CAPSTONE PROJECT

SMART LIVING SYSTEM

Objective

Design and develop a smart living system using web development, Python programming, and data analysis. Students will explore automation through conditional programming and the integration of smart devices and learn to manage data from various sources. This project focuses on building a sustainable and efficient living system for homes.

Session 1: Understanding the Smart Living Environment

Activities

1. **Smart Home System Research**

   ◇ Task

   - ✦ Students will explore the concept of smart homes, focusing on the integration of devices like smart thermostats, lights, and security systems. They will create a presentation explaining how these devices contribute to energy savings, sustainability, and a connected environment.

   ◇ Skills Practised

   - ✦ Research and presentation skills.
   - ✦ Understanding the application of smart technologies in sustainable living.

2. **Working with the Binary System in Smart Devices**

   ◇ Task

   - ✦ Students will explore the binary system, focusing on how binary data is used in smart devices for communication. They will perform conversions between binary and decimal numbers to understand data representation in digital systems.

   ◇ Skills Practised

   - ✦ Conversions between decimal and binary.
   - ✦ Exploring operations on binary numbers and their relevance to smart device functionality.

Outcome for Session 1

◆ A presentation on smart home devices and their benefits.

◆ Exercises on binary and decimal conversions for smart device communication.

Session 2: Developing a Smart Living Website

Activities

1. **Introduction to Web Development for Smart City Features**

   ◆ **Task**

   ✦ Students will create a basic webpage using HTML5 to display features of a smart home, such as temperature control, lighting, and energy usage data. They will incorporate elements like images, tables, and links to make the page interactive and informative.

   ◆ **Skills Practised**

   ✦ Structuring web pages using HTML5.

   ✦ Working with multimedia (images, links, and tables).

   ✦ Developing a basic user interface for smart home management.

2. **Smart Home Management with HTML5**

   ◆ **Task**

   ✦ Students will create an interactive webpage where users can monitor and control smart devices (e.g., lights, thermostat). They will add input fields (buttons, switches) to control devices and display real-time data (e.g., temperature, light status).

   ◆ **Skills Practised**

   ✦ Using HTML5 forms and elements (input, buttons, switches) for interactivity.

   ✦ Displaying real-time data on a web page.

   ✦ Integrating front-end design with functionality for smart home management.

Outcome for Session 2

◆ An interactive webpage showcasing smart home features, such as control for lights and temperature.

◆ A basic UI to simulate smart home management via web development.

Session 3: Automating and Integrating the Smart Living System

Activities

1. **Python Programming for Smart Automation**

   <> **Task**

   ✦ Students will write Python scripts that automate tasks in a smart home system. They will use conditional statements (if-else) to control devices based on sensor data (e.g., turning lights on when it's dark or adjusting temperature when it's too high).

   <> **Skills Practised**

   ✦ Writing Python code using conditional statements (if-else, if-elif-else).

   ✦ Automating tasks in a smart home environment.

   ✦ Integrating Python automation with smart home management.

2. **Integrating Web and Python for Smart Living**

   <> **Task**

   ✦ Students will integrate their HTML5 web page with Python scripts. They will link the webpage inputs (e.g., turning devices on/off) with Python functions that carry out those actions. The system will automatically adjust the smart home environment based on user input or sensor data.

   <> **Skills Practised**

   ✦ Connecting HTML5 with Python for a fully automated smart home system.

   ✦ Understanding how user input can trigger automated responses.

   ✦ Integrating front-end and back-end technologies for a cohesive system.
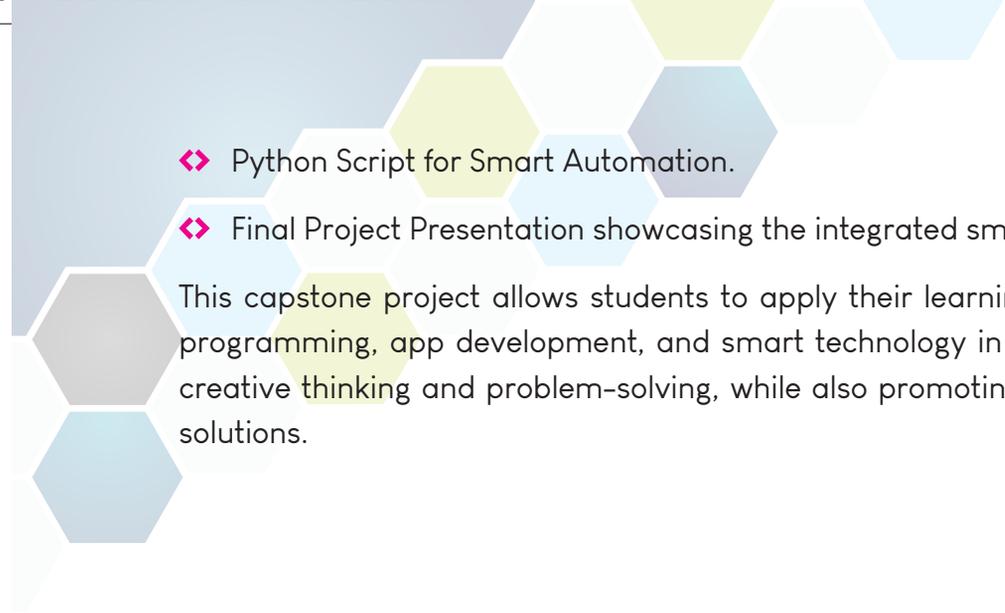
Outcome for Session 3

<> A Python script automating smart home tasks (e.g., lights, temperature)

<> A fully functional system where the web page and Python code work together to manage and control the smart home environment

Final Deliverables

Tick (✓) the box if submitted:

<> Smart Home System Research Presentation.

<> Interactive Web Page for Smart Home Features.

- ❖ Python Script for Smart Automation.

- ❖ Final Project Presentation showcasing the integrated smart living system.

This capstone project allows students to apply their learning in a practical setting, integrating programming, app development, and smart technology in a real-world context. It encourages creative thinking and problem-solving, while also promoting sustainability through smart living solutions.