Layered Architecture - Sensor Management System

מערכת ניהול חיישנים ומעקב ביצועים

Presentation Layer (UI Layer)

Navigation Interface

Search Page

create_search_page()
 display_results()
 on_search()
 search box widgets

Dashboard UI

create_DashBoard_page()
create_metrics_section()
manager greeting
alerts and recommendations

Statistics UI

create_statistics_page()
charts and visualizations
matplotlib widgets
interactive sliders

Team Management

create_Meetings_page()
build_engineer_race_table()
meeting scheduling UI
task assignment forms

Performance UI

create_Rates_page()
engineer ranking
donut charts
progress bars



Application Layer (Service Layer)

Search Services

[CLASS] IndexService [CLASS] QueryService [CLASS] ResultService search my index()

search_my_index()
add_document(), create_query()
format_results()

Meeting Services

saveMeeting()
schedule_Meeting()
show_meeting_popup()
update meeting()

Engineer Services

update_engineer_task()
refresh_engineer_dropdowns()
on_assign_clicked()
on_add_engineer()

Notification Services

send_alert_notification()
format_dashboard_data()
 validate_user_input()
 process ui requests()

Task Management Services

create_daily_tasks_section()
update_summary_section()
load_custom_styles()
create weekly summary page()



Business Logic Layer (Domain Layer)

Data Processing

compute_engineer_scores()
crawl_and_index()
stemmer processing
stop words filtering

Analytics Engine

create_sensor_trend_analysis()
 create_comparative_stats()
 create_anomaly_heatmap()
 create_team_impact_timeline()

Prediction Engine

create_failure_simulator()
risk calculation logic
threshold validation
sensor anomaly detection

Visualization Logic

create_time_line_chart()
create_reliability_index()
create_score_donut()
create_task_progress_bar()

Alert and Recommendations

create_critical_alerts_section()
create_station_recommendations()
threshold monitoring
anomaly detection



Data Access Layer (Persistence Layer)

Firebase Operations

FBconn.get()
FBconn.put()
FBconn.post()
FBconn.delete()

Firebase Collections

/LiveSensors /LiveSensorsOUTDOOR /EngineerPerformance /DailyTeamsTasks, /Meetings

Data Fetch Functions

fetch_team_names()
fetch_engineer_data()
fetch_historical_data()
fetch_last_hour_data()

Web Crawling

fetch_page()
BeautifulSoup
requests.get()
URL parsing

Data Processing Libraries

pandas DataFrames
NLTK text processing
matplotlib
numpy arrays

Search Index Data

/Index (inverted index)

Document storage

URL crawling data

NLTK processed text

Usage and Benefits:

- Real-time sensor monitoring and management
- Team performance tracking and task assignment
- Meeting scheduling and engineer management
- Advanced analytics and failure prediction
- Document indexing and intelligent search

Implementation Details

This sensor management system implements a 4-layer architecture with Firebase backend, real-time data processing, and interactive Google Colab widgets. Features include intelligent search with text processing, team management, engineer performance tracking, predictive analytics, and comprehensive sensor monitoring with intelligent alerts and recommendations.

Built with Python, pandas, matplotlib, NLTK, and Firebase for scalable data management in Google Colab environment.