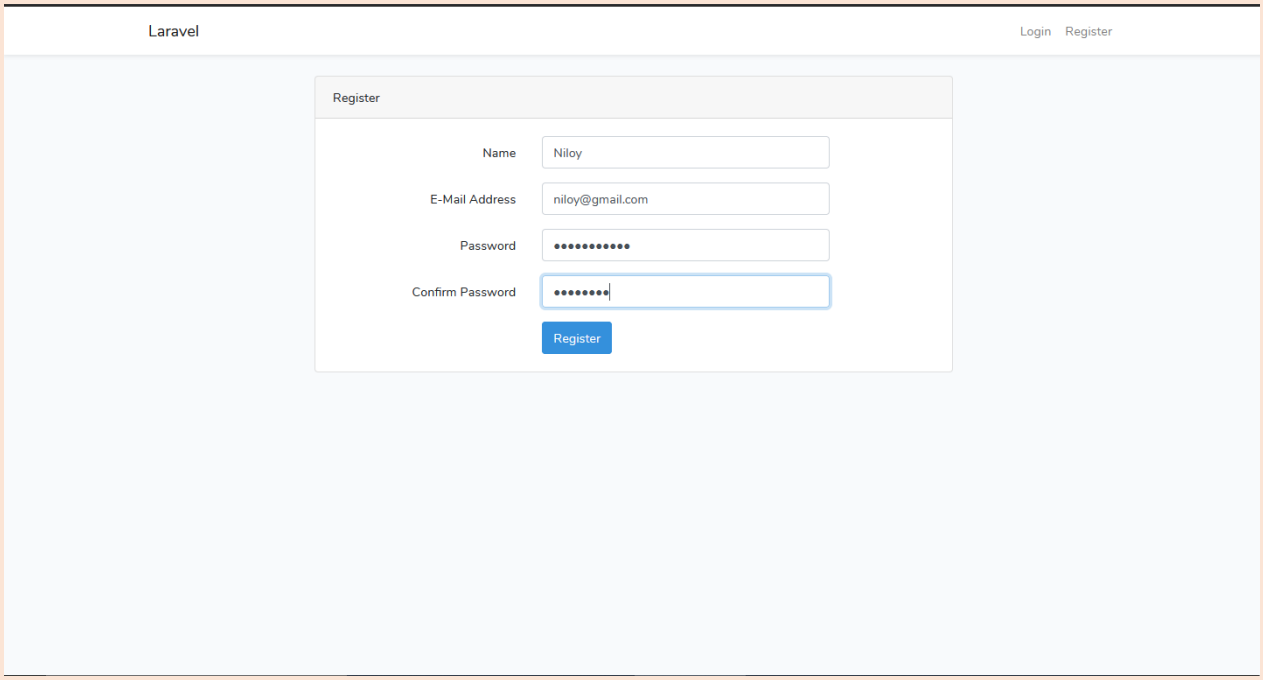
Due to the current situation of the world we were not able to manage the best hardware tools for this system. If we got that Wi-Fi module, the systems Auto Generate file will automatically upload to the server, from where Experts should get Detail Information about the train.

7.3 Future Enhancements

We will make more detailed improvements to the system in the future. For example, The System will processed images and will response if Only it found Train. And there will be more details about the train.

Appendix

User Manual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E-Mail Address
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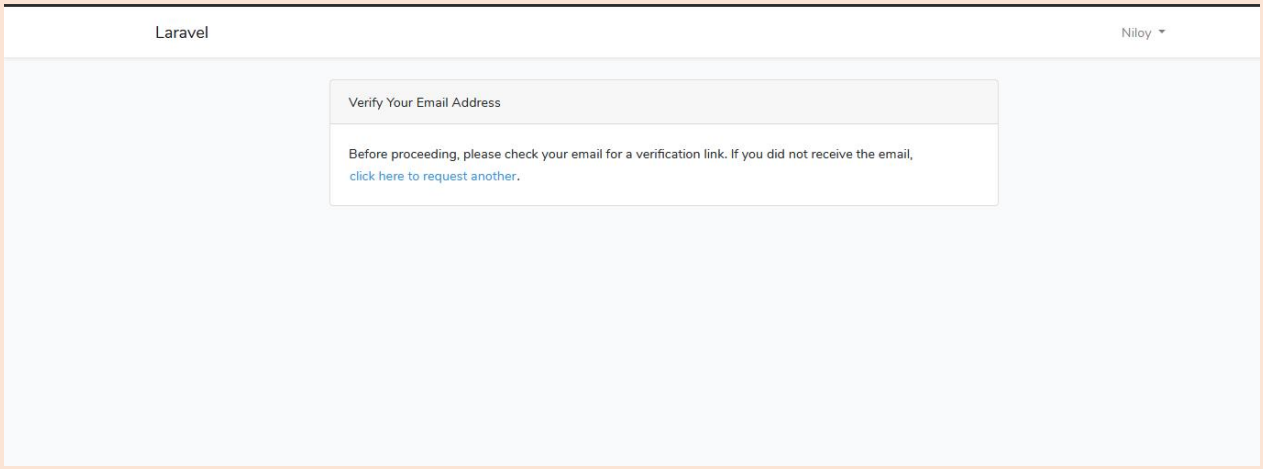
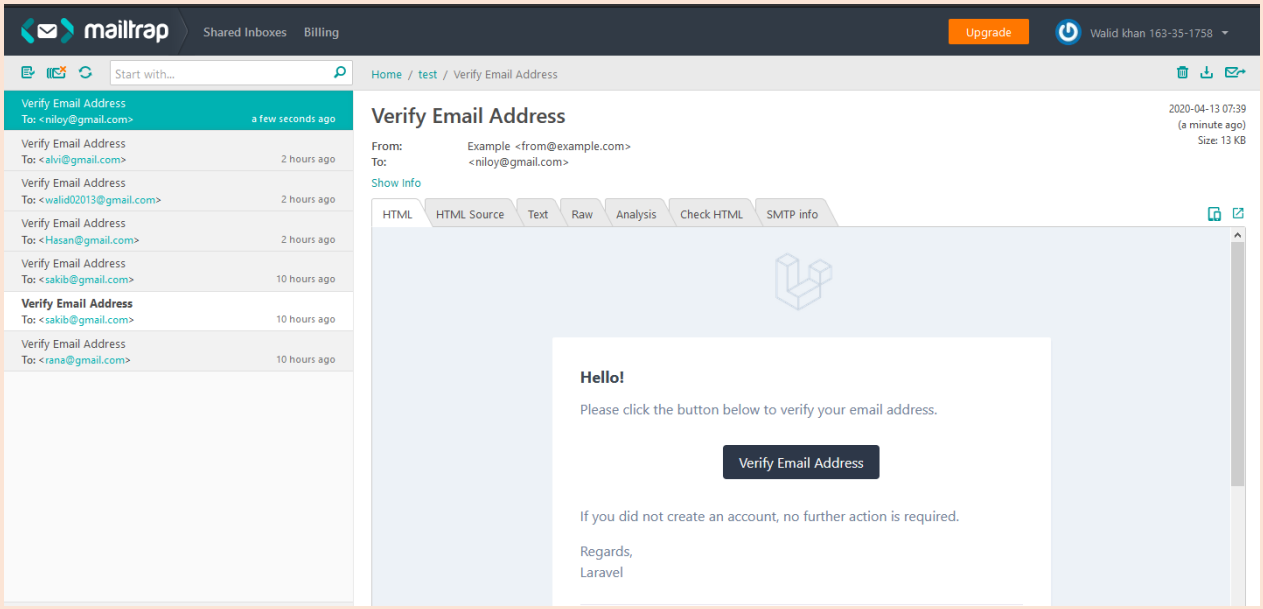
Password
Confirm Password
Register


Laravel
Niloy
Verify Your Email Address
Before proceeding, please check your email for a verification link. If you did not receive the email,
click here to request another.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Shared Inboxes
Billing
Upgrade
Walid khan 163-35-1758
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Home / test / Verify Email Address
Verify Email Address
To: <niloy@gmail.com>
a few seconds ago
Verify Email Address
To: <alvi@gmail.com>
2 hours ago
Verify Email Address
To: <walid02013@gmail.com>
2 hours ago
Verify Email Address
To: <Hasan@gmail.com>
2 hours ago
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Verify Email Address
To: <sakib@gmail.com>
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Verify Email Address
To: <rana@gmail.com>
10 hours ago
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From: Example <from@example.com>
To: <niloy@gmail.com>
2020-04-13 07:39
(a minute ago)
Size: 13 KB
Show Info
HTML
HTML Source
Text
Raw
Analysis
Check HTML
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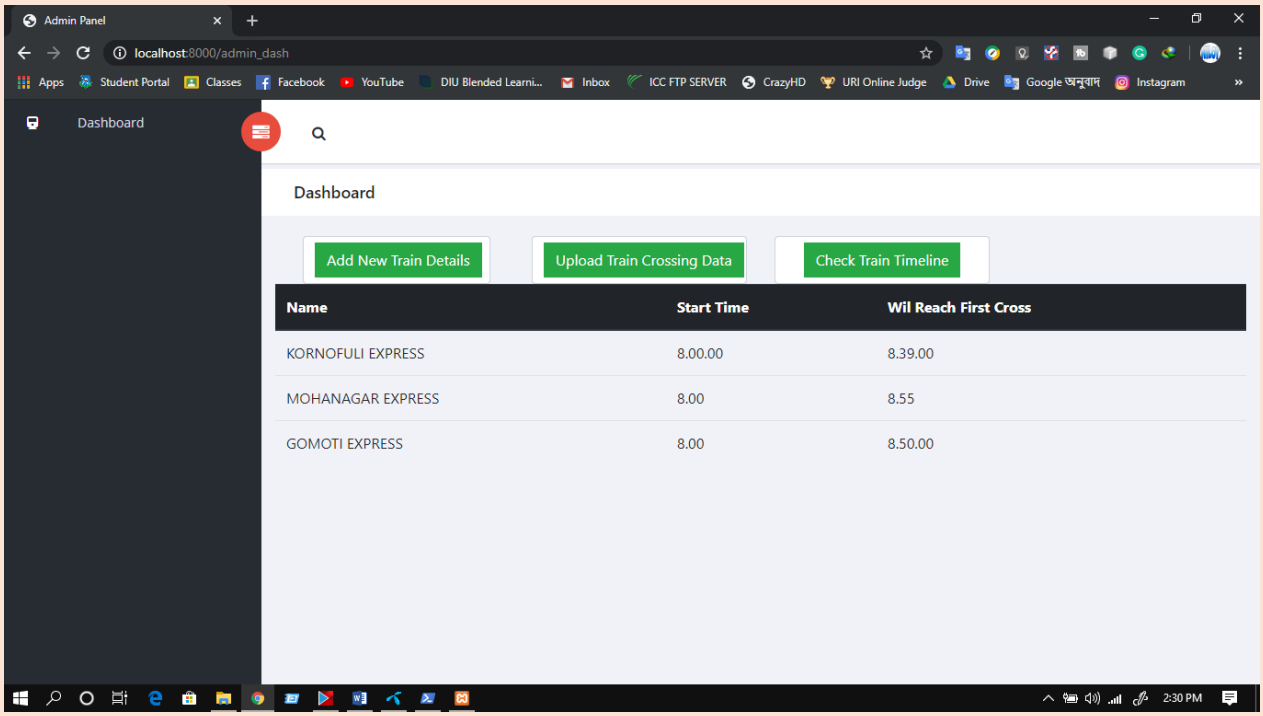
Please click the button below to verify your email address.
Verify Email Address
If you did not create an account, no further action is required.
Regards,
Laravel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Classes
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CrazyHD
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Drive
Google অনুবাদ
Instagram
Dashboard
Dashboard
Add New Train Details
Upload Train Crossing Data
Check Train Timeline
Name
Start Time
Wil Reach First Cross
KORNOFULI EXPRESS
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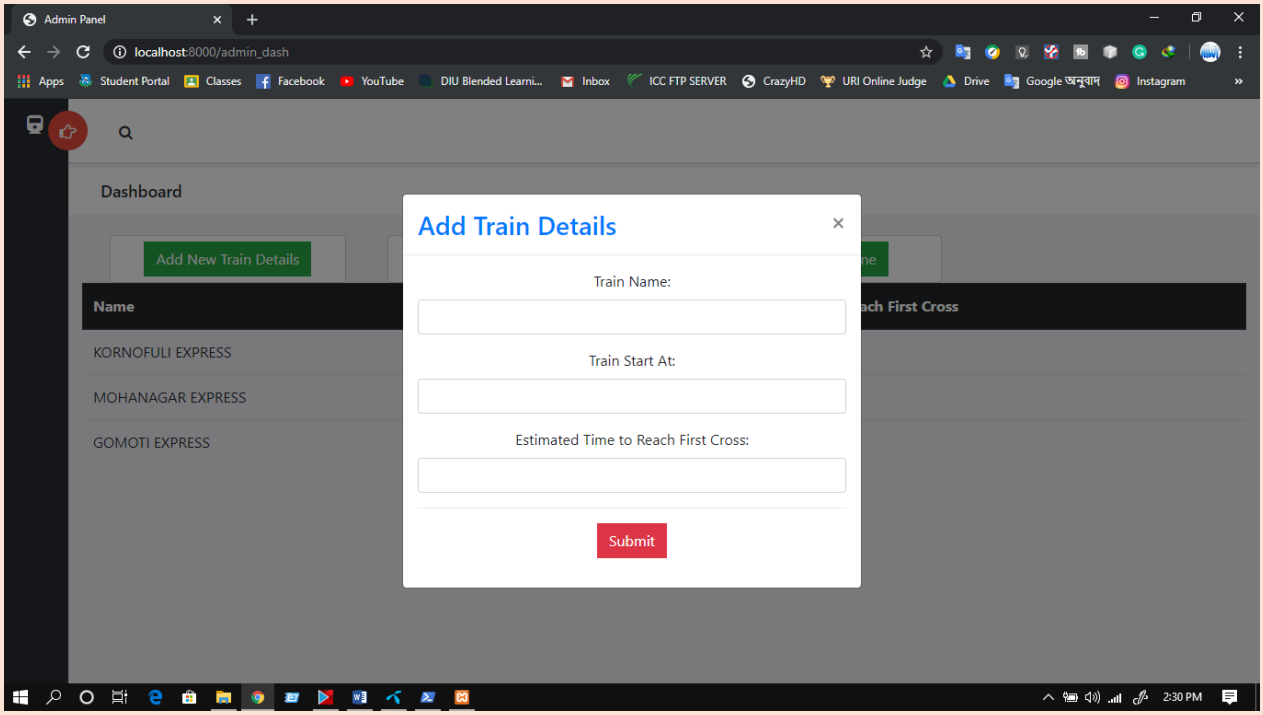
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Dashboard
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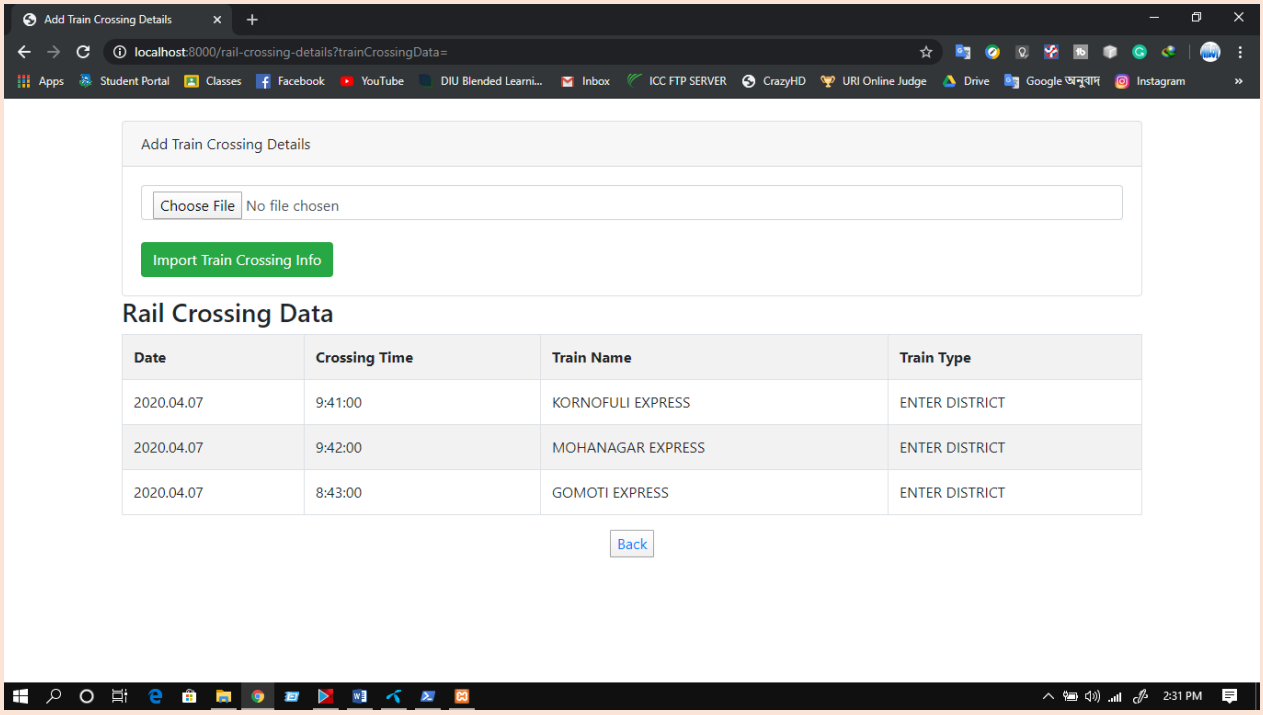
KORNOFULI EXPRESS
MOHANAGAR EXPRESS
GOMOTI EXPRESS
Add Train Details
Train Name:
Train Start At:
Estimated Time to Reach First Cross:
Submit
2:30 PM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Import Train Crossing Info
Rail Crossing Data
Date
Crossing Time
Train Name
Train Type
2020.04.07
9:41:00
KORNOFULI EXPRESS
ENTER DISTRICT
2020.04.07
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ENTER DISTRICT
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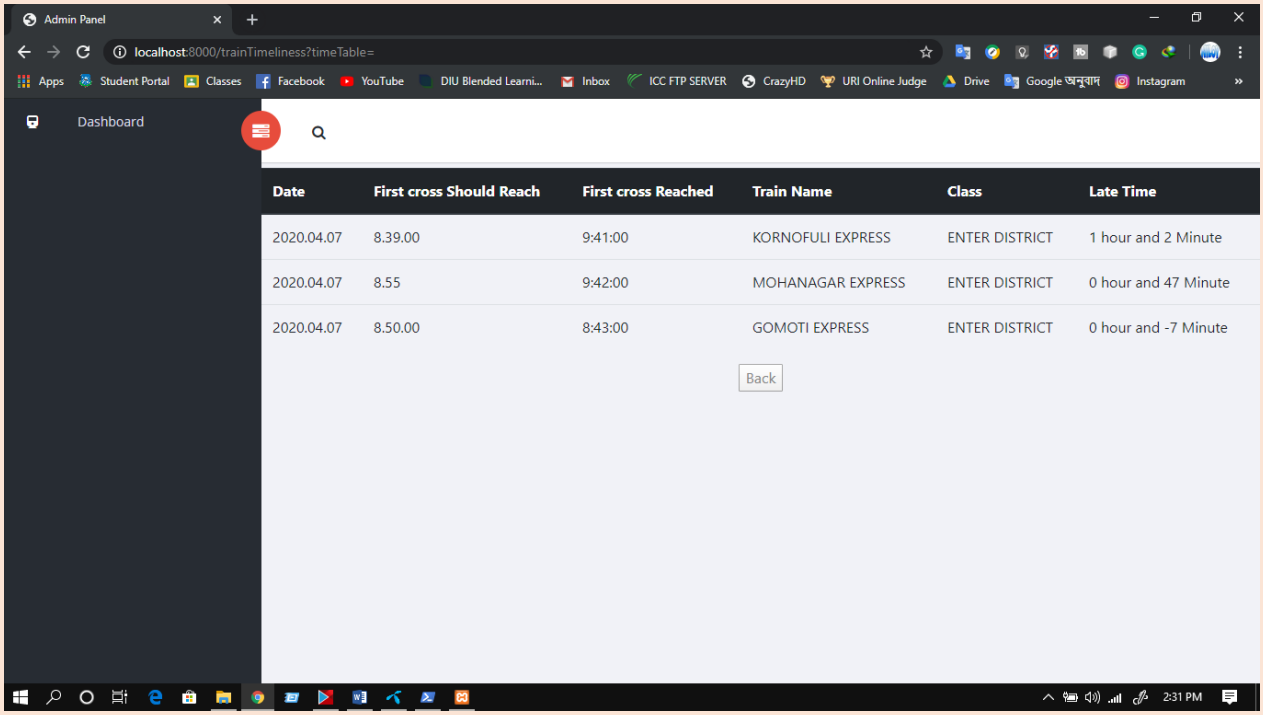
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Apps
Student Portal
Classes
Facebook
YouTube
DIU Blended Learni...
Inbox
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CrazyHD
URI Online Judge
Drive
Google অনুবাদ
Instagram
Dashboard
Date
First cross Should Reach
First cross Reached
Train Name
Class
Late Time
2020.04.07
8.39.00
9:41:00
KORNOFULI EXPRESS
ENTER DISTRICT
1 hour and 2 Minute
2020.04.07
8.55
9:42:00
MOHANAGAR EXPRESS
ENTER DISTRICT
0 hour and 47 Minute
2020.04.07
8.50.00
8:43:00
GOMOTI EXPRESS
ENTER DISTRICT
0 hour and -7 Minute
Back
2:31 PM