MARRI LAXMAN REDDY GROUP OF INSTITUTIONS

MLR INSTITUTE OF TECHNOLOGY

(UGC AUTONOMOUS)

Laxman Reddy Avenue, Dundigal, Hyderabad - 500 043, Telangana, India

A

Mini Project Report

On

"WEB WATCH"

Submitted in partial fulfilment of the Requirements for the paward of the degree of

Bachelor of Technology

In

Computer Science & Engineering (Data Science)

By

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CERTIFICATE

This is to certify that the project entitled **"Web Watch"** has been submitted by **J. Prashanth (22R21A67F5), C. Omkar (22R21A67E2) and S. Gouri Shankar (22R21A67J8)** in partial fulfilment of the requirements for the award of degree of Bachelor of Technology in Computer Science and Engineering – Data Science from MLR Institute of Technology affiliated to Jawaharlal Nehru Technological University, Hyderabad. The results embodied in this project have not been submitted to any other University or Institution for the award of any degree or diploma.

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DECLARATION

We hereby declare that the project entitled **"Web Watch"** is the work done during the period from **January 2025 to June 2025** and is submitted in partial fulfilment of the requirements for the award of degree of Bachelor of Technology in Computer Science and Engineering – Data Science from MLR Institute of Technology affiliated to Jawaharlal Nehru Technological University, Hyderabad. The results embodied in this project have not been submitted to any other University or Institution for the award of any degree or diploma.

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Abstract

The WebWatch Chrome Extension presents an innovative, client-side solution to two critical digital challenges: enhancing online time management and ensuring remote exam integrity. It effectively fills the void left by fragmented tools and resource-intensive systems, offering an integrated approach that prioritizes user privacy. Through its Normal Mode, WebWatch empowers individuals with real-time website monitoring, customizable time limits, and non-intrusive alerts to boost productivity and self-awareness. Simultaneously, its robust Exam Mode provides educational institutions with a practical and lightweight tool for secure online assessments. This mode enforces full-screen display, prevents unauthorized navigation, and utilizes password-protected activation to combat academic dishonesty without intrusive monitoring. Leveraging a client-side architecture, WebWatch ensures enhanced privacy, reliability, and minimal performance impact, making it a cost-effective and accessible alternative for both digital productivity and secure online learning.

Keywords: *Chrome Extension, Time Management, Online Productivity, Remote Proctoring, Exam Security, Academic Integrity, Client-Side Solution, User Privacy, Digital Well-being, Web Usage Monitoring*

Chapter 1
INTRODUCTION

1.1 Overview

WebWatch is an innovative and versatile Chrome extension designed to empower users with enhanced control over their online activities and to provide a robust solution for securing online examination environments. Developed as a practical tool, WebWatch addresses the critical needs of both individual productivity and institutional academic integrity.

At its core, WebWatch operates through two distinct and powerful modes:

- **Normal Mode:** This mode focuses on promoting efficient time management and healthy Browse habits. It allows users to monitor their time spent on various websites, set personalized time limits for specific domains, and receive timely pop-up alerts when these limits are approached or exceeded. This functionality aids in reducing digital distractions and optimizing online productivity for everyday users.

- **Exam Mode:** Tailored specifically for educational institutions and online proctoring, Exam Mode transforms the browser into a controlled and secure examination environment. It enforces strict measures such as mandating full-screen display, automatically closing unauthorized tabs upon detection of exit attempts, and requiring an examiner-set password for activation and deactivation. These features are meticulously designed to mitigate cheating and uphold the integrity of online assessments.

In essence, WebWatch stands as a comprehensive browser-based solution, seamlessly integrating functionalities for personal time management with advanced features for secure online proctoring, making it a valuable asset for a wide range of users, from individual students and professionals to educational institutions.

1.2 Purpose of the project

The contemporary digital landscape, while offering unparalleled access to information and resources, also presents significant challenges regarding time management and maintaining academic integrity, particularly in the context of online learning and assessments. The WebWatch project was conceived and developed with the primary purpose of addressing these dual, pressing issues.

Specifically, the project aims to:

1. **Empower Users for Efficient Time Management:** In an age of constant digital distractions, individuals often struggle with unproductive Browse habits and disproportionate time allocation across various online platforms. The purpose here is to provide users with a tangible tool to gain awareness and control over their online time, fostering a more disciplined and productive digital routine. This includes enabling users to:
    - Monitor actual time spent on websites.

- Set proactive boundaries through customizable time limits.
- Receive timely reminders to encourage adherence to these limits.

2. **Enhance the Security and Integrity of Online Examinations:** With the increasing prevalence of online education and remote assessments, ensuring a fair and cheat-proof examination environment has become paramount. Traditional proctoring methods are often difficult to implement remotely, leading to vulnerabilities. The purpose of WebWatch in this regard is to establish a controlled digital environment that discourages academic dishonesty by:

- Enforcing a full-screen mode to minimize external distractions and access.
- Preventing unauthorized navigation or tab-switching during exams.
- Requiring secure, examiner-controlled activation to ensure exam conditions are met.

By addressing these core challenges, WebWatch serves to enhance individual productivity and uphold the standards of academic honesty, offering a practical and accessible solution for both personal use and institutional application.

1.3 Motivation

The development of WebWatch was driven by a clear recognition of the evolving demands and inherent challenges within the digital sphere. Our primary motivations stemmed from observing two critical areas where existing solutions were either insufficient or cumbersome:

First, in the realm of **personal productivity and digital well-being**, we recognized a pervasive issue: while the internet offers immense benefits, it's also a significant source of distraction. Many individuals struggle with managing their online time effectively, often finding themselves falling into unproductive Browse habits or losing track of time on engaging but ultimately time-consuming websites. Existing solutions were often too intrusive, lacked customization, or required significant technical effort to implement. We were motivated to create an intuitive, accessible tool that empowers users to regain control, fostering better focus and more intentional online engagement without resorting to drastic measures like disconnecting entirely.

Second, the rapid acceleration of **online education and remote work**, especially in recent years, brought to the forefront the critical need for reliable and secure online examination environments. Traditional proctoring methods are difficult to scale and implement remotely, leading to concerns about academic integrity. We observed a gap for a robust, browser-based solution that could genuinely deter cheating during virtual assessments. Our motivation here was to contribute to maintaining the credibility and fairness of online learning, providing educational institutions with a practical and effective tool to ensure a level playing field for all students.

In essence, WebWatch was born out of a desire to bridge these gaps, offering a dual-purpose solution that enhances both individual productivity and institutional integrity in the increasingly digital world. We aimed to build a tool that is not only functional but also user-friendly and highly impactful.

Chapter 2

LITERATURE SURVEY

2.1 Existing System

The current digital ecosystem offers various tools and methodologies attempting to address challenges related to online time management and the integrity of remote assessments. These existing systems can broadly be categorized into two main groups, each with its own focus and operational paradigm:

a) Productivity and Time Management Tools

This category encompasses a range of applications and browser extensions designed to help users control their online habits and enhance focus.

1. **Website Blockers and Limiters:** These tools operate by preventing access to specified distracting websites, either permanently or for set durations. Some allow for time-based access limits, where users can define how much time they can spend on certain sites before access is blocked.
   Examples: StayFocusd, BlockSite, Freedom (cross-platform).

2. **Time Tracking Applications:** These systems monitor and report on how users spend their time across various applications and websites. They often provide analytics and reports on productivity.
   Examples: RescueTime, Toggl Track, Clockify.

3. **Focus and Habit-Building Tools:** Some tools gamify the process of staying focused or integrate with scheduling to encourage better time allocation.
   Examples: Forest, Momentum Dash.

These tools primarily rely on user self-discipline or predefined rules to manage online consumption, offering varying degrees of customization and reporting.

b) Online Examination Proctoring Solutions

This category includes more specialized systems aimed at securing the integrity of online assessments. These solutions are typically employed by educational institutions.

1. **Dedicated Secure Browsers:** These are standalone applications that lock down the student's computer during an exam. They prevent access to other applications, copying/pasting, printing, and sometimes even block internet access outside the exam platform.
   Examples: Respondus LockDown Browser, Safe Exam Browser (SEB).

2. **AI-Powered Remote Proctoring Platforms:** These are comprehensive services that often integrate with Learning Management Systems (LMS). They utilize webcams, microphones, and AI algorithms to monitor student behavior, detect suspicious activities (e.g., unauthorized talking, looking away, multiple

people), and flag potential cheating incidents for review by human proctors. *Examples:* ProctorU, Examity, Honorlock, Proctorio.

3. **Basic Browser-Based Proctoring Extensions:** A few less sophisticated browser extensions exist that attempt to provide a minimal layer of proctoring, such as forcing full-screen mode or trying to detect tab-switching. However, their capabilities are often limited compared to dedicated solutions.

These existing systems represent the current approaches to managing online activities and securing educational environments, forming the backdrop against which WebWatch's unique integrated solution is positioned.

2.1.1 Limitations of the Existing System

While the existing landscape of time management and online proctoring tools offers various functionalities, a critical analysis reveals several significant limitations that hinder their overall effectiveness, convenience, and accessibility. These shortcomings underscore the necessity for an integrated solution like WebWatch.

a) Disjointed Functionality and Lack of Integration

A primary limitation is the **fragmented nature of existing solutions**. Users or institutions often need to employ multiple, distinct tools to address both time management and academic integrity needs.

- **For Individuals:** A user might use one extension to block distracting websites and another application to track productivity, but neither offers a robust solution for a secure online exam. This leads to managing multiple interfaces, potential conflicts between extensions, and a less streamlined user experience.

- **For Institutions:** Educational bodies typically have to invest in separate, often expensive, proctoring platforms for exams, while students might be using their own personal productivity tools independently. There's no single, lightweight tool that can serve both purposes from a browser-native perspective.

b) Overhead, Complexity, and Cost

Many effective existing solutions come with significant operational burdens:

- **Dedicated Secure Browsers:** While secure, they require students to download and install separate software, which can lead to compatibility issues, technical support overhead, and a disruptive user experience as students switch environments.

- **AI-Powered Remote Proctoring Platforms:** These are often very expensive subscription services, making them inaccessible for smaller institutions or individual educators. Their deployment requires complex integration with Learning Management Systems (LMS), and they often demand specific hardware (e.g., webcam, microphone) and robust internet connections, which can be barriers for some students. The setup and configuration can be complex

for administrators.

- **Technical Expertise:** Some advanced tools require a certain level of technical expertise to configure effectively, posing a challenge for non-technical users or examiners.

c) Limited Scope and Bypass Potential in Basic Browser-Based Proctoring

While some simple browser extensions offer basic proctoring features, they frequently suffer from significant security weaknesses:

- **Inadequate Restriction:** They may not effectively prevent or detect common cheating methods, such as opening new browser windows (not just tabs), using external applications, or accessing local files.
- **Easy Circumvention:** Many can be easily bypassed by tech-savvy users who understand browser functionalities or by using simple workarounds (e.g., using a second device, virtual machines).
- **Lack of Control:** They often lack a robust, examiner-controlled activation and deactivation mechanism (like a secure password), making them less reliable for formal assessments.

d) Inadequate Granularity and Real-Time Feedback (for Productivity)

For time management, many tools provide post-hoc reports but lack sufficient real-time, actionable feedback:

- Users might only realize they've spent excessive time on a site *after* the fact, rather than receiving proactive nudges.
- Customization options for setting flexible limits or receiving progressive alerts are sometimes limited, leading to an all-or-nothing approach (either blocked or not).
- The absence of clear, at-a-glance insights into current Browse habits can make it harder for users to self-regulate effectively.

e) Privacy Concerns (for Proctoring)

Advanced proctoring solutions, particularly those using webcam and microphone monitoring with AI, raise significant privacy concerns among students. The continuous recording and analysis of personal data can be intrusive and lead to distrust, impacting the learning experience.

f) Lack of a Lightweight, Integrated Solution

Fundamentally, there is a gap for a single, lightweight, and user-friendly Chrome extension that seamlessly integrates robust, configurable time management capabilities with effective, on-demand browser-level security for online examinations, controllable via a simple, secure mechanism. Existing systems either provide one function well while lacking the other, or they are too complex, costly, or intrusive for widespread, flexible use. WebWatch is designed to fill this specific void.

2.1.2 Dependency on External APIs

While not universally applicable to all simple browser extensions, advanced online proctoring platforms often exhibit significant reliance on external Application Programming Interfaces (APIs).

- **Cloud Services and AI:** These systems frequently depend on third-party cloud computing services (e.g., AWS, Google Cloud) for their infrastructure, data storage, and computationally intensive tasks like AI-driven behavioral analysis (e.g., facial recognition, voice detection). This introduces potential points of failure, latency issues, and increased operational costs.

- **LMS Integration:** Many proctoring solutions need to integrate with various Learning Management Systems (e.g., Moodle, Canvas, Blackboard) via their respective APIs. This creates a dependency on the stability and documentation of these external LMS APIs, and any changes can break compatibility.

- **Security and Privacy Risks:** Reliance on external APIs can introduce security vulnerabilities if those APIs are not properly secured or if data transmission between services is compromised. It also escalates privacy concerns, as student data might be processed or stored by multiple third-party vendors.

- **Maintenance Overhead:** Changes or updates to external APIs can necessitate continuous maintenance and updates for the proctoring platform, increasing development and operational overhead.

This dependency often leads to higher complexity, increased potential for service disruptions, and can raise significant data privacy concerns, aspects that WebWatch, by operating primarily as a client-side Chrome extension with minimal external dependencies for its core functionality, aims to mitigate.

2.1.3 Overhead of Big Data Technologies

Many effective existing solutions come with significant operational burdens:

- **Dedicated Secure Browsers:** While secure, they require students to download and install separate software, which can lead to compatibility issues, technical support overhead, and a disruptive user experience as students switch environments.

- **AI-Powered Remote Proctoring Platforms:** These are often very expensive subscription services, making them inaccessible for smaller institutions or individual educators. Their deployment requires complex integration with Learning Management Systems (LMS), and they often demand specific hardware (e.g., webcam, microphone) and robust internet connections, which can be barriers for some students. The setup and configuration can be complex for administrators.

- **Technical Expertise:** Some advanced tools require a certain level of technical expertise to configure effectively, posing a challenge for non-technical users or examiners.

2.1.4 Complex System Architectures

Particularly for high-end online proctoring solutions, the underlying system architectures are often highly intricate, involving multiple interconnected components and layers.

- **Distributed Systems:** These platforms often operate as distributed systems, with components spread across various servers, data centers, and cloud regions to handle scalability, data processing, and real-time monitoring. Managing such distributed environments introduces significant complexity in terms of deployment, monitoring, and debugging.

- **Microservices vs. Monoliths:** Whether monolithic or microservice-based, the sheer volume of features (e.g., video streaming, AI processing, database management, reporting, LMS integration) necessitates a sophisticated architectural design that requires specialized knowledge to develop, maintain, and scale.

- **Interoperability Challenges:** Different modules (e.g., webcam feed processing, AI analysis, fraud detection algorithms, reporting dashboards) need to communicate seamlessly, often leading to complex communication protocols and data synchronization challenges.

- **Increased Attack Surface:** More complex architectures inherently present a larger attack surface, requiring extensive security measures across all layers and components, increasing the risk of vulnerabilities if not meticulously managed.

  This architectural complexity translates into higher development costs, longer deployment cycles, and increased potential for system failures or performance bottlenecks, aspects that WebWatch, as a more contained browser extension, aims to simplify.

2.1.5 Disjointed Functionality and Lack of Integration

A primary limitation is the **fragmented nature of existing solutions**. Users or institutions often need to employ multiple, distinct tools to address both time management and academic integrity needs.

- **For Individuals:** A user might use one extension to block distracting websites and another application to track productivity, but neither offers a robust solution for a secure online exam. This leads to managing multiple interfaces, potential conflicts between extensions, and a less streamlined user experience.
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recording and analysis of personal data can be intrusive and lead to distrust, impacting the learning experience.

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Fundamentally, there is a gap for a single, lightweight, and user-friendly Chrome extension that intelligently combines robust, configurable time management capabilities with effective, on-demand browser-level security for online examinations, controllable via a simple, secure mechanism. Existing systems either provide one function well while lacking the other, or they are too complex, costly, or intrusive for widespread, flexible use. WebWatch is designed to fill this specific void.

Chapter 3

PROPOSED SYSTEM

3.1 Proposed System

The WebWatch project proposes a novel and integrated Chrome extension designed to directly address the limitations of existing time management and online proctoring tools. By combining both functionalities into a single, intuitive, and lightweight browser extension, WebWatch offers a practical and accessible solution for enhancing individual productivity and ensuring academic integrity in online environments.

WebWatch is envisioned as a dual-mode Chrome extension operating entirely within the user's browser environment (client-side), minimizing external dependencies and maximizing user control. Its core design principle is to provide powerful functionalities without compromising on simplicity, accessibility, or user privacy. The system seamlessly transitions between its two primary operational modes:

- **Normal Mode:** Dedicated to fostering healthy Browse habits and efficient time management.
- **Exam Mode:** Engineered to create a secure and controlled environment for online assessments.

The proposed system aims to be a comprehensive yet unintrusive tool, providing real-time feedback and robust security measures tailored to specific user contexts.

3.2 Key Features

3.2.1 Integrated Dual Functionality

Unlike fragmented existing solutions, WebWatch provides a single point of control for both time management and exam supervision. This seamless integration eliminates the need for users to install and manage multiple, disparate tools, simplifying the overall digital experience.

3.2.2 Intuitive and User-Friendly Interface

The extension will feature a clean, minimalist user interface accessible directly from the Chrome toolbar.

- **Normal Mode UI:** Provides at-a-glance insights into website usage and easy configuration of time limits.
- **Exam Mode UI:** Simple activation/deactivation for examiners and a clear, restrictive interface for students, minimizing confusion during critical assessment periods.

3.2.3 Client-Side Operation with Minimal External Dependencies

WebWatch is designed to operate primarily using Chrome's native extension APIs and local storage.

- **Enhanced Privacy:** By processing and storing most data locally within the user's browser, the system significantly reduces concerns about data privacy and the transmission of sensitive information to external servers.

- **Reliability:** Reduced reliance on external APIs or cloud services minimizes potential points of failure, ensuring consistent performance even without constant internet connectivity for core functions.

- **Lightweight Footprint:** The extension is designed to be resource-efficient, ensuring it does not significantly impact browser performance or consume excessive system resources.

3.2.4 Robust Time Management in Normal Mode

WebWatch offers comprehensive features to empower users in managing their online time:

- **Real-Time Website Usage Monitoring:** Continuously tracks and displays the time spent on various websites.

- **Customizable Time Limits:** Users can set daily or session-based time limits for specific websites or categories of websites.

- **Proactive Pop-up Alerts:** Timely and customizable alerts notify users as they approach and exceed their set time limits, encouraging self-correction.

- **Activity Dashboard:** A clear overview of time spent, enabling users to review their Browse habits and identify areas for improvement.

3.2.5 Secure Online Examination Environment in Exam Mode

WebWatch's Exam Mode is specifically engineered to uphold academic integrity with practical security measures:

- **Full-Screen Mode Enforcement:** Automatically forces the browser into full-screen mode upon activation and actively detects and prevents attempts to exit it, minimizing access to external applications or the desktop.

- **Aggressive Tab Closure Upon Exit:** If a student attempts to open a new tab, navigate away from the exam page, or minimize the browser, WebWatch is designed to detect this and close the unauthorized tab/window, redirecting focus back to the exam.

- **Examiner-Controlled Password Protection:** Activation and deactivation of Exam Mode require a password set by the examiner. This ensures that the secure environment can only be initiated and exited by authorized personnel, preventing students from bypassing the restrictions.

- **Minimal Intrusion (No Webcam/AI):** Unlike more intrusive proctoring solutions, WebWatch achieves its security goals without requiring webcam monitoring or complex AI analysis of student behavior, addressing privacy concerns and making it more accessible.

3.3 System Architecture and Functionality

The WebWatch system is designed as a robust, client-side Google Chrome extension. Its architecture is built upon the standard Chrome Extension Manifest V3 (or V2 if you're using an older version, specify which), leveraging its native APIs to provide a seamless and secure user experience. The core principle is to operate efficiently within the browser environment, minimizing external dependencies and ensuring data privacy.

3.3.1 High-Level Architecture Overview

At a high level, WebWatch functions as a single, self-contained unit integrated into the Chrome browser. It consists of background processes that handle continuous monitoring and logic, and various user interface components for interaction and configuration.

```
graph TD
    subgraph Google Chrome Browser
        User -->|Interacts with| Popup UI
        User -->|Configures via| Options Page
        Popup UI -->|Communicates with| Background Script
        Options Page -->|Communicates with| Background Script
        Background Script -->|Monitors & Enforces| Active Tab (Web
Content)
        Background Script -->|Stores/Retrieves Data| Chrome Storage
        Active Tab (Web Content) --Optional Interaction--> Content
Script
        Background Script -->|Triggers| Pop-up Alerts
    end
```

3.3.2 Detailed Component Breakdown

The WebWatch architecture is composed of several interconnected modules, each responsible for specific functionalities:

a) `manifest.json` (The Core Configuration)

This file is the backbone of the Chrome extension, defining its properties, permissions, and the entry points for all other components. It specifies:

- **Name, Version, Description:** Basic extension metadata.
- **Permissions:** Declares necessary API permissions (e.g., `activeTab`, `storage`, `tabs`, `idle`, `windows`). These are crucial for the extension's operation, allowing it to monitor tab activity, store data, and manage browser windows.
- **Background Script:** Points to the main background logic.
- **Action (Popup):** Defines the default popup UI that appears when the extension icon is clicked.
- **Options Page:** Specifies the HTML file for the extension's configuration settings.
- **Content Scripts:** Defines which scripts run on specific web pages and their matching patterns.

b) Background Script (`background.js`)

This is the persistent, non-visible part of the extension that runs in the background. It is the central nervous system of WebWatch, responsible for:

- **Event Listeners:** Actively listens for browser events such as:
    - `chrome.tabs.onActivated`: Detects when a tab becomes active.
    - `chrome.tabs.onUpdated`: Monitors tab URL changes.

  - `chrome.windows.onFocusChanged`: Tracks changes in window focus (crucial for Exam Mode).
  - `chrome.idle.onStateChanged`: Detects user inactivity.
- **Time Tracking Logic:** Accumulates time spent on active tabs based on URL.
- **Time Limit Enforcement:** Compares current usage against user-defined limits and triggers alerts.
- **Mode Management:** Handles the logic for switching between Normal Mode and Exam Mode.
- **Exam Mode Enforcement Logic:**
  - Manages full-screen window state.
  - Detects unauthorized tab/window changes or exits.
  - Initiates tab closures upon detection of rule violations.
- **Data Persistence:** Manages saving and loading data (website times, limits, exam settings, password) to and from `chrome.storage.local`.
- **Communication Hub:** Acts as an intermediary for messages between the Popup UI, Options Page, and Content Scripts.

c) Popup UI (`popup.html` & `popup.js`)

This is the small, interactive interface that appears when the user clicks the WebWatch icon in the Chrome toolbar.

- **HTML Structure:** Defines the visual layout (e.g., current site usage, time limit controls, mode toggle).
- **JavaScript Logic:** Handles user interactions, fetches current data from the Background Script, displays information, and sends user commands (e.g., "set limit," "activate Exam Mode") back to the Background Script.

d) Options Page (`options.html` & `options.js`)

A more comprehensive configuration interface accessed via the Chrome Extensions management page.

- **HTML Structure:** Provides detailed settings for WebWatch.
- **JavaScript Logic:** Allows users to:
  - Set global time limits or specific limits for multiple websites.
  - Review historical usage data.
  - Configure Exam Mode settings (e.g., set/change examiner password).
  - Manage data (e.g., clear history).
  - Communicates these configurations to the Background Script for persistence.

e) Content Scripts (`content.js` - if applicable)

These are JavaScript files that run in the context of specific web pages. While WebWatch's core functions (time tracking, window management) primarily reside in the background, content scripts can be used for more direct interaction with the web page's DOM if needed.

- *Potential Use Cases:*
  - Displaying subtle, in-page notifications about time limits.
  - Blocking specific elements on a page rather than the whole site.
  - More advanced full-screen handling directly on the page.

f) Chrome Storage (`chrome.storage.local`)

This API provides a way for the extension to store data persistently in the user's Chrome profile.

- **Data Stored:**
  - Website usage logs (time spent per domain).
  - User-defined time limits.
  - Current operating mode (Normal/Exam).
  - Examiner password (securely hashed, not plaintext).
  - Other configuration preferences.
- **Benefit:** Ensures that settings and accumulated data are preserved even after the browser is closed or restarted, and are only accessible by the extension itself.

3.3.3 Data Flow and Interactions

1. **User Interaction:** The user interacts with the **Popup UI** or **Options Page** to view data or change settings.
2. **Command Transmission:** These UI components send messages (e.g., "activate exam mode," "set limit for youtube.com") to the **Background Script**.
3. **Background Processing:** The **Background Script** processes these commands.
   - **Data Storage:** It retrieves/stores necessary data using **Chrome Storage**.
   - **Monitoring:** It continuously monitors browser events (tab changes, window focus) and updates time logs.
   - **Enforcement:** In Exam Mode, it actively enforces full-screen and tab closure rules by interacting with `chrome.windows` and `chrome.tabs` APIs.
   - **Alerting:** Triggers pop-up alerts based on time limit thresholds.
4. **UI Updates:** The **Background Script** can send updates back to the **Popup UI** or **Options Page** to reflect real-time changes (e.g., updated time spent).

3.4 System Requirements

The WebWatch Chrome extension is designed to be lightweight and operate efficiently within the Google Chrome browser environment. As such, its system requirements are primarily software-centric, relying on the capabilities of the host browser and underlying operating system.

3.4.1 Software Requirements

- **Operating System:** WebWatch is compatible with any operating system that supports Google Chrome. This includes, but is not limited to:
  - Microsoft Windows (Windows 7 or later recommended)
  - macOS (macOS 10.10 Yosemite or later recommended)
  - Linux distributions (e.g., Ubuntu, Fedora, Debian)
  - Chrome OS
- **Web Browser:**
  - **Google Chrome:** Version 80 or higher is recommended to ensure full compatibility with the latest Chrome Extension APIs (especially if designed with Manifest V3 in mind, though Manifest V2 is widely supported). The extension is specifically built for and tested on Google Chrome.
- **Internet Connectivity:**
  - Internet access is required for initial installation from the Chrome Web Store.
  - Once installed, core functionalities (time tracking, limit enforcement, exam mode) operate offline, relying on Chrome's local APIs and storage.

- Internet access would only be necessary if future features involving external services (e.g., syncing data to cloud, external proctoring integration) were added, which are explicitly outside the current scope.

3.4.2 Hardware Requirements

Since WebWatch operates as a browser extension, its hardware requirements are inherently tied to the minimum specifications needed to run the Google Chrome browser smoothly on the user's system. No specific additional hardware beyond a standard modern computer is required.

- **Processor:** Any modern multi-core processor (e.g., Intel Core i3 equivalent or newer, AMD Ryzen 3 equivalent or newer).
- **RAM:** 4 GB RAM or more is generally recommended for a smooth browser experience. WebWatch itself has a minimal memory footprint.
- **Storage:** Minimal disk space (a few MBs) for the extension files and local data storage within the Chrome profile.
- **Display:** Standard display resolution suitable for web Browse.
- **Input Devices:** Standard keyboard and mouse/trackpad.

3.4.3 Functional Requirements

Normal Mode:

- **Track Website Time:** Accurately monitor how long users spend on different websites.
- **Show Usage:** Display real-time time spent on the current website.
- **Set Limits:** Allow users to set time limits for specific websites.
- **Alerts:** Notify users when they're approaching or exceeding their time limits.
- **Save Data:** Remember website usage across browsing sessions.
- **Usage History:** Show users a summary of their browsing time over a period.
- **Clear Data:** Allow users to erase their browsing history.
- **Mode Switching:** Easily switch to Exam Mode.

Exam Mode:

- **Password Protection:** Require an examiner-set password to start and stop Exam Mode.
- **Force Full-Screen:** Automatically put the browser in full-screen and prevent exiting.
- **Block New Tabs:** Prevent students from opening new tabs or windows.
- **Close Unauthorized Tabs:** Automatically close any tabs opened by students.
- **Prevent Navigation Away:** Stop students from leaving the exam page.
- **(Optional) Disable Right-Click:** Prevent students from using context menus.
- **(Optional) Clear Session Data:** Allow examiners to clear browsing data after the exam.
- **Show Exam Mode Status:** Clearly indicate when Exam Mode is active.

3.4.4 Non-Functional Requirements

Non-functional requirements describe the operational aspects of the Tweet Analyzer tool that are not related to specific behaviors or functionalities but are critical for ensuring the tool’s performance, reliability, and scalability. Below is an outline of

the key non-functional requirements for the system:

Performance:

- The system must be able to process and analyze tweets in real-time or within a few seconds of receiving the user input.The system should be optimized to handle large datasets efficiently, ensuring minimal processing delays even when analyzing a high volume of tweets.Response times for user queries and analysis results should not exceed 5 seconds under normal operating conditions.

Scalability:

- The system should be able to scale horizontally to accommodate increasing numbers of users or a growing volume of tweet data.As user demand grows, the system must be able to manage additional workload without compromising performance.The application should be capable of handling more complex analyses or larger datasets with minimal additional resources.

Reliability:

- The system must operate reliably and consistently, with minimal downtime or failure.he tool should have a recovery mechanism in place to ensure continuity of service in case of an unexpected failure (e.g., automatic restart in case of a crash).Error logging and monitoring should be implemented to detect failures early and allow for quick troubleshooting.

Availability:

- The system should be available 24/7 with high availability, minimizing service interruptions.If cloud services or third-party dependencies are used, the system should be able to gracefully handle periods of downtime or degraded performance from these services.

Security:

- All data transmitted between the system and users should be encrypted using industry-standard protocols (e.g., HTTPS) to ensure data confidentiality.The sys- tem must ensure that user data and processed tweet data are handled securely, with measures to protect against unauthorized access or data breaches.Any per- sonal data collected (such as Twitter handles) should be anonymized or stored in a way that respects user privacy.The system must comply with relevant data privacy regulations and standards (e.g., GDPR or similar guidelines).

Usability:

- The system should provide an intuitive and user-friendly interface that is accessible to users without technical expertise.The user interface should be responsive, working seamlessly across different devices (desktops, tablets, smartphones).The system must provide clear instructions and feedback during the user interaction to enhance user experience.

Maintainability:

- The codebase should be modular and well-documented to ensure easy maintenance and future enhancements.The system should be designed in a way that allows for the addition of new features or changes with minimal disruption to existing functionality.The system should support automated testing to ensure quality and reduce the time spent on manual testing.

Portability:

- The system should be deployable in different environments (e.g., local machines, cloud platforms, production servers) without requiring significant modifications. Dockerization of the application ensures portability and easy deployment across different platforms.

Compliance:

- The system must comply with relevant legal, regulatory, and industry standards for data processing, especially regarding user privacy and data protection.The system must operate in accordance with Twitter's terms of service and any ap- plicable laws governing data scraping and data usage.

Chapter 4

SYSTEM DESIGN

4.1 Components

The WebWatch Chrome extension is built from several distinct but interconnected components, each playing a crucial role in its overall functionality:

- **manifest.json:**
  - **Role:** This is the foundational configuration file for the entire extension. It acts as the "blueprint," declaring the extension's name, version, necessary permissions (e.g., to access tabs, manage storage), and defining where other parts of the extension (like the background script, popup, and options page) are located.
- **Background Script (background.js):**
  - **Role:** This is the core "brain" of the extension. It runs continuously in the background, listening for browser events. It's responsible for all the core logic, including time tracking, mode management (Normal vs. Exam), enforcing Exam Mode rules (like full-screen and tab closure), and managing data storage.
- **Popup UI (popup.html & popup.js):**
  - **Role:** This is the small, interactive window that appears when you click the WebWatch icon in your Chrome toolbar. It provides a quick overview of current website usage and allows for immediate actions, such as toggling between modes or setting quick limits. The popup.html provides the visual structure, and popup.js handles its functionality.
- **Options Page (options.html & options.js):**
  - **Role:** This is a more comprehensive settings interface. Users can access it for detailed configurations, such as setting specific time limits for multiple websites, reviewing historical usage data, and (for examiners) setting or changing the Exam Mode password. options.html is the structure, options.js is the logic.
- **Chrome Storage (chrome.storage.local):**
  - **Role:** This is the extension's local database within your Chrome browser. It's used to persistently save all user-specific data, including accumulated website times, custom limits, mode settings, and the securely stored examiner password, ensuring data is kept even after the browser is closed.
- **Content Scripts (content.js - *Optional/Situational*):**
  - **Role:** (While not strictly necessary for *all* core WebWatch functions, they are common in extensions). If implemented, these scripts would run directly within specific web pages. Their role would be to interact with the content of a webpage, potentially for more granular in-page notifications or advanced content-level restrictions during Exam Mode.

These components collectively form the WebWatch system, working together to deliver its time management and exam proctoring functionalities.

4.2 Proposed System Architecture

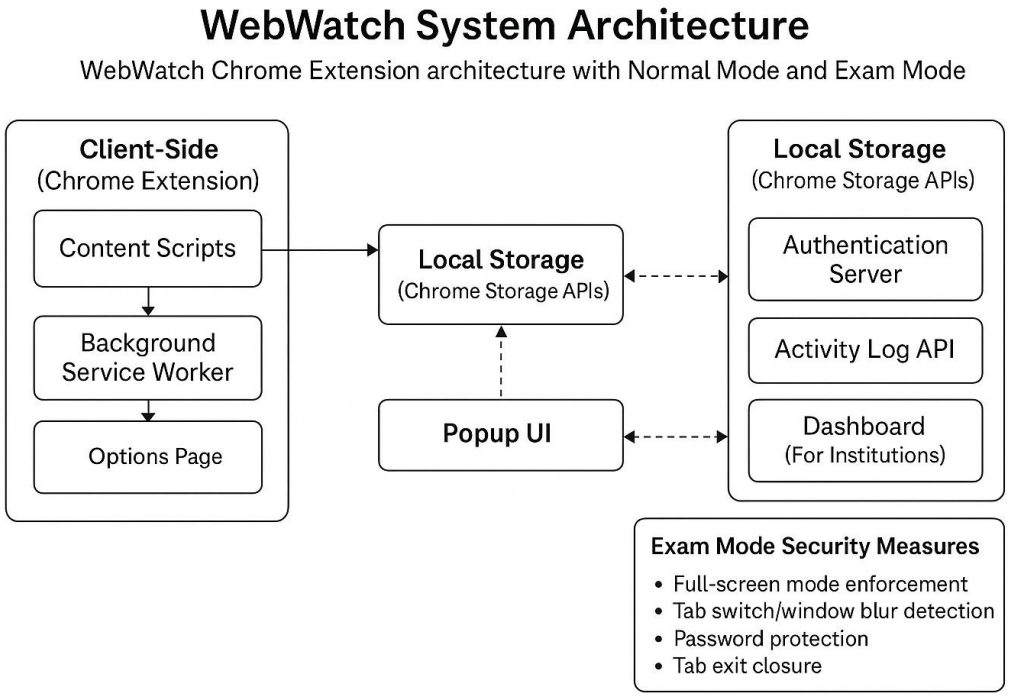

Figure 4.1: WebWatch System Architecture

4.2.1 Architecture Flow Diagram

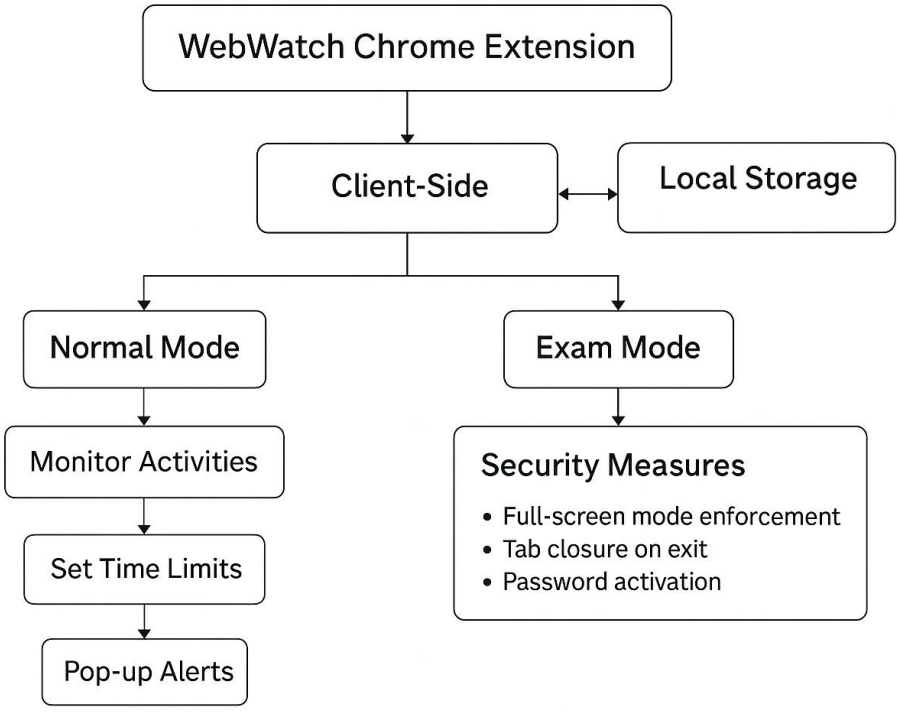

Figure 4.2: Architecture Workflow

4.2.2 UML Diagrams

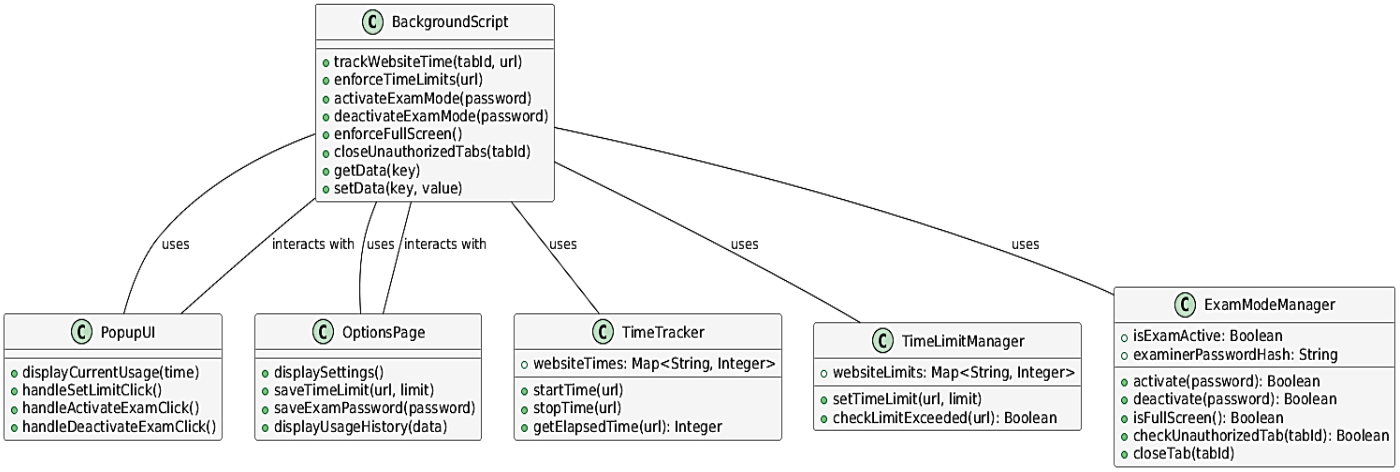

Figure 4.3: Class Diagram

The WebWatch Class Diagram represents the internal structure and organization of the WebWatch Chrome Extension. It depicts the main software components (classes) such as BackgroundScript, which acts as the central logic unit; PopupUI and OptionsPage for user interaction; and specialized manager classes like TimeTracker, TimeLimitManager, and ExamModeManager, which encapsulate specific business logic. The connections between these classes illustrate their relationships and how they collaborate. This object-oriented design ensures a modular structure, promoting separation of concerns and facilitating easier maintenance and future enhancements.

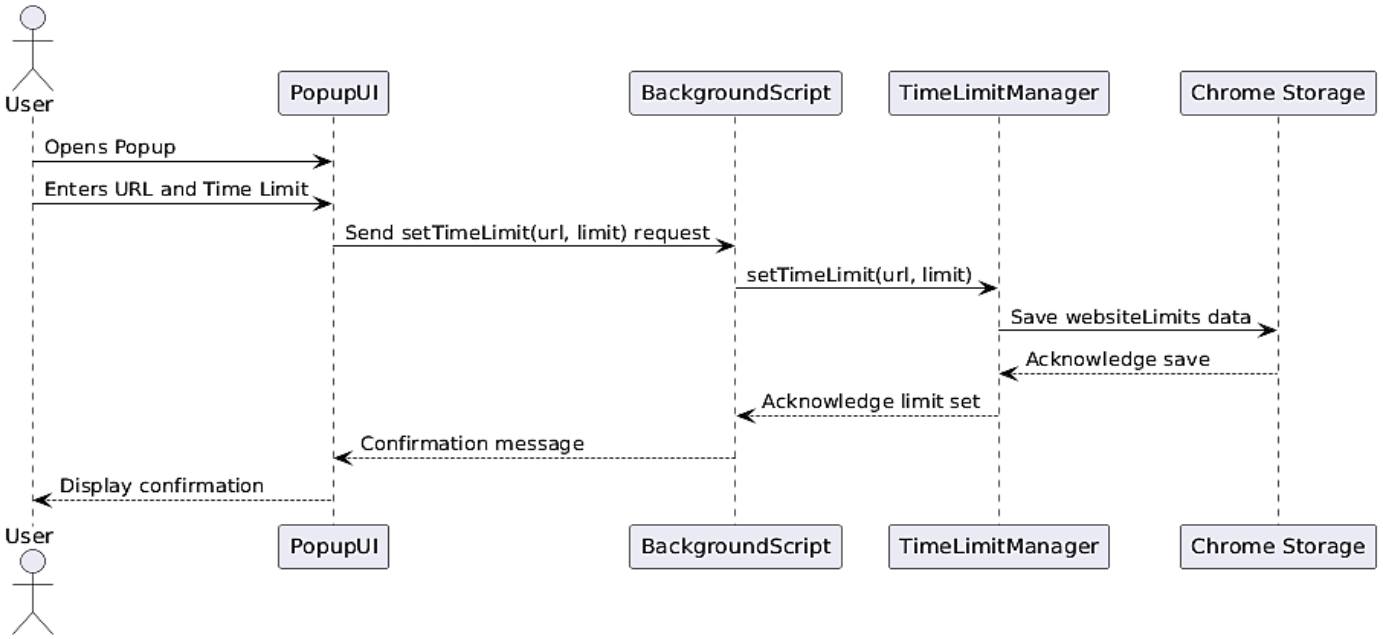

Figure 4.4: Sequence Diagram

The WebWatch Sequence Diagram illustrates a specific workflow for the "Setting a Time Limit" use case within the WebWatch system. It details the step-by-step interaction between the **User**, the PopupUI, the central BackgroundScript, the TimeLimitManager responsible for limit logic, and Chrome Storage for data persistence. The flow begins with the User opening the PopupUI and entering details, which are then passed to the BackgroundScript. The BackgroundScript delegates the actual limit setting to the TimeLimitManager, which then saves the data to Chrome Storage. Finally, acknowledgments and confirmations are passed back to the User. This diagram effectively visualizes the chronological order of method calls and data flow within the system for this particular operation.

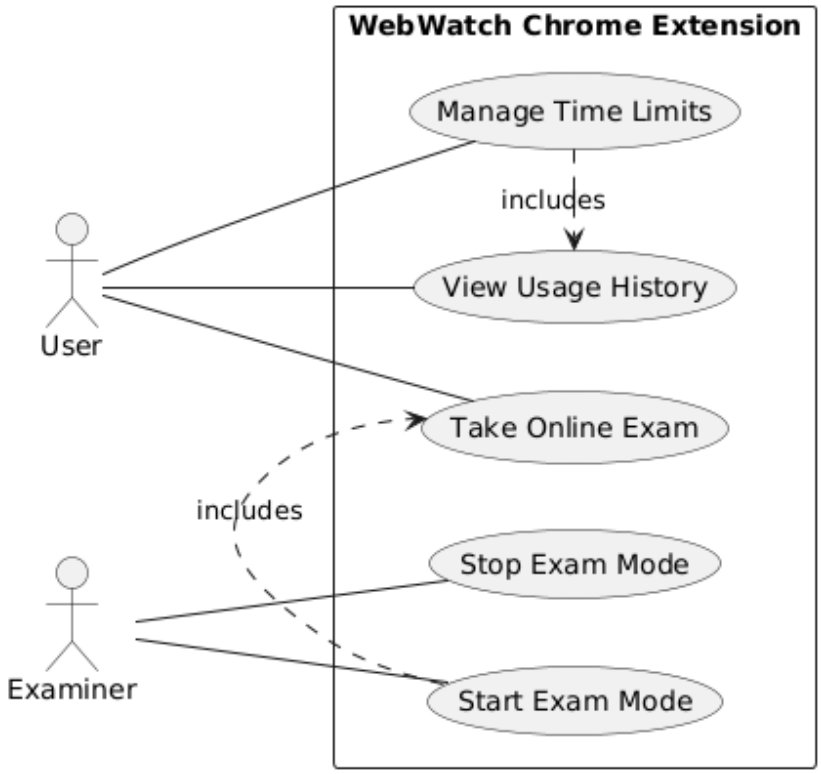

Figure 4.5: Use Case Diagram

The WebWatch Use Case Diagram outlines the primary interactions between users and the WebWatch Chrome Extension. It identifies two key actors: the **User**, who engages with productivity features like managing time limits and viewing usage history, and the **Examiner**, who is responsible for initiating and ending the secure Exam Mode. The diagram clearly shows the distinct functionalities offered in both Normal Mode (time management) and Exam Mode (secure online assessments), illustrating the system's dual purpose. This overview effectively captures how different user roles interact with the core functionalities of the WebWatch system.

Chapter 5

IMPLEMENTATION OF PROJECT

Source Code

5.1.1 manifest.json

```
{
 "manifest_version": 3,
 "name": "Website Time Tracker & Exam Mode",
 "version": "1.0",
 "description": "Track website access time and enable exam mode",
 "permissions": [
  "tabs",
  "storage",
  "activeTab",
  "webNavigation",
  "windows",
  "scripting"
 ],
 "host_permissions": [
  "<all_urls>"
 ],
 "background": {
  "service_worker": "background.js"
 },
 "action": {
  "default_popup": "popup.html"
 },
 "icons": {
  "16": "icon16.png",
  "48": "icon48.png",
  "128": "icon128.png"
 }
}
```

5.1.2 popup.js

```
document.addEventListener('DOMContentLoaded', function() {
  const normalModeBtn = document.getElementById('normalModeBtn');
  const examModeBtn = document.getElementById('examModeBtn');
  const normalModeSection = document.getElementById('normalModeSection');
  const examModeSection = document.getElementById('examModeSection');
  const websiteList = document.getElementById('websiteList');
  const startExamBtn = document.getElementById('startExamBtn');
  const signin = document.getElementById('signin');
  const invigilatorbtn = document.getElementById('invigilatorbtn');
  const studentbtn = document.getElementById('studentbtn');
  const invigilatorSection = document.getElementById('invigilatorSection');
  const studentSection = document.getElementById('studentSection');
  const invigilatorsavebtn = document.getElementById('invigilatorsavebtn');
  const examname = document.getElementById('examname');
  const examurl = document.getElementById('examurl');
  const examcode_invigilator = document.getElementById('examcode-invigilator');
  const examduration = document.getElementById('examduration');
  const studentloginbtn = document.getElementById('studentloginbtn');
  const examcode_student = document.getElementById('examcode-student');
  const rollno = document.getElementById('rollno');
  const examUrldisplay = document.getElementById('examUrldisplay');
  const examDurationdisplay = document.getElementById('examDurationdisplay');
  invigilatorSection.style.display = 'none';
  studentSection.style.display = 'none';
  signin.style.display = 'none';
  examModeSection.style.display = 'none';
  function getTodayDate() {
    const date = new Date();
    return date.toISOString().split('T')[0];
  }
  function formatDuration(milliseconds) {
    const hours = Math.floor(milliseconds / (1000 * 60 * 60));
    const minutes = Math.floor((milliseconds % (1000 * 60 * 60)) / (1000 * 60));
    const seconds = Math.floor((milliseconds % (1000 * 60)) / 1000);
    let timeString = '';
    if (hours > 0) timeString += `${hours}h `;
    if (minutes > 0) timeString += `${minutes}m `;
    if (seconds > 0 || timeString === '') timeString += `${seconds}s`;
    return timeString.trim();
  }
  function updateWebsiteList() {
    chrome.storage.local.get(['websiteData'], function(result) {
      const websiteData = result.websiteData || {};
      const today = getTodayDate();
      const todayData = websiteData[today] || {};
      websiteList.innerHTML = '';
      const dateHeader = document.createElement('h4');
      dateHeader.textContent = `Today's Activity (${today})`;
      websiteList.appendChild(dateHeader);
      const sortedWebsites = Object.entries(todayData)
        .sort(([, a], [, b]) => b.time - a.time);
      if (sortedWebsites.length === 0) {
        const noDataMsg = document.createElement('div');
```

```
        noDataMsg.textContent = 'No activity recorded today';
        noDataMsg.style.fontStyle = 'italic';
        noDataMsg.style.color = '#666';
        noDataMsg.style.padding = '10px 0';
        websiteList.appendChild(noDataMsg);
        return;
       }
       sortedWebsites.forEach(([url, data]) => {
        const websiteItem = document.createElement('div');
        websiteItem.className = 'website-item';
        websiteItem.style.padding = '8px 0';
        websiteItem.style.borderBottom = '1px solid #eee';
        const faviconImg = document.createElement('img');
        faviconImg.src = data.favicon || 'default-favicon.png';
        faviconImg.width = 16;
        faviconImg.height = 16;
        faviconImg.style.marginRight = '10px';
        faviconImg.onerror = () => { faviconImg.src = 'default-favicon.png'; };
        const infoContainer = document.createElement('div');
        infoContainer.style.flexGrow = '1';
        const urlDiv = document.createElement('div');
        urlDiv.textContent = url;
        urlDiv.style.fontWeight = 'bold';
        const timeDiv = document.createElement('div');
        timeDiv.textContent = formatDuration(data.time);
        timeDiv.style.color = '#666';
        timeDiv.style.fontSize = '0.9em';
        infoContainer.appendChild(urlDiv);
        infoContainer.appendChild(timeDiv);
        websiteItem.appendChild(faviconImg);
        websiteItem.appendChild(infoContainer);
        websiteList.appendChild(websiteItem);
       });
      });
    }
    setInterval(updateWebsiteList, 1000);

    normalModeBtn.addEventListener('click', () => {
      normalModeSection.style.display = 'block';
      signin.style.display = 'none';
      invigilatorSection.style.display = 'none';
      examModeSection.style.display = 'none';
      studentSection.style.display = 'none';
      updateWebsiteList();
    });
    examModeBtn.addEventListener('click', () => {
      normalModeSection.style.display = 'none';
      signin.style.display = 'block';
    });
    invigilatorbtn.addEventListener('click', () => {
      studentSection.style.display = 'none';
      invigilatorSection.style.display = 'block';
    });
    invigilatorsavebtn.addEventListener('click', async() => {
        let exam={
```

```
      name:examname.value,
      url:examurl.value,
      code:examcode_invigilator.value,
      duration:examduration.value,
      rollnos:[],
     }
     await fetch('http://localhost:4000/addexam',{
      method:'POST',
      headers:{
       Accept:'application/json',
       'Content-Type':'application/json',
      },
      body:JSON.stringify(exam),
     }).then((res=>res.json())).then((data)=>{
      if(data.success){
       alert('Exam saved');
       examname.value="";
       examcode_invigilator.value="";
       examurl.value="";
       examduration.value="";
      }else{
       alert('Failed! Exam code already exist');
      }
     })

});

studentbtn.addEventListener('click', () => {
 examModeSection.style.display = 'none';
 invigilatorSection.style.display = 'none';
 studentSection.style.display = 'block';
});
let currentexam;
studentloginbtn.addEventListener('click',async()=>{
 let request={
  code:examcode_student.value,
 }
 await fetch('http://localhost:4000/getexam',{
  method:'POST',
  headers:{
   Accept:'application/json',
   'Content-Type':'application/json',
  },
  body:JSON.stringify(request),
 }).then((res=>res.json())).then((data)=>{
  if(data.success){
   currentexam=data.exam;
   examUrldisplay.innerText="URL:"+ currentexam.url;
   examDurationdisplay.innerText="Duration:"+ currentexam.duration;
   examModeSection.style.display="block";
  }else{
   examModeSection.style.display="none";
   alert("Failed! Exam code doesn't exist");
  }
 })
```

```
  })
  startExamBtn.addEventListener('click', async() => {
     const request={
     code:currentexam.code,
     rollno:rollno.value,
    }
    let iswritten=false;
    await fetch('http://localhost:4000/addrollno',{
     method:'POST',
     headers:{
       Accept:'application/json',
       'Content-Type':'application/json',
     },
     body:JSON.stringify(request),
    }).then((res=>res.json())).then((data)=>{
       if(!data.success){
       alert(request.rollno+' already written!');
       iswritten=true;
      }
    })
  if(iswritten) return;
  const examUrl = currentexam.url;
  const examDuration = currentexam.duration;

    if (!examUrl || !examDuration) {
      alert('Please enter exam URL and duration');
      return;
    }
     chrome.runtime.sendMessage({
      action: 'startExam',
      url: examUrl,
      duration: parseInt(examDuration) * 60 * 1000
    });
  });
  updateWebsiteList();
});
```

5.1.3 background.js

```
let websiteData = {};
let activeTab = null;
let trackingInterval = null;
let examTabId = null;
let isSubmitting = false;
function getTodayDate() {
  const date = new Date();
  return date.toISOString().split('T')[0];
}
function initializeWebsiteData() {
  chrome.storage.local.get(['websiteData'], function(result) {
    websiteData = result.websiteData || {};
    const today = getTodayDate();
    if (!websiteData[today]) {
      websiteData[today] = {};
```

```
    }
    cleanupOldData();
    saveWebsiteData();
  });
}
function cleanupOldData() {
  const dates = Object.keys(websiteData).sort();
  const thirtyDaysAgo = new Date();
  thirtyDaysAgo.setDate(thirtyDaysAgo.getDate() - 30);
  const cutoffDate = thirtyDaysAgo.toISOString().split('T')[0];
  dates.forEach(date => {
    if (date < cutoffDate) {
      delete websiteData[date];
    }
  });
}
function saveWebsiteData() {
  chrome.storage.local.set({ websiteData });
}
async function submitGoogleForm(tabId) {
  if (isSubmitting) return;
  isSubmitting = true;
  try {
    await chrome.scripting.executeScript({
      target: { tabId: tabId },
      function: () => {
        return new Promise((resolve) => {
          if (window.location.hostname.includes('docs.google.com') &&
            window.location.pathname.includes('/forms/')) {
            try {
              const submitButtons = [
                document.querySelector('div[role="button"][jsname="M2UYVd"]'),
               document.querySelector('div[role="button"].freebirdFormviewerViewNavigationSu
               bmitButton'),
                document.querySelector('div[role="button"][aria-label*="Submit"]'),
                document.querySelector('div[role="button"][data-mdc-dialog-action="ok"]'),
                ...Array.from(document.querySelectorAll('div[role="button"]')).filter(el =>
                  el.textContent.toLowerCase().includes('submit'))
              ];
              const submitButton = submitButtons.find(btn => btn);
              if (submitButton) {
                submitButton.dispatchEvent(new MouseEvent('mousedown', { bubbles: true }));
                submitButton.dispatchEvent(new MouseEvent('mouseup', { bubbles: true }));
                submitButton.dispatchEvent(new MouseEvent('click', { bubbles: true }));
                submitButton.click();
                const form = document.querySelector('form');
                if (form) {
                  form.submit();
                }
                resolve(true);
              } else {
                const form = document.querySelector('form');
                if (form) {
                  form.submit();
                  resolve(true);
```

```
            }
          }
        } catch (error) {
          console.error('Form submission error:', error);
        }
      }
      resolve(false);
    });
  }
 });
 await new Promise(resolve => setTimeout(resolve, 500));
} catch (error) {
 console.error('Error in submitGoogleForm:', error);
} finally {
 isSubmitting = false;
}
}
async function closeExamTab() {
 if (examTabId) {
  const tabId = examTabId;
  try {
   await submitGoogleForm(tabId);
   examTabId = null;
   chrome.tabs.remove(tabId, () => {
    if (chrome.runtime.lastError) {
     chrome.tabs.remove(tabId);
    }
    chrome.windows.getCurrent((window) => {
     if (window) {
      chrome.windows.update(window.id, { state: 'maximized' });
     }
    });
   });
  } catch (error) {
   console.error('Error in closeExamTab:', error);
   examTabId = null;
   chrome.tabs.remove(tabId);
  }
 }
}
function trackActiveTab(tabId, url) {
 if (trackingInterval) {
  clearInterval(trackingInterval);
 }
 try {
  const hostname = new URL(url).hostname;
  const today = getTodayDate();
  if (!websiteData[today]) {
   websiteData[today] = {};
  }
  if (!websiteData[today][hostname]) {
   websiteData[today][hostname] = {
    time: 0,
    favicon: null
   };
```

```
    }
    trackingInterval = setInterval(() => {
      if (websiteData[today][hostname]) {
        websiteData[today][hostname].time += 1000;
        saveWebsiteData();
      }
    }, 1000);
    chrome.tabs.get(tabId, (tab) => {
      if (!chrome.runtime.lastError && tab && tab.favIconUrl) {
        websiteData[today][hostname].favicon = tab.favIconUrl;
        saveWebsiteData();
      }
    });
  } catch (error) {
    console.error('Error tracking tab:', error);
  }
}
chrome.tabs.onUpdated.addListener((tabId, changeInfo, tab) => {
  if (changeInfo.status === 'complete' && tab.url && tab.url.startsWith('http')) {
    trackActiveTab(tabId, tab.url);
  }
});
chrome.tabs.onActivated.addListener((activeInfo) => {
  if (examTabId && activeInfo.tabId !== examTabId) {
    closeExamTab();
    return;
  }
  chrome.tabs.get(activeInfo.tabId, (tab) => {
    if (tab.url && tab.url.startsWith('http')) {
      trackActiveTab(activeInfo.tabId, tab.url);
    }
  });
});
chrome.windows.onFocusChanged.addListener((windowId) => {
  if (examTabId) {
    if (windowId === chrome.windows.WINDOW_ID_NONE) {
      closeExamTab();
    } else {
      chrome.windows.get(windowId, { populate: true }, (window) => {
        if (!window.tabs.some(tab => tab.id === examTabId)) {
          closeExamTab();
        }
      });
    }
  }
});
chrome.runtime.onMessage.addListener((message) => {
  if (message.action === 'startExam') {
    if (trackingInterval) {
      clearInterval(trackingInterval);
    }
    chrome.tabs.create({
      url: message.url,
      active: true
    }, (tab) => {
```

```
if (chrome.runtime.lastError) {
  console.error('Error creating exam tab:', chrome.runtime.lastError);
  return;
}
examTabId = tab.id;
const examWindowId = tab.windowId;
chrome.tabs.onUpdated.addListener(function tabLoadListener(tabId, changeInfo,
        tabInfo) {
  if (tabId === examTabId && changeInfo.status === 'complete') {
    chrome.tabs.onUpdated.removeListener(tabLoadListener);
    let lastActivityTime = Date.now();
    let hasStarted = false;
    const focusCheckInterval = setInterval(() => {
      chrome.windows.getCurrent((currentWindow) => {
        if (!examTabId) {
          clearInterval(focusCheckInterval);
          return;
        }
        if (!currentWindow || !currentWindow.focused) {
          closeExamTab();
          return;
        }
        chrome.windows.get(currentWindow.id, { populate: true }, (window) => {
          if (!window.tabs.some(tab => tab.id === examTabId)) {
            closeExamTab();
            return;
          }
          if (window.state !== 'fullscreen') {
            closeExamTab();
            return;
          }
        });
      });
    }, 1000);
    chrome.windows.update(examWindowId, { state: 'fullscreen' }, () => {
      if (chrome.runtime.lastError) {
        console.error('Error entering fullscreen:', chrome.runtime.lastError);
        clearInterval(focusCheckInterval);
        closeExamTab();
        return;
      }
      chrome.scripting.executeScript({
        target: { tabId: examTabId },
        function: () => {
          const resetTimer = () => {
            chrome.runtime.sendMessage({ action: 'activity' });
          };
          ['mousemove', 'keydown', 'scroll', 'click'].forEach(event => {
            document.addEventListener(event, resetTimer);
          });
          document.addEventListener('fullscreenchange', () => {
            if (!document.fullscreenElement) {
              chrome.runtime.sendMessage({ action: 'fullscreenExit' });
            }
          });
```

```
    document.addEventListener('keydown', function(e) {
      const blockedKeys = ['Meta', 'Windows', 'F11', 'Escape'];
      if (e.key === 'Alt' && !e.ctrlKey && !e.shiftKey && !e.metaKey) {
        return;
      }
      if (e.altKey && (
        e.key === 'Tab' ||
        e.key === 'F4' ||
        e.key === 'Space' ||
        e.key === 'Enter' ||
        e.key === 'Home' ||
        e.key === 'ArrowLeft' ||
        e.key === 'ArrowRight'
      )) {
        e.preventDefault();
        e.stopPropagation();
        chrome.runtime.sendMessage({ action: 'windowBlur' });
        return false;
      }
      if ((e.ctrlKey && e.key === 'w') ||
        (e.ctrlKey && e.key === 'W') ||
        blockedKeys.includes(e.key)) {
        e.preventDefault();
        chrome.runtime.sendMessage({ action: 'windowBlur' });
      }
    }, true);
    window.addEventListener('blur', () => {
      chrome.runtime.sendMessage({ action: 'windowBlur' });
    });
    document.addEventListener('contextmenu', e => e.preventDefault());
    document.addEventListener('selectstart', e => e.preventDefault());
    document.addEventListener('visibilitychange', () => {
      if (document.hidden) {
        chrome.runtime.sendMessage({ action: 'pageHidden' });
      }
    });
    window.addEventListener('beforeunload', (e) => {
      chrome.runtime.sendMessage({ action: 'windowBlur' });
    });
    document.documentElement.requestFullscreen().catch(console.error);
  }
}).catch(error => {
  console.error('Script injection failed:', error);
  clearInterval(focusCheckInterval);
  closeExamTab();
});
chrome.scripting.insertCSS({
  target: { tabId: examTabId },
  css: `#examTimer { position: fixed; top: 10px; right: 10px; background: rgba(0, 0,
    0, 0.8); color: white; padding: 10px 20px; border-radius: 5px; font-size: 20px; z-
    index: 999999; }`
}).catch(console.error);
chrome.scripting.executeScript({
  target: { tabId: examTabId },
  function: () => {
```

```
            const timerDiv = document.createElement('div');
            timerDiv.id = 'examTimer';
            document.body.appendChild(timerDiv);
          }
        }).catch(console.error);
        let remainingTime = message.duration;
        const timerInterval = setInterval(() => {
          if (!examTabId) {
            clearInterval(timerInterval);
            return;
          }
          chrome.scripting.executeScript({
            target: { tabId: examTabId },
            function: (time) => {
              const minutes = Math.floor(time / (1000 * 60));
              const seconds = Math.floor((time % (1000 * 60)) / 1000);
              const timer = document.getElementById('examTimer');
              if (timer) {
                timer.textContent = `${minutes}:${seconds.toString().padStart(2, '0')}`;
              }
            },
            args: [remainingTime]
          }).catch(() => {
            clearInterval(timerInterval);
            clearInterval(focusCheckInterval);
            closeExamTab();
          });
          remainingTime -= 1000;
          if (remainingTime <= 0) {
            clearInterval(timerInterval);
            clearInterval(focusCheckInterval);
            submitGoogleForm(examTabId).then(() => {
              closeExamTab();
            });
          }
        }, 1000);
        chrome.runtime.onMessage.addListener((message) => {
          if (message.action === 'activity') {
            lastActivityTime = Date.now();
          }
        });
        const exitHandler = (message) => {
          if (['fullscreenExit', 'pageHidden', 'windowBlur'].includes(message.action)) {
            clearInterval(timerInterval);
            clearInterval(focusCheckInterval);
            chrome.runtime.onMessage.removeListener(exitHandler);
            submitGoogleForm(examTabId).then(() => {
              closeExamTab();
            });
          }
        };
        chrome.runtime.onMessage.addListener(exitHandler);
      });
    }
  });
```

```
      });
    }
  });
initializeWebsiteData();
```

5.1.4 popup.html

```
<!DOCTYPE html>
<html>
<head>
  <title>Website Time Tracker</title>
  <style>
    body {
      width: 350px;
      padding: 15px;
      font-family: Arial, sans-serif;
      margin: 0;
    }
    .mode-switch {
      display: flex;
      justify-content: space-between;
      margin-bottom: 15px;
      gap: 10px;
    }
    .mode-switch button {
      flex: 1;
      padding: 8px;
      border: none;
      border-radius: 4px;
      background-color: #b4faf5;
      color:black;
      cursor: pointer;
      transition: background-color 0.2s;
    }
    .mode-switch button:hover {
      background-color: #f8f395;
    }
    .website-list {
      max-height: 400px;
      overflow-y: auto;
      padding-right: 5px;
    }
    .website-list::-webkit-scrollbar {
      width: 6px;
    }
    .website-list::-webkit-scrollbar-track {
      background: #f1f1f1;
      border-radius: 3px;
    }
    .website-list::-webkit-scrollbar-thumb {
      background: #888;
      border-radius: 3px;
    }
    .website-list::-webkit-scrollbar-thumb:hover {
```

```
      background: #666;
    }
    .website-item {
      display: flex;
      align-items: flex-start;
      padding: 8px 0;
      border-bottom: 1px solid #eee;
    }
    .website-item:last-child {
      border-bottom: none;
    }
    h3, h4 {
      margin-top: 0;
      margin-bottom: 15px;
      color: #333;
    }
    input[type="url"],
    input[type="number"],
    input[type="password"],
    input[type="text"] {
      width: 100%;
      padding: 8px;
      margin-bottom: 10px;
      border: 1px solid #ddd;
      border-radius: 4px;
      box-sizing: border-box;
    }
    button {
      background-color: #4CAF50;
      color: white;
      padding: 8px 16px;
      border: none;
      border-radius: 4px;
      cursor: pointer;
      transition: background-color 0.2s;
    }
    button:hover {
      background-color: #45a049;
    }
  </style>
</head>
<body>
  <div class="mode-switch">
    <button id="normalModeBtn">Normal Mode</button>
    <button id="examModeBtn">Exam Mode</button>
  </div>

  <div id="normalModeSection">
    <h3>Website Access Time</h3>
    <div id="websiteList" class="website-list"></div>
  </div>
  <div id="signin">
    <h3>Signin</h3>
    <button id="invigilatorbtn">Invigilator</button>
    <button id="studentbtn">Student</button>
```

```
  </div>
  <div id="invigilatorSection">
     <input type="text" name="examname" id="examname" placeholder="Enter Exam name">
     <input type="text" name="examurl" id="examurl" placeholder="Enter Exam Url">
     <input type="text" name="examcode" id="examcode-invigilator" placeholder="Enter Exam
code">
     <input type="text" name="examduration" id="examduration" placeholder="Enter Exam
duration in min">
    <button id="invigilatorsavebtn">Save</button>
  </div>
  <div id="studentSection">
    <input type="text" name="examcode" id="examcode-student" placeholder="Enter Exam
code">
    <button id="studentloginbtn">Enter</button>
  </div>
  <div id="examModeSection">
    <h3>Exam details</h3>
    <p id="examUrldisplay"></p>
    <p id="examDurationdisplay"></p>
    <input type="text" name="rollno" id="rollno" placeholder="Enter Rollno">
    <button id="startExamBtn">Start Exam</button>
  </div>
  <script src="popup.js"></script>
</body>
</html>
```

Chapter 6

RESULTS

6.1 OUTPUT

The WebWatch Chrome Extension primarily produces functional and interactive outputs designed to provide users with real-time feedback, enforce specific Browse behaviors, and maintain data integrity. Unlike traditional software that might generate files or complex reports, WebWatch's outputs are integrated directly into the user's Browse experience.

6.1.1 Normal Mode Outputs:

- **Real-time Website Usage Display:** The extension's popup UI (accessible by clicking the icon) serves as an immediate output, dynamically displaying the time spent on the currently active website. This provides instant awareness to the user.
- **Proactive Pop-up Alerts:** When user-defined time limits are approached or exceeded, the system outputs clear, non-intrusive pop-up notifications directly within the browser. These visual alerts are crucial for prompting users to manage their time effectively.
- **Historical Usage Data Summaries:** The options page provides a visual output of accumulated Browse time for various websites over different periods (e.g., daily, weekly). This historical data is presented in an organized format, allowing users to review and analyze their digital habits.
- **Improved User Productivity:** While not a tangible file, a key functional output of Normal Mode is the enablement of enhanced user focus and productivity through self-regulation and awareness.

6.1.2 Exam Mode Outputs:

- **Secure Browse Environment:** The primary output of Exam Mode is the creation and maintenance of a highly controlled and secure browser environment. This includes:
    - **Forced Full-Screen Display:** The browser automatically enters and attempts to remain in full-screen mode, restricting access to the desktop or other applications.
    - **Automatic Tab/Window Closure:** The system outputs an immediate action by closing any newly opened, unauthorized tabs or browser windows, preventing navigation away from the exam.
    - **Clear Mode Indication:** The user interface (e.g., the extension icon or a subtle banner) clearly indicates that Exam Mode is active, ensuring transparency for the student.
- **Prevention of Academic Dishonesty:** The collective enforcement measures result in the crucial output of a reduced risk of cheating, thereby upholding the integrity of online examinations.

6.1.3 General Outputs:

- **Persisted User Settings and Data:** All user-defined time limits, mode configurations, examiner passwords (hashed), and accumulated Browse time are securely saved to the browser's local storage. This ensures that user preferences and historical data are retained across sessions.
- **Streamlined User Experience:** The intuitive design and seamless operation of the extension contribute to an overall output of a more controlled and less distracting online experience for the user.

6.1.4 Output images

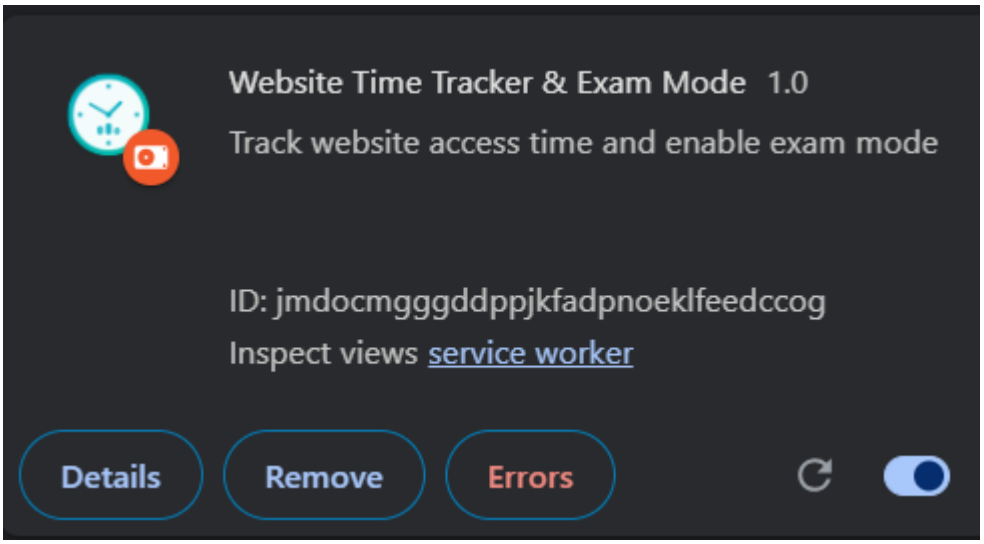

Figure 6.1: Loaded Extension

Figure 6.2: Modes

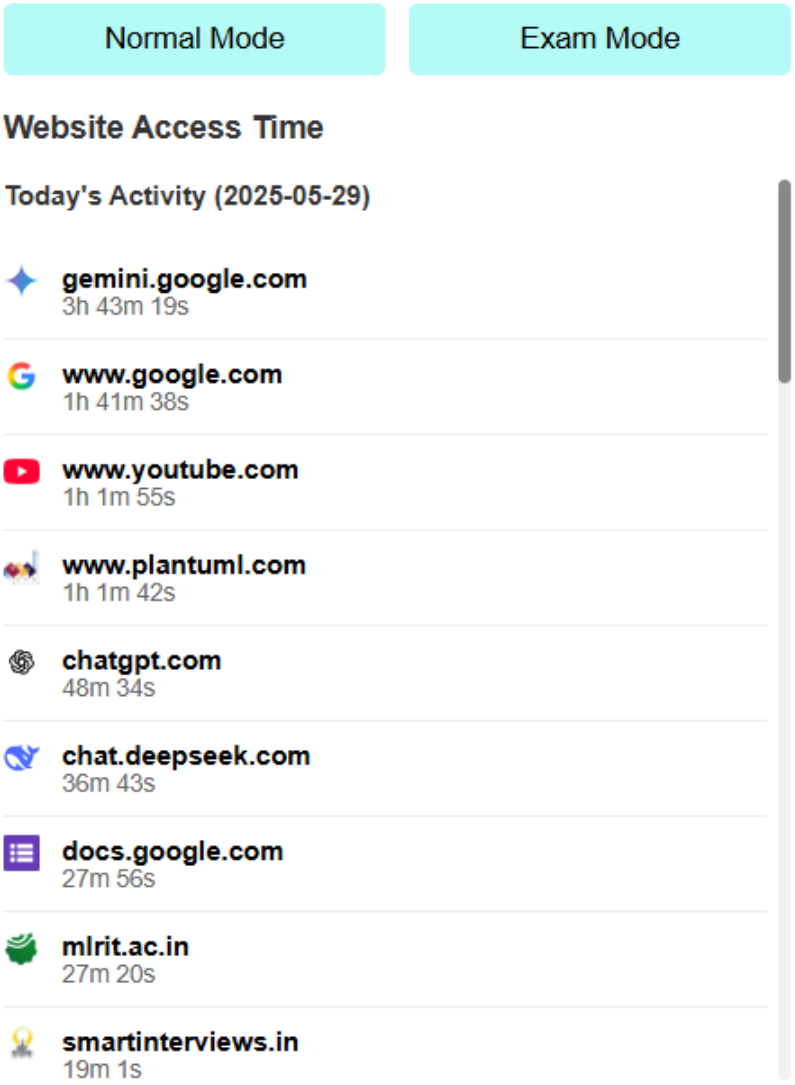

Figure 6.3: Normal Mode

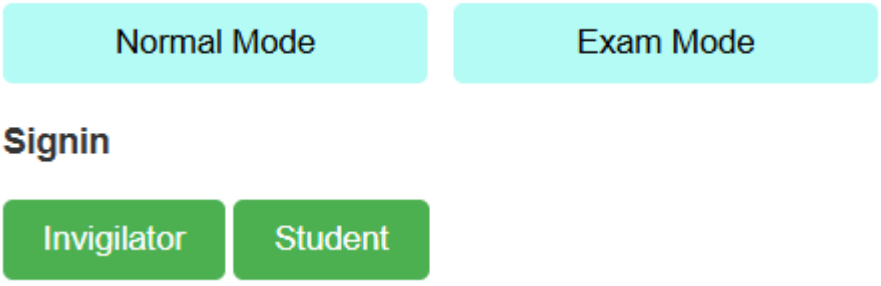

Figure 6.4: Exam Mode

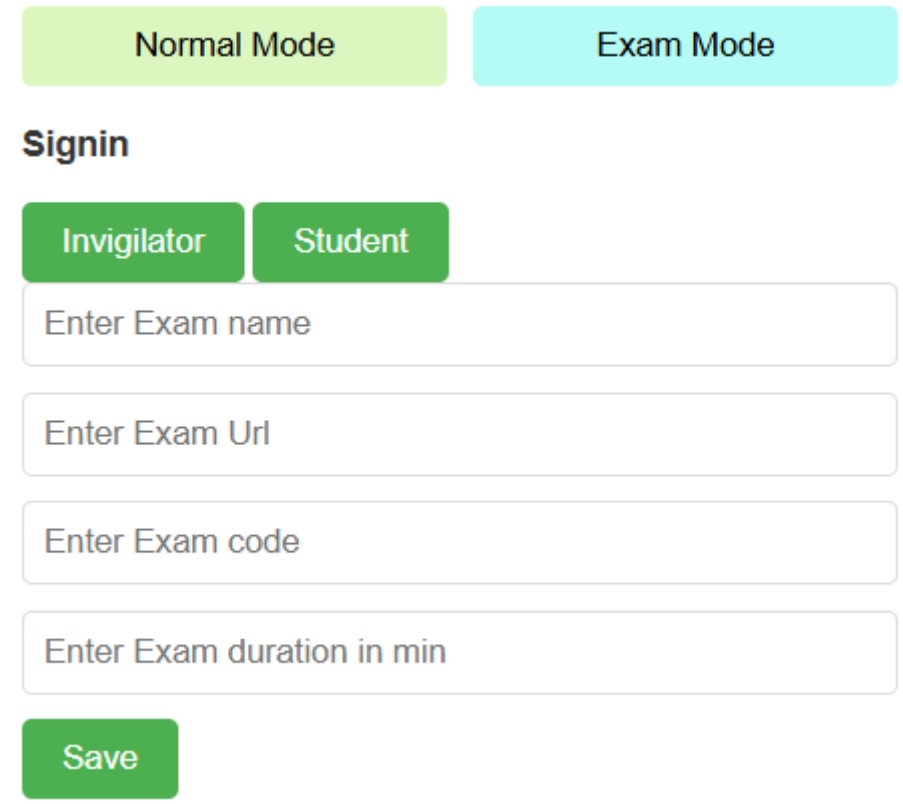

Figure 6.5: Invigilator Area

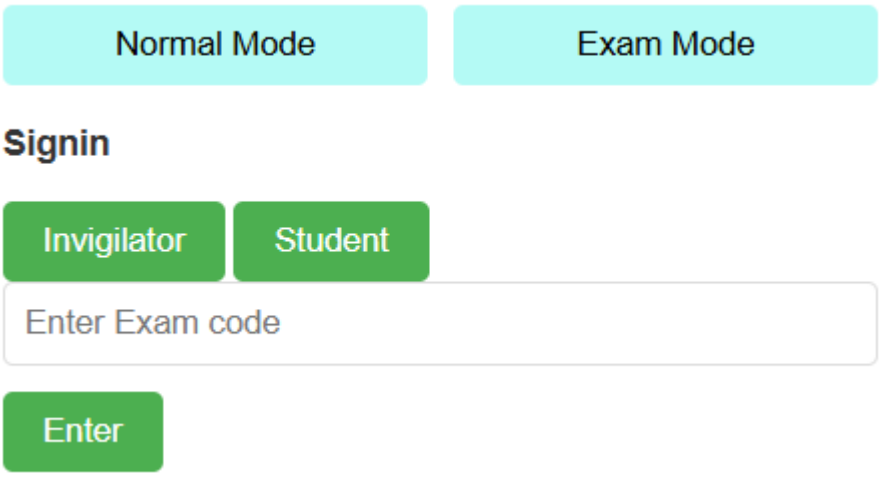

Figure 6.6: Student Area

Chapter 7
CONCLUSION

The WebWatch Chrome Extension effectively tackles two key digital challenges: **online time management** and **maintaining integrity in remote exams**. It offers a novel, integrated, client-side solution that fills gaps left by fragmented or overly complex existing tools, which often demand significant resources or compromise user privacy.

WebWatch achieves this through its dual functionality. **Normal Mode** empowers users with real-time website monitoring, customizable time limits, and non-intrusive alerts, fostering self-awareness and productivity. Its robust **Exam Mode** provides educational institutions with a practical, lightweight tool to secure online assessments by enforcing full-screen display, preventing unauthorized navigation, and using secure, password-protected activation. This design combats academic dishonesty without resorting to intrusive monitoring, respecting student privacy. The extension's client-side architecture minimizes external dependencies, ensuring enhanced **user privacy**, reliability, and minimal performance impact, making it a cost-effective and accessible alternative to expensive proctoring platforms. Ultimately, WebWatch is a comprehensive, user-friendly, and privacy-conscious solution for digital productivity and secure online learning.

Chapter 8

FUTURE ENHANCEMENT

Introducing more sophisticated control over Browse habits, such as time limits or blocking entire website categories (e.g., social media, streaming services), and providing advanced time analytics and reporting with intuitive graphs. A Pomodoro Technique timer will also be integrated.

Refining protective measures by allowing examiners to define a specific whitelist of permissible URLs and implementing features to prevent copying and pasting text during exams.

Offering more control over alert customization (sounds, visual styles), providing an intuitive onboarding tour, and adding dark mode and broader accessibility features (keyboard navigation, screen reader compatibility, customizable font sizes).

Introducing optional, user-controlled cloud synchronization for secure data syncing across devices. Exploring secure connections with Learning Management Systems (LMS) like Moodle or Canvas to initiate Exam Mode and receive basic browser activity reports. Investigating browser APIs to deter or detect screenshots/print screens during Exam Mode and basic monitoring for unusual network activity.

Chapter 9

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