	Akhil Bharatiya Maratha Shikshan Parishad's **Anantrao Pawar College of Engineering & Research**	
	Record No.: ACA/D/003A **Revision: 00**	**DoI: 01/02/2025**
Seminar and Project Approval sheet		

Synopsis Report

1. Group No (Project Group Information)

Group No.	Roll No	Name of the Student	Contact No	Email –Id	Sign
34	M2075	Pratik Shrirang Nikam	8668450424	pratik2002nikam@gmail.com	

2. **Title of the Project:** Data visualization in APIS & Port Scanner.

3. **Abstract(System Overview):**

Data visualization is the graphical representation of information and data, designed to make

Complex datasets are more accessible, understandable, and actionable. By transforming raw number

Into visual formats-such as charts, graphs, heatmaps, and dashboards-it enables users to detect patterns, trends, and outliers that might be missed in textual or tabular data.

Modern data visualization integrates principles from statistics, design, and computer science,

And increasingly leverages interactive tools, AI-drive analytics, and immersive technologies like

VR/AR. A port scanner is a network reconnaissance tool used to identify active ports and services on a target system. By sending packets to a range of ports and analysing the responses, it determines whether ports are open, closed, or filtered. This process helps assess the security posture of a system, detect unauthorized services, and support vulnerability analysis. Port scanning is a foundational technique in cybersecurity, often used in penetration testing, network auditing, and threat detection.

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4. Project Purpose:

The purpose of this project is to transform raw, complex datasets into intuitive visual formats that enhance understanding, support decision-making, and uncover actionable insights. By leveraging data visualization techniques, the project aims to bridge the gap between data analysis and strategic communication—especially in domains like performance monitoring, security analytics, and cloud resource optimization.

Project Scope:

Data Sources: Structured and unstructured data from logs, APIs, databases, or cloud platforms (e.g., AWS CloudWatch, Jenkins build logs, vulnerability scan reports). Tools & Technologies: Python (Matplotlib, Seaborn, Plotly), Tableau, Power BI, or web-based dashboards using D3.js.

Project Objective:

To develop a system that performs network port scanning and visualizes the results using interactive dashboards powered by API-driven data pipelines. The project aims to enhance cybersecurity awareness and simplify technical insights through intuitive visual representation.

- Port Scanner Module:
  - Scans target IPs for open, closed, and filtered ports.
  - Uses tools/libraries like `Nmap`, `socket`, or `scapy`.
  - Outputs structured data (e.g., JSON or XML).
- API Layer:
  - Serves scan results via RESTful endpoints.
  - Enables integration with frontend visualization tools.
  - Supports filtering, pagination, and scan history retrieval.
- Data Visualization Dashboard:
- Built using Python libraries (e.g., Plotly, Dash, Matplotlib) or JavaScript frameworks (e.g., D3.js).
- Displays port status, host availability, and scan trends.
- Includes interactive elements like tooltips, filters, and real-time updates.

5. Software & Hardware Specification:

Operating System Compatibility:
Windows 11
Programming Language & Libraries:
Python & Libraries - Matplotlib, Seaborn, Plotly, Pygal, Bokeh, Dash
Visualization Platforms & Tools:
Cloud-Based Tools-Google Data Studio, AWS QuickSight, Azure Synapse Analytics
IDE Support-VS Code, Jupyter Notebook, PyCharm
Data Handling & Integrations:
Support for-CSV, SQL/NoSQL databases, APIs and real-time data streams, ETL tools for preprocessing

Hardware Requirements:

Processor-Dual-core processor (Intel i3 or AMD Ryzen 3)
RAM- 8GB
Storage- 100 GB free disk space (HDD or SSD)
Graphics- Integrated GPU

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Brief description of technology used (Front End/ Back End):

Front End Technologies (Data Visualization Layer)

These tools help present scan results in an intuitive, interactive format:

Technology	Purpose
HTML/CSS/JS	Basic structure and styling of the dashboard
Plotly / Chart.js / D3.js	Dynamic charts and graphs for port status, trends, and scan metrics
Dash / Streamlit	Python-based frameworks for building interactive web apps

Back End Technologies (Scanning & API Layer)

This layer handles scanning logic, data processing, and API delivery:

Technology	Purpose
Python	Core language for port scanning and data handling
Socket / Scapy / Nmap (via subprocess or `python-nmap`)	Libraries/tools for performing actual port scans
Flask / FastAPI	RESTful API framework to expose scan results to the front end
SQLite / PostgreSQL	Stores scan logs, host metadata, and user queries
Docker	Containerization for consistent deployment across environments

6. Literature Survey:

1. Foundational Concepts

Early studies define data visualization as the graphical representation of abstract data to enhance human cognition. It bridges the gap between raw data and meaningful insight, especially when dealing with large or complex datasets. Visualization techniques have evolved from static charts to dynamic, interactive systems that support real-time decision-making.

2. Evolution of Visualization Techniques

- Traditional Tools: Early tools like Excel and MATLAB focused on static plots and basic charting.
- Modern Libraries: Python libraries such as Matplotlib, Seaborn, and Plotly introduced customizable, interactive plots for scientific and business data.
- Web-Based Platforms: JavaScript libraries like D3.js and Chart.js enabled browser-based visualizations with high interactivity and responsiveness.

3. Domain-Specific Applications

- Healthcare: Visualization of patient data, disease spread, and genomic patterns using platforms like iFeature Omega.
- Environmental Monitoring: Tools like euPOLIS Visualization Platform track spatiotemporal impacts of urban planning decisions.

7.Project Requirement and Planning:

1. Functional Requirements

- Import and preprocess data from multiple sources (CSV, APIs, databases)
- Generate static and interactive visualizations (charts, graphs, heatmaps, dashboards)
- Enable filtering, zooming, and drill-down capabilities
- Export visual outputs (PDF, PNG, CSV)
- Provide role-based access if deployed on the web

Project Planning

Phase 1: Requirement Analysis

Phase 2: Tool Selection & Setup

Phase 3: Data Collection & Preprocessing

Phase 4: Visualization Design

Phase 5: Implementation

Phase 6: Testing & Optimization & Documentation

8.Expected Outcome:

1. Enhanced Decision-Making
2. Improved Data Accessibility
3. Real-Time Monitoring & Alerts
4. Pattern Recognition & Predictive Insights
5. Better Communication & Collaboration
6. Operational Efficiency

9.References:

Books & Academic Paper- The Visual Display of Quantitative Information Edward R. Tufte

Python Crash Course: A Hands-On , Project - Based

Data Visualization Reference Guides — Cool Infographics

Stanford Data Visualization References

Prof. Purvesh D Wagh Project Guide	Prof. Purvesh D Wagh Project Coordinator	Dr. Atul D Newase Head of the Department

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Title Font Size: 14, **Bold**

Subtitle Font Size: 12, Bold

Text Field: 12 Normal,

Paragraph Alignment: Justify

Paper size: A4

left Margin: 1.5” inch.

Right Margin: 1” inch

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