Major Project Synopsis

1. Team Details:

Group No.	Sr. No.	Team Members	SID	Supervisors
G33	1.	Supriyo Mohanty	21105124	Dr. Divya Dhawan Dr. Muzaffar Imam
	2.	Shivansh Anand	21105125	
	3.	Navneet Yadav	21105127	

2. Title/Broad Area of the project:

SentinelGuard: Advanced Safety Helmet for High-Risk Industries

3. Type of Project:

Hardware + Software

4. Objectives:

- To detect toxic gases like methane (CH4), carbon monoxide (CO), and other hazards using advanced sensors.
- To implement wireless communication for remote monitoring via WiFi technology and location tracking through GPS module.
- To provide instant audio and visual alarms to alert workers of dangerous conditions.
- To design an ergonomic helmet that meets industrial safety standards while being lightweight and comfortable for prolonged usage.

5. Proposed Methodology:

❖ **System Requirements and Planning**
  - Clearly define the functional and performance goals of the safety helmet.
  - Identify and source hardware components like sensors (MQ-135, MQ-7, MQ-6, DHT11), WiFi module, GPS module and power supplies.

❖ **Hardware Setup**

- Integrate sensors into the helmet for detecting environmental hazards.
- Mount WifI and GPS modules to enable wireless communication and location tracking between the helmet and a central monitoring system.
- Incorporate visual and audio alarms for real-time alerting.

❖ **Software Development**
- Develop firmware to process sensor data and trigger alerts.
- Build a monitoring application for supervisors to view real-time data from helmets.

❖ **Integration and Testing**
- Test individual components like sensors, alarms, WiFi and GPS modules.
- Conduct system testing to ensure accurate hazard detection and reliable communication.
- Field-test the helmets in controlled environments simulating high-risk conditions.

❖ **Deployment and Maintenance**
- Deploy the helmets in real-world environments.
- Provide training and user manuals for proper operation.
- Schedule periodic maintenance and updates for firmware and hardware.

6. Software and Hardware Requirements:

Sr. No.	Item Name	Tentative Quantity	Tentative Cost	Justification
1.	MQ-135 Gas Sensor	1	Rs. 200	To detect air pollutants and gases
2.	MQ-7 Gas Sensor	1	Rs. 100	To detect carbon monoxide
3.	MQ-6 Gas Sensor	1	Rs. 150	To detect methane
4.	DHT -11 sensor	1	Rs. 100	For temperature and humidity data
5.	WiFi Module	1	Rs. 300	For wireless data transmission
6.	Microcontroller-based development platform	1	Rs. 800	For processing sensor data
7.	Battery Pack	1	Rs. 200	To power the system

8.	Helmet	1	Rs. 400	Base for integrating components
9.	Buzzer	1	Rs. 100	For audio alarms
10.	16x2 LCD	1	Rs. 300	For displaying the message
11.	Connecting Wires	10	Rs. 200	For connecting the components together
12.	IR Sensor	1	Rs. 200	For obstacle detection
13.	Force Sensor	1	Rs. 500	For compression force detection
14	GPS Module	1	Rs. 800	For sending location coordinates

7. Timelines and Milestones:

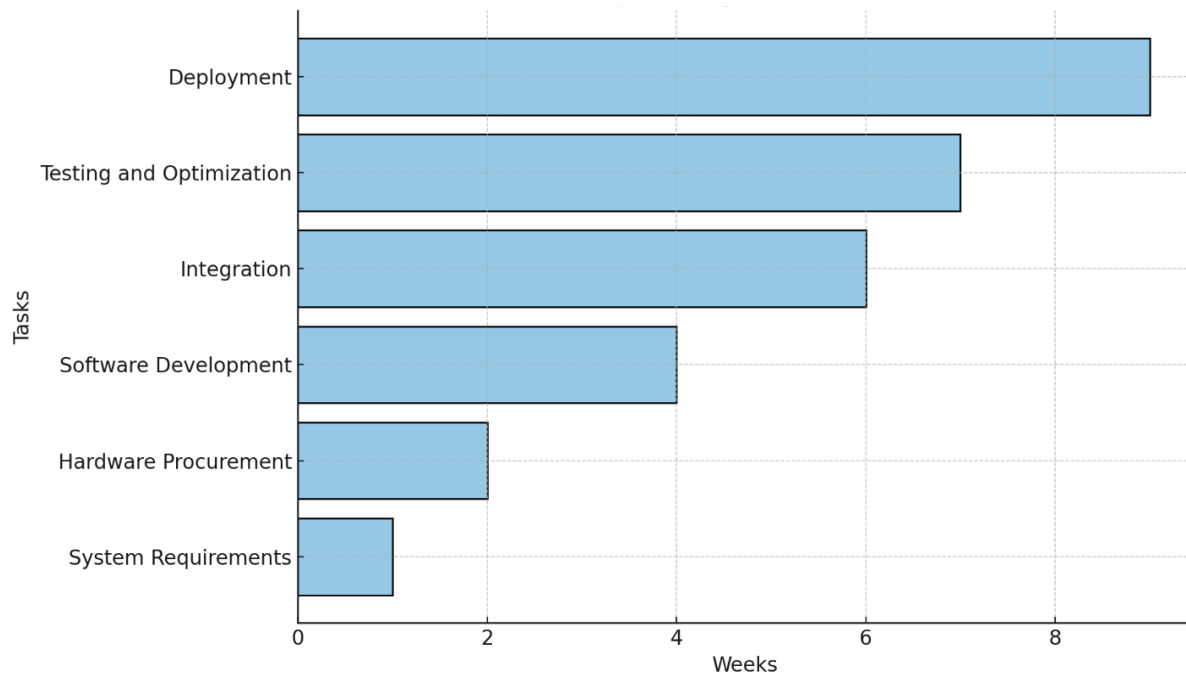| Week	Key Activities
1-2	System requirements gathering and planning.
3-4	Hardware procurement and assembly
5-6	Software development, including sensor data processing and communication protocols
7	Integration of hardware and software components
8	Testing, debugging, and optimization
9	Deployment in a simulated environment and user training

Fig.1 : Pert Chart of the Major Project

Students Signature

Supriyo Mohanty

Shivansh Anand

Navneet Yadav

Date: 24-01-25

Supervisors Signature

Dr. Divya Dhawan

Dr. Muzaffar Imam

Date: 24-01-25