



AttendU

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A Facial Recognition Attendance System

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Client:
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Problem

- Manual attendance recording is oftentimes a time-consuming process riddled with inaccuracies
- Seek to create an all-in-one system that takes attendance both accurately and quickly with other features such as generated reports and notifications





The Solution: AttendU

Our team has developed AttendU, an all-encompassing application for all things attendance related for both students and teachers

AttendU consist of the following:

- A Canvas-like structure where students and teachers are able to manage their classes
- Facial Scan attendance system which utilizes AI to mark students as present
- Report Generation for teachers to analyzes trends in attendance
- Calendar View for students to visually see their attendance
- Student attendance editing allowing teachers to manually adjust attendance for their students
- AI-powered notification system to alert students of class starting and how much time they have before they are marked as late by the system

Tech Stack: React, Flask, Firebase, OpenCV, and DeepFace.

User Interface

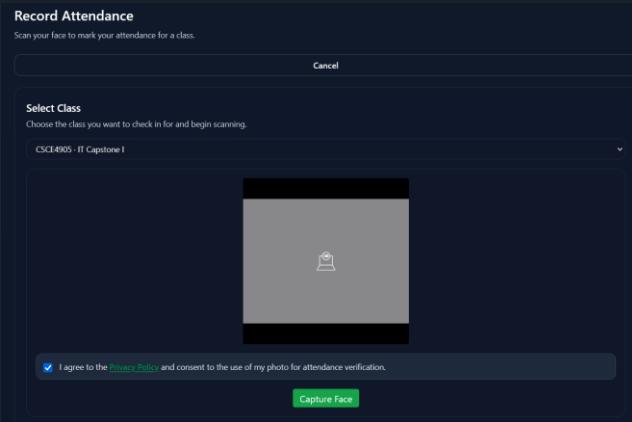


Student Dashboard

Log-In Page

A screenshot of the AttendU Student Portal Dashboard. It features a sidebar with "Dashboard", "My Classes", and "Notifications" buttons. The main content area includes sections for "Attendance History" (with a "View History" button), "Record Attendance" (with a "Start Scan" button), and "My Classes" (listing courses like CSC1040 and CSC4905). Large green arrows point from both the "Log-In Page" and "Student Dashboard" screenshots towards this dashboard.

User Interface cont.



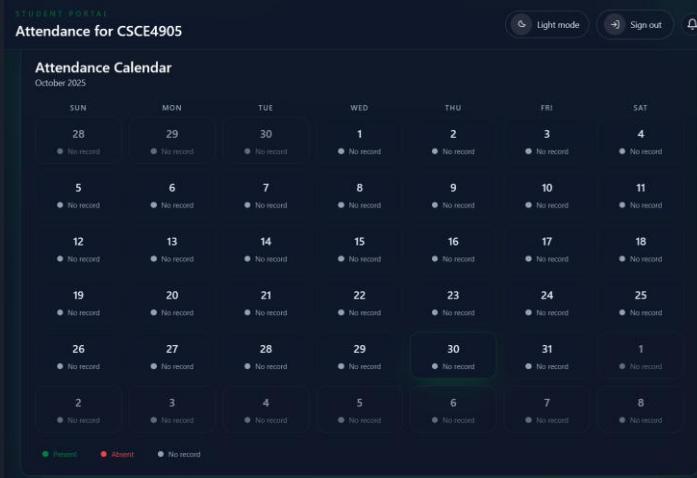
← Face Scanning Element

My Classes Page →

The screenshot shows the "My Classes" page of a student portal. At the top, it says "STUDENT PORTAL" and "My Classes". There are "Light mode", "Sign out", and a lock icon. Below that is a "Courses" section with the heading "Access details about each course and monitor your attendance performance." It lists three courses:

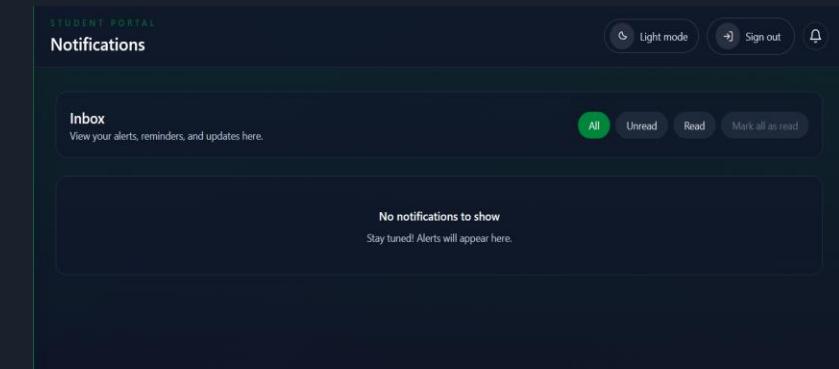
- CSCIE1040 - Computer Science II**
Teacher: Rick Sanchez
Room: 203
Scheduled Time: T 12:00AM - 10:00PM View Class
- CSCIE4905 - IT Capstone I**
Teacher: Rick Sanchez
Room: 442
Scheduled Time: T 12:00PM - 2:20PM View Class
- CSCIE3055 - IT Project Management**
Teacher: Rick Sanchez
Room: 305
Scheduled Time: TTH 8:30AM - 9:50AM View Class

User Interface cont.



The screenshot shows the 'Attendance for CSCE4905' page. At the top, there are buttons for 'Light mode', 'Sign out', and a lock icon. Below this is the 'Attendance Calendar' for October 2025. The calendar grid shows days from Sunday to Saturday. Most days are marked with a small blue dot and the text 'No record'. The date '30' is highlighted with a larger blue box, indicating it is the current day. At the bottom left, there are three colored dots: green (Present), red (Absent), and grey (No record). The background has decorative blue and green diagonal stripes.

← Attendance Calendar View



The screenshot shows the 'Notifications' page. At the top, there are buttons for 'Light mode', 'Sign out', and a lock icon. Below this is the 'Inbox' section, which displays the message 'View your alerts, reminders, and updates here.' There are four buttons at the top right: 'All' (green), 'Unread' (grey), 'Read' (grey), and 'Mark all as read' (grey). A large green arrow points to the right from the center of the slide towards this inbox area. At the bottom, a message says 'No notifications to show' and 'Stay tuned! Alerts will appear here.'

Notifications Page →

User Interface cont.

The Teacher Dashboard displays a welcome message "Welcome, Rick Sanchez!" and navigation links for Dashboard, My Classes, and Notifications. It shows a summary of Active Classes (5) and Enrolled Students (21). The "My Classes" section lists four courses:

- CSCE3055 - IT Project Management
Room: 305
Schedule: MW 10:00AM - 11:50AM
Students Enrolled: 5
- CSCE4995 - IT Capstone I
Room: 400
Schedule: MW 10:00AM - 12:00PM
Students Enrolled: 8
- CSCE4995 - IT Capstone II
Room: 306
Schedule: MW 2:30PM - 5:00PM
Students Enrolled: 5
- MATH123 - Calculus I
Room: 504
Schedule: MW 10:00PM - 11:00PM
Students Enrolled: 7

Each class entry includes a "View All" button and a "Open Class" button.

← Teacher Dashboard

Class Overview



The Class Overview page for CSCE3055 displays an "Attendance Overview" section with a large red circle representing the status of all students. Below it is a "Student List" section showing five students:

Student Name	ID	Status	Action
Brendon Stepanek	0111000	Present	View Attendance
Joshua Odlegai	0211000	Absent	View Attendance
Max Hernandez	0311000	Pending	View Attendance
Neel Patel	0411000	Present	View Attendance
Zain Jamal	0511000	Present	View Attendance



Work Done



Work Done

- Built a full multi-role web app (Student, Teacher, Admin)
- Implemented a facial recognition model
- Created class management, attendance tracking, calendar view, manual edits
- Added geofencing, IP checks, security rules, and notifications
- Developed CSV exports for attendance reporting
- Performed unit, integration, system, performance, and UAT testing
- Fixed major bugs found from UAT and improved UI/UX
- Set up deployment
- Improved and completed full documentation set: Project Charter, SRS, DDS, ERD, Use Cases, Test Plan, UAT Report, Maintenance Plan, User Manual



Challenges & Lessons Learned



Challenges

Challenge 1: Canvas-Integration

- Massive part of our initial project plan was unable to be implemented as we were unable to get permission for Canvas integration
- The workaround for this was to create our own Canvas-esque platform to host our attendance system

Challenge 2: Geofencing

- Based on feedback received from the stakeholder at the end of the first semester we needed to incorporate some form of geofencing to prevent students from just using the application at home to log their attendance
- To overcome this challenge, we decided to utilize IP Geofencing in which we have the system check the IP and confirm that it is on one of the UNT campuses otherwise the student is not allowed to scan their face for attendance.



Lessons Learned

What Went Well?

- Successful completion of a final product which satisfies all requirement laid out by the client
 - Facial scanning to record attendance
 - Manual attendance adjusting
 - Notification system
 - IP Geofencing
 - Report Generation
- Collaboration
 - Improved teamwork from the previous semester
- Adaptability
 - Despite overall little familiarity working with the frameworks and tools used in the final product, we were able to learn as we went

Things That Could Have Been Done Better:

- More consistent project plan
 - Multiple changes to the design were necessary to prevent scope creep and to adhere to stakeholder requests



Testing



Testing Approach

For our approach, we performed various unit, integration, system, and UAT tests

- Unit
 - Utilized pytest for backend unit tests
 - Tested React components, Flask endpoints, and Firestore interactions
- Integration
 - Verified frontend ↔ backend ↔ database communication
- System
 - Highlighted user workflows (student scan → backend → database → attendance recorded)
 - Tested geofencing, notifications, 30-minute pending rule, role permissions, and attendance exports
 - Ensuring users can't perform scans without being connected to UNT's EagleNet network
- UAT
 - 8 testers, conducted on-campus and remotely, tested all roles and their respective features

Test Results:

3. Test Results

Test Case ID	Description	Expected Result	Actual Result	Pass/Fail	Notes
TC-01	Valid Username and Password	Redirects to correct dashboard	Works as expected	Pass	Verified on Chrome/Safari browsers
TC-02	Invalid Login Credentials	Displays 'Invalid credentials'	Works as expected	Pass	Verified on Chrome/Safari browsers
TC-03	Logout	Returns to login screen	Works as expected	Pass	N/A
TC-04	Facial Recognition - Successful Match	Confirmation/Pending message shown	Works as expected	Pass	~4s recognition processing time
TC-05	Facial Recognition - Unrecognized Face	Displays "Face not recognized"	Works as expected	Pass	N/A
TC-06	Manual Attendance Modification	Record updated and logged	Works as expected	Pass	N/A

TC-07	Instructor - View Classes	Displays correct class list	Works as expected	Pass	N/A
TC-08	Instructor - View Class Attendance	Shows accurate table/chart	Works as expected	Pass	N/A
TC-09	Student - View Own Attendance	Displays own records only	Works as expected	Pass	N/A
TC-10	Reports - Generate by Date Range	Exports correct totals	Works as expected	Pass	N/A
TC-11	Geofencing - Outside Allowed Network	Submission blocked/logged	Works as expected	Pass	N/A
TC-12	Geofencing - Inside Allowed Network	Attendance recorded successfully	Works as expected	Pass	N/A
TC-13	AI Notification - Pre-Class Reminder	Reminder sent 5 mins before	Works as expected	Pass	Alignment issues on banner
TC-14	AI Notification - Absence Threshold Alert	Instructor alert generated	Notification wasn't sent	Fail	Look into issue
TC-15	30-Minute Pending Rule	Finalizes after 30 minutes	Works as expected	Pass	N/A
TC-16	Performance - Multiple Concurrent Scans	Stable under 5-8 scans	Works as expected	Pass	No noticeable performance issues
TC-17	Network Drop During Scan	Error handled, retry allowed	Works as expected	Pass	N/A
TC-18	Unauthorized Access Blocked	Access denied to restricted pages	Works as expected	Pass	N/A
TC-19	Facial Recognition - Multiple Faces	Error displayed, scan blocked	Works as expected	Pass	Attempt to prioritize closest face to remove error
TC-20	Camera Permission Denied	Scanning disabled until granted	Works as expected	Pass	N/A
TC-21	Duplicate Scan	Prevents duplicate records	Works as expected	Pass	Once a successful
	Suppression	scan is recorded the user cannot submit another			

Test Results *cont.*

TC-22	Finalize Window (30 Minutes)	Leaves at 29 minutes marked absent, stays for 31 minutes marked present	Works as expected	Pass	N/A
TC-23	Geofencing with IP Change	Logs network change accurately	Works as expected	Pass	Improve logging in database schema
TC-24	Large Class Report Export	Accurate for 50+ students	Works as expected	Pass	50 test students were created and assigned to a class; records were reflected in export document
TC-25	API Slow or Failure with Retry	Displays retry/error message	Works as expected	Pass	N/A
TC-26	Admin – Add User	User created successfully	Works as expected	Pass	N/A
TC-27	Admin – Edit User	User info saved correctly	Works as expected	Pass	N/A
TC-28	Admin – Delete User	User removed from list	Works as expected	Pass	N/A
TC-29	Admin – Add Class	Class created successfully	Works as expected	Pass	N/A
TC-30	Admin – Edit Class	Class info saved correctly	Works as expected	Pass	N/A
TC-31	Admin – Delete Class	Class deleted from system	Works as expected	Pass	N/A

Bugs/Defects:

Defect ID	Description	Status	Notes
D-01	Calendar stays in 2025	Fixed	Calendar now goes +/- 1 year from 2025
D-02	Modification reason text is hard to see when editing attendance	Fixed	Darkened text for readability
D-03	Unused "Message" tab in navigation bar	Fixed	Removed from user view
D-04	Visually plain login page	Open	Background image being added
D-05	Failed attendance scan/recording	Deferred	Testers reference image was not in database
D-06	Text Readability	Fixed	Improved text contrast around all user pages
D-07	Simultaneous logins for same user	Open	Original user should be logged out after the new login attempt
D-08	Record modification reason text box needs character limit	Open	Add character limit to text box to prevent large record file sizes

Test Successes / Major Issue Fixes

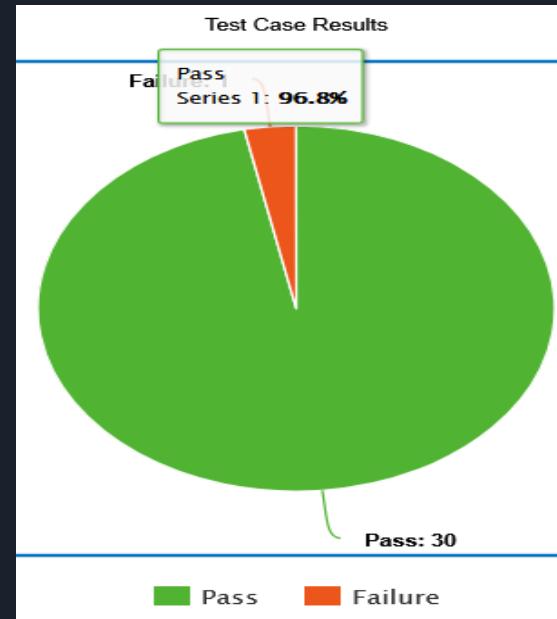
Of 31 Test Cases, only 1 failure (absence notification) for a strong 97% success rate

Successes of testing:

- Facial recognition works in ~4 seconds or less
- Geofencing blocks unauthorized IPs
- CSV exports accurate reports
- Stable for multiple connections
- Real-time updates to attendance record

Major issues fixed:

- Calendar Date bug
- Improved Text readability
- Removed unused UI elements
- Export formatting corrected
- Absence threshold notification logic fixed
- Memory limit utilizing previous backend host





Live Demonstration

[Web App Link](#)



Thanks for your time!

Questions?