Synapse Synchrony

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A network of productivity and mental well-being.

Motivation ⟶

Modern campuses are not only centers for academic learning but also hubs of social interaction, collaboration, and personal growth. However, students today face a range of challenges:

Mental Health Challenges

Rising stress, anxiety, and depression are common, while traditional monitoring is often invasive, stigmatizing, or slow to provide early support.

Fragmented Collaboration

Academic collaboration is fragmented across tools, causing inefficiency and limited engagement.

Distraction in Communication

Traditional chat and social platforms can be distracting and not inclusive for differently-abled students.

Information Gaps

Campus updates, events, and notices are scattered, making it hard for students to stay informed.

Objective ⟶

To develop a web-application that enhances the academic, social, and mental well-being of students on campus through a unified platform that integrates:

Collaborative learning space

A **visual collaboration space** with **whiteboard channels**, featuring a **note-sharing portal** enhanced with **AI summarization** to boost teamwork and knowledge sharing.

AI-powered mental wellness monitoring

Non-invasive assessment of student mental health to provide proactive insights and interventions.

Inclusive, secure communication

Real-time, **encrypted** chat that supports accessibility features, including **sign language-to-text and speech translation**, ensuring every student can communicate effectively.

Centralized information dissemination

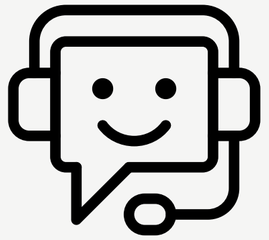
A dynamic portal for **campus events**, **lost-and-found notices**, and **personal blogs** to foster community engagement.

Features ⟶

Ensuring the following requirements will help us successfully deploy our project.

SynapseWorkspace

SynapseChat



MediLink

SynapsePortal

SynapseWorkspace →

White-board collaborative channels:

- Channel-based structure similar to Discord, but visually interactive instead of audio-based
- Drawing tools: Pen, highlighter, shapes, arrows, diagrams
- Sticky notes and text boxes for explanations and brainstorming
- Layering and color-coded inputs to distinguish contributors
- Integrated file/slide import for marking up study materials
- Persistent boards saved per session with the ability to revisit, edit, or export.

File - Sharing Portal:

- Supports multiple file types: PDF, DOCX, PPT, images (JPEG/PNG), and handwritten notes
- Drag-and-drop or file picker upload for quick sharing
- Automatic file preview for notes, slides, and images without requiring downloads
- Organized under subjects, tags, or course channels for easier discovery
- Permission controls allowing users to make files public, private, or group-specific
- Versioning to update files while keeping older copies accessible
- Inline commenting so peers can discuss or clarify specific sections of a file

SynapseChat ⟶

End-to-end encrypted messaging:

- Low-latency messaging with read receipts, typing indicators, and reliability under high load.
- Secure chats for individuals and groups, preventing unauthorized access.

Accessibility & inclusivity features:

- **Sign language → text translator**
- **Speech → text converter**
- **Text → speech generator**
- **Ensures communication equality & inclusivity for differently-abled students.**

Distraction-free mode:

- Minimalist UI that hides non-essential buttons, animations, and chat clutter.
- Temporarily disables pop-up notifications, message previews, and sound alerts to maintain focus.

Multi-channel messaging:

- Channels for clubs, departments, study groups, and student communities.
- Threaded conversations to keep discussions organized within each channel

MediLink ⟶

Non-Invasive Behavioral Analysis:

- Avoids invasive methods such as facial scans or heart rate monitoring, ensuring students feel comfortable and unobserved.
- Analyzes daily routines — such as peak productivity times, break patterns, or irregular activity — to detect potential stress or fatigue.

Context-Aware Alerts:

- Automatically prompts students to take short breaks when detecting signs of fatigue, such as long continuous screen time or reduced activity accuracy
- Allows users to configure when and what types of alerts they want to receive.

Early Stress & Mood Detection

- Identifies micro-changes in activity that may indicate early sadness, anxiety, or overwhelming academic pressure.
- Detects deviations from the user's normal behavior — such as reduced interaction, increased late-night activity, or inconsistent study patterns — as early indicators of stress.

Mood Trend Dashboard:

- Displays daily, weekly, and monthly mood patterns through intuitive charts or color-coded indicators.
- Shows improvement streaks — such as consistent calm days or reduced stress indicators — to motivate healthy habits.

SynapsePortal ⟶

Centralized Campus Updates:

- All official campus notifications — academic, administrative, and extracurricular — are collected in one place.
- Users receive real-time notifications for urgent announcements such as schedule changes, exam updates, or emergency alerts.

Real-Time Event Listings:

- Displays all upcoming campus events, workshops, seminars, and extracurricular activities in real time.
- Provides comprehensive information including date, time, location, organizer, and description.

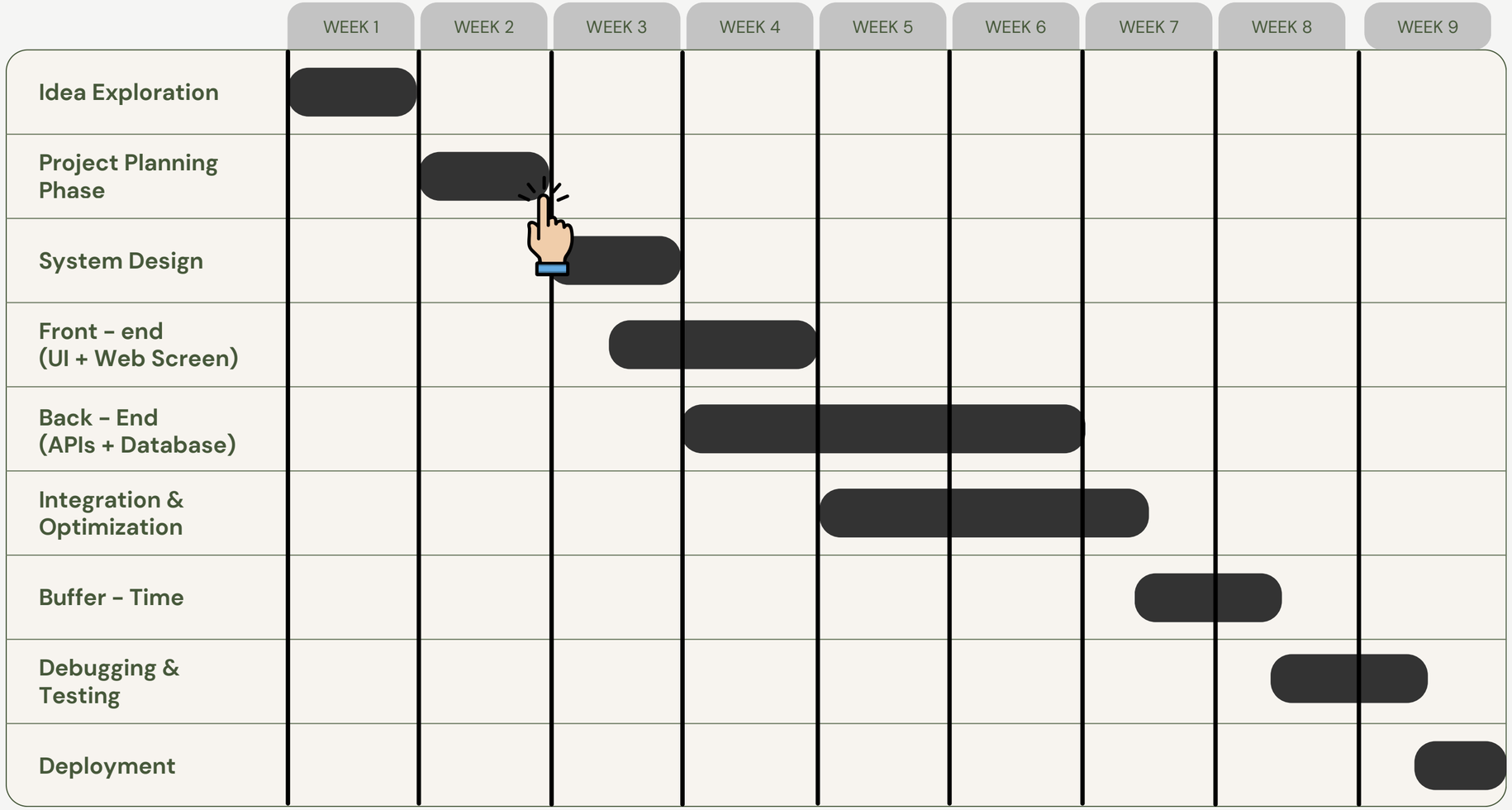
Lost & Found System:

- Students can easily report lost or found items by uploading descriptions, photos, and relevant details.
- Users can search for items by keyword, category, location, or date to find matches efficiently.

Student Blog & Experience Sharing:

- Students can write and share personal experiences, campus life stories, or academic insights.
- Other students can comment, ask questions, or provide suggestions to encourage interaction.

PROJECT BREAKDOWN



Major Stakeholders

S

Students benefit from wellness tracking, collaborative tools, inclusive communication, time-management and information access.

F

Faculties can efficiently share materials, monitor student engagement, and supervise interactive collaboration, enhancing teaching effectiveness and academic guidance.

U

University Administration gains actionable insights from wellness and engagement analytics, enabling informed decisions on policies, events, and student support initiatives.

M

Mental Health Professionals can use AI-driven wellness trends and secure communication tools to provide timely, personalized support and early interventions for students' mental health.

Tools & Technologies ⟶

Programming Languages

JavaScript
Python

Front - End


React.js
Tailwind CSS

Back - End + Database

Node.js
Express.js
MongoDB with Mongoose

Security


JWT(JSON Web Token)
BCrypt Hash

Continuous Integration/Deployment

Miscellaneous

File Handling: Multer, S3, Cloudinary
Testing: Jest, Supertest
Helmet.js (HTTP headers security)
OpenCV libraries & Gen AI with Gemini API

Critical Challenges

1. AI-powered Health Monitoring
2. Real-time Encrypted Chat
3. Note Sharing & Collaboration
4. Information Portal

AI-powered Health Monitoring

Accuracy of AI Predictions

- Risk of false positives **(flagging healthy behavior as stress)** or false negatives **(missing real stress)**.
- Variability in individual behavior and external factors can reduce model reliability.

Privacy and Ethical Concerns

- Handling sensitive information securely can be challenging.
- Ensuring informed consent and compliance with privacy regulations.

Real-time Encrypted Chat

Security Risks

- Safeguarding messages, files, and media with end-to-end encryption.
- Preventing unauthorized access, data leaks, and man-in-the-middle attacks.

Latency and Scalability

- Maintaining instant message delivery even during peak usage or large group chats.
- Optimizing encryption/decryption processes to avoid delays.
- Ensuring smooth performance across multiple devices (desktop, mobile, tablet).

Note Sharing & Collaboration

Concurrent Editing Conflicts

- Handling multiple users editing the same note simultaneously without overwriting each other's changes.
- Minimizing delays so that updates appear instantly to all collaborators.

AI Summarization Quality

- AI may misinterpret complex content or miss key points, producing incomplete or misleading summaries.
- Notes may include images, tables, or mixed media that AI struggles to summarize correctly.

Information Portal

Content Moderation

- Detecting and filtering inappropriate, offensive, or spam content in real time.
- Handling diverse content types (text, images, videos, links) effectively.

Timeliness of Updates

- Ensuring event information, lost & found posts, and announcements are posted and updated in real time.
- Maintaining reliability during high-traffic periods or peak academic seasons.

Conflicting Requirements

1

Inclusivity Features
VS
System Performance

2

Notification Needs
VS
Mental Wellness Goals

Inclusivity Features VS System Performance

Conflict:

- Real-time sign-language-to-text, speech-to-text, and text-to-speech require intensive computation.
- But the system also needs to maintain low latency for real-time chat and collaboration.

Trade-Off:

- Real-time AI translation → increases server workload and delays.
- High-speed performance → limits AI translation frequency or complexity.

Notification Needs VS Mental Wellness Goals

Conflict:

- Event updates, collaboration edits, wellness alerts, and chat messages all require timely notifications.
- But too many notifications increase stress, contradicting the wellness objective.

Trade-Off:

- Frequent notifications → user awareness but higher mental load.
- Reduced notifications → fewer updates and missed events.

Thank you