

# CAPSTONE PROJECT

## SMART CITY PLANNER

### Objective

Design a Smart City by integrating skills in programming, data analysis, web development and circuit design to create eco-friendly solutions for the city.

### Session 1: Research, Planning and Initial Design

#### Activities

##### 1. Design Digital Posters

###### ◀▶ Task

Students will use Canva to design a digital poster promoting clean energy awareness or a plastic-free market in the Smart City.

###### ◀▶ Skills Practiced

- ✦ Creating and editing digital posters using Canva.
- ✦ Incorporating text, images and design elements for visual impact.
- ✦ Applying design principles like alignment, contrast and balance for communication.

##### 2. Excel for Power Calculation

###### ◀▶ Task

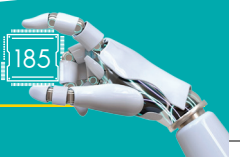
Students will create an Excel spreadsheet to calculate power usage in the city, including solar energy savings. They will use formulas like SUM, AVERAGE and IF to simulate data and calculate energy consumption and savings.

###### ◀▶ Skills Practiced

- ✦ Using SUM, AVERAGE and IF formulas to calculate and manipulate data in Excel.
- ✦ Displaying energy usage and savings through data analysis using charts.

#### Outcome for Session 1

A Canva poster promoting eco-living, an Excel sheet showing total power saved with solar energy calculations.



## Session 2: Building the City Digitally

### Activities

#### 1. Python Programming for Smart Monitoring

##### ◊ Task

Students will write a Python program using conditional statements to monitor air quality. If the air quality exceeds 100, the program will recommend using public transport; otherwise, it will suggest cycling.

##### ◊ Skills Practiced

- ✦ Writing Python code with **if-else** conditional statements.
- ✦ Implementing logic to make decisions based on input data.

#### 2. Create a Basic Smart City Web page

##### ◊ Task

Students will create a simple HTML and CSS web page for the Smart City, including headings, paragraphs, a table for eco-friendly transport options and a list for waste management rules. They will also add a link to the earlier Python smart monitoring program.

##### ◊ Skills Practiced

- ✦ Structuring a web page using HTML tags (headings, paragraphs, tables, lists).
- ✦ Styling the web page with CSS (fonts, colours, layout).
- ✦ Adding external links to connect the Python program for smart monitoring.

### Outcome for Session 2

An HTML web page displaying eco-friendly city information and a Python script for smart monitoring using conditional statements.

## Session 3: Smart Tech Integration and Final Presentation

### Activities

#### 1. Design Circuits Using Tinkercad

##### ◊ Task

To promote the Smart City, prepare solar panels using Tinkercad's solar cell components to power a solar-powered streetlight, demonstrating how solar energy can drive smart components in the city.



### ✦ Skills Practiced

- ✦ Designing circuits using Tinkercad's circuit design tools.
- ✦ Understanding how solar energy can be harnessed for sustainable devices.
- ✦ Applying electrical components (e.g., solar panels, sensors, LEDs) in a real-world smart city context.

## 2. Smart City at a Glance

### ✦ Task

Students will create a final presentation in Canva, incorporating Excel data and a Canva poster, web page screenshots with Python code and Tinkercad circuit designs.

### ✦ Skills Practiced

- ✦ Combining different types of work (Excel, Canva, HTML, Python, Tinkercad) into one cohesive presentation.
- ✦ Using Canva to create visually appealing and well-organised presentations.
- ✦ Communicating technical and creative work effectively through design and visual aids.

## Outcome for Session 3

A Tinkercad model of a smart object and a final presentation titled "Smart City Planner" showcasing all work completed throughout the project.

## Final Deliverables

Tick (✓) the box if submitted:

- |  |                          |
|--|--------------------------|
| ✦ Digital Poster in Canva  | <input type="checkbox"/> |
| ✦ Excel Spreadsheet with power calculations and savings            | <input type="checkbox"/> |
| ✦ HTML Web page with smart city information, lists, tables and CSS | <input type="checkbox"/> |
| ✦ Python Code with conditional statements for monitoring           | <input type="checkbox"/> |
| ✦ Tinkercad Model of a smart circuit                               | <input type="checkbox"/> |
| ✦ Presentation in Canva showcasing all artefacts                   | <input type="checkbox"/> |

This capstone applies technical concepts practically, focusing on eco-friendly city life and integrates skills progressively across three sessions to address real-world challenges.

