A Project Report on

Hardware Monitoring Suite

Submitted in partial fulfillment of the requirements for the award of the degree of

Bachelor of Engineering

in

Computer Engineering

by

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Approval Sheet

This Project Report entitled ***"Hardware Monitoring Suite"*** Submitted by ***"Saumil Padwal"(18102012), "Vaibhav Shukla"(18102069), "Mayur Pawar"(18102050), "Vikas Prajapati"(18102017)***is approved for the partial fulfillment of the requirenment for the award of the degree of ***Bachelor of Engineering*** in ***Computer Engineering*** from ***University of Mumbai***.

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Place:A.P.Shah Institute of Technology, Thane
Date: 8 Nov 2021

CERTIFICATE

This is to certify that the project entitled ***"Hardware Monitoring Suite"*** submitted by ***"Saumil Padwal" (18102012),"Vaibhav Shukla" (18102069),"Mayur Pawar" (18102050),"Vikas Prajapati" (18102017)*** for the partial fulfillment of the requirement for award of a degree ***Bachelor of Engineering*** in ***Computer Engineering***,to the University of Mumbai,is a bonafide work carried out during academic year 2021-2022.

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Declaration

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, We have adequately cited and referenced the original sources. We also declare that We have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

_____

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Chapter 1

Introduction

Hardware Monitoring Suite is a system monitoring app which will be used for tracking of hardware components such as CPU (temperatures, voltages), fan speeds, Core temperature, system hardware detection, PSU load, among others. As currently there is a lack of user-friendly and centraliized hardware monitoring tools.

Chapter 2

Project Concept

2.1 Abstract

Hardware Monitoring Suite is a system monitoring app which will be used for tracking of hardware components such as CPU (temperatures, voltages), fan speeds, Core temperature, system hardware detection, PSU load, among others. In addition, it will also provide suggestion of better components than the current components, as well as news about latest hardware for upgrades.

2.2 Objectives

Main Objectives of Hardware Monitoring Suite are:

1. To retrieve values of fan speeds which helps understand the RPM of fans and also helps identify whether fans are working properly or not.
2. To detect CPU core temperatures because when a CPU gets too hot, it can cause considerable damage to your device. It's a good practice to periodically check your CPU temps to ensure you aren't causing any unnecessary harm on your device.
3. System Hardware detection which helps in identifying details of CPU, Ram, GPU, etc.
4. To keep tab on voltages. It helps determine the amount of voltage your CPU needs to maintain stability at the default clock speeds.
5. Suggestions for better hardware components than those currently in use.
6. Providing latest and exclusive news related to new upcoming technology.

2.3 Literature Review

Hardware monitoring approaches have successfully been applied in many software engineering tasks, particularly in program profiling, dynamic optimization, and software testing. While advances have been made in improving the efficiency of using instrumentation for program execution monitoring, research has revealed that the use of hardware mechanisms can eliminate or drastically reduce the need for instrumentation. The key trade-off in balancing hardware monitoring and instrumentation use is between the efficiency needed for the approach and the amount and type of observations that must be made. The research presented in this chapter demonstrates how hardware monitoring has been used successfully in balancing these trade-offs in software engineering tasks.

Finally, the efficiency and applicability of hardware monitoring approaches may be improved as the hardware, OS tools, and user level tools continue to develop. Although hardware monitoring research currently focuses on applications executing on commodity machines, their use may potentially aid in testing, debugging, use analysis and application analysis on mobile devices and embedded systems as well.

2.4 Problem Definition

- Currently there is a lack of user-friendly and centralized hardware monitoring tools.
- The existing tools are quite unintuitive and built for network professionals rather than home users or hobbyists with a single machine.
- Tools that take time to fully learn and utilize all features in the platform.
- Paid Apps and some of the essential feature are not available in free trials.
- User interface can feel crowded and not understandable for laymen.
- Open-source versions lack paid support options, and are reliant on community for bug fixes.

2.5 Scope

The main implication of hardware monitoring is to strengthen your grip on the performance of your IT system and lets you measure the exact performance of your system. It not only focuses on the current performance issues but also you can overview of process that might need improvements soon.

2.6 Technology Stack

1. HTML, CSS and JavaScript
2. Tailwind
3. Node js
4. Electron

2.7 Benefits for environment and society

1. Increase User Satisfaction:

   Happier Users attract others, and they usually become a brand-loyal, long-term users of an app. The baseline objective is to have fewer bugs and crashes, so we can provide a platform which makes our users content.

2. Improve End-User Experience:

   A fast and responsive software is the basis of UX, and application performance monitoring software can help you identify any related issues.

3. Reduce Downtime:

   If 1% of 1 million customers can't connect, that's 10K unhappy users, which we can avoid if we proactively monitor app performance and reduce downtime.

4. Speed Up Innovation

   Obviously, reducing the time needed to fix bugs, problems frees up more time for your software engineering team to work on adding new features to the app.

Chapter 3

Project Design

3.1 Proposed System

Core desktop application powered by electron and node js. System information library :- It is a System and OS information library for node js.

Core modules of the application are :

- Hardware information module
- Real time monitoring module
- Utility Module

OSD (On Screen Display) overlay drawn over windows which shows selected outputs rendered on top of the application currently running

3.2 Design(Flow Of Modules)

- Core Module, which is the Hardware information module. It gives the specification of the information system it is running on.
- The user can interact with the real time monitoring module which is contained on a separate page for better interaction.
- The user can then access the utility module which houses various overlay tools like FPS counters, latency, ping tests, etc.

3.3 Class diagram

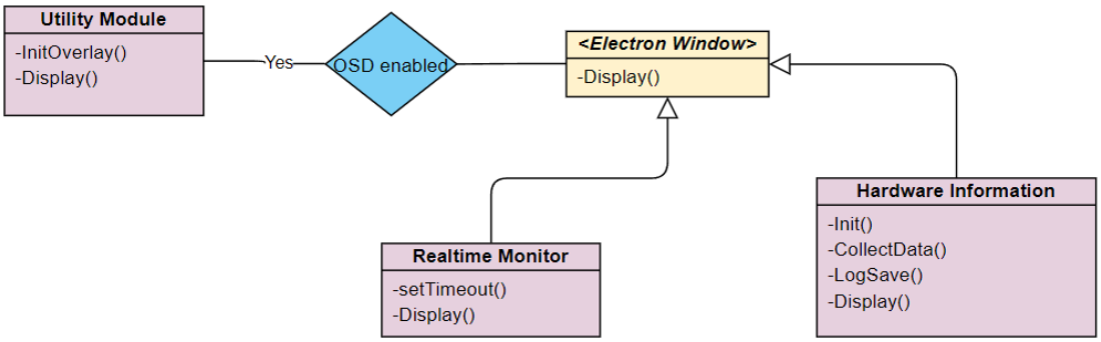

Figure 3.1: Design Flow

3.3.1 Modules

Module-1

Hardware information module:

- Displays static information about the system hardware, and temporarily logs to a file.
- This information includes make/model of the CPU, GPU, RAM speeds and clock timings, OS information and HDD usage.

Module-2

Real time monitoring module:

- Displays real-time info about the system in a dynamic manner.
- Uses node libraries that are wrappers of low level C libraries to get real-time information about system CPU temperatures, fan speeds, power voltages, SSD speeds, and VRAM usage, etc.
- Output is verbose and cross platform, irrespective of the OS.

Module-3

Utility Module:

- This module houses various small tools to improve system monitoring workflow.
- This includes, but not limited to: FPS counter, latency and ping test and real-time data like CPU and GPU temps and usage.
- All these utilities, shown on your screen through OSD (On-screen display).

3.4 Reference

- Venkata 2016(A Real-time Distributed Hardware Health Monitoring Framework)
- Computer Hardware Monitor(Design and Implementation of Computer Hardware Monitoring System Based on Cloud Computing)
- Node js(IEEE research paper)
- JavaScript research paper(Modern JavaScript frameworks: A Survey Study)

Chapter 4

Planning for next semester

- Suggestion for System/Hardware upgradation
- Implementing news section
- FPS overlay
- Improving existing features and UI
- Drivers updating system