



### CADVertex Solutions

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## Solid Edge Automation with ML & AI

Language: **Python**

### Training Structure

**Module 1:** Python Programming.

**Module 2:** Solid Edge Automation.

**Module 3:** Machine Learning, AI and integration.

### Training Highlights



Online Training



Flexible Timings



Trainer: 25 yrs Exp.



Duration: 6 Wks



1 Hour Daily



Basic to Advanced



10 Industry Projs



Certificate



Support after Training



CuttingEdge Tech

### List of Projects (Automation)

1. Geometric Calculator
2. Create Drawing Views
3. Batch Processor
4. Title Blocks and Annotations
5. Parametric Parts
6. Assembly Generation

## Module 1: Python Programming

### 1. Installation and Basics

- Installing Python.
- Installing Python Editors - PyCharm, IDLE.
- Project Explorer, output and error windows.

### 2. Introduction to programming

- Setting up user interaction and collecting inputs.
- Running Python programs.
- Calculations and output display.
- Arithmetic operators.
- Using the Math library functions.
- Syntax, Comments, User Input, Print results, and control Program Flow.
- Variables: Float, Integer, and String.
- String Variables: Find, Replace, Formatting and Slicing operations.
- Datatypes and Typecasting.

### 3. List, Tuples, and Loops

- Lists, Tuples, Dictionaries and Sets.
- List comprehensions.
- List Operations - Slicing and Data Extraction.
- String Operations - Slicing and Manipulations.
- Conditionals: If- Elif and If-Else, Nested If.
- Chaining Comparison Operators.
- Loops: For loop, nested For loops.

### 4. Functions and Modules

- Defining Functions and Arguments.
- Functions: Arguments, Return Statements and values.
- Functions: Optional Arguments.
- Functions: Multiple Return Values.
- Function Help and DocStrings.
- Modules and the Python standard library.
- Importing from modules.
- Creating Aliases.
- Life of variables, global and local variables.
- Errors - syntax, logical and exceptions.
- Exception handling.

## **5. Exception Handling**

- Try Catch Except.
- Debugging Python Functions.
- Adding breakpoints and inspecting values.
- Determine source of error.
- Troubleshooting and fixing errors in the code.

## **6. OS Functions**

- Installing 3rd party packages using pip.
- Performing File, Folder, Path and operations.
- Manipulating file paths and extensions.
- Handling Files, File Filters.
- Text files - read, append and write with practical applications.
- Storing and retrieving data.
- Folders and Folder operations.

## **7. Tkinter GUI Programming**

- Dialogs and mainloop.
- Setting dialog box properties, title, icon, size and location.
- Adding widgets and adjusting their properties and placement.
- Tkinter Datatypes - Double, Integer, and Strings.
- Data Type Conversion - TkInter variables and python variables.
- Labels - static and dynamic.
- Entry Textboxes - storing user input from textboxes into variables.
- Setting default values and last used values in text boxes.
- Button widget - formatting and calling functions.
- Check boxes and radio buttons.

## **8. Advanced GUI Programming**

- Listboxes - single selection and multiple selections.
- Listboxes - adding items static and dynamic.
- Listbox display total count and selection count.
- Listbox - add items from textbox.
- Listbox - remove items.
- Spinner widget - setting range and layout.
- Scale widget - setting range and layout.
- Images - displaying images in a dialog box.
- File selection dialog.
- Single and multiple files.
- Adding file filters.

- Folder selection dialog.
  - Selecting all files from folder dialog.
  - Adding file filters for folder dialog.
  - Opening files in associated application.
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- Message boxes - information, query and warning.
  - Configuring single line and multiline messages.
  - Button configurations and icons.
  - Checking message box responses against button configurations.
  - Handling multiple dialogs.

## Module 2: CAD Automation

### 9. Getting Started

- ❖ Connect CAD
- ❖ Getting information from the UI
- ❖ Read-write various properties of the UI

### 10. Solid Edge Documents:

- ❖ Document type and environments
- ❖ Create new files - Part, Drawing and Assembly
- ❖ Open, Close, Save and SaveAs files
- ❖ Close all documents in the Session
- ❖ Export documents to other formats
- ❖ Activate files in a session
- ❖ Loop through files in the session

### 11. File Handling

- ❖ Standard file dialogs to select CAD files
- ❖ Setting CAD file filters

### 12. Managing Sheets in Drawings

- ❖ Creating drawing sheets
- ❖ Accessing, counting sheets
- ❖ Extracting sheet info
- ❖ Switching between sheets

### 13. Drawing Views

- ❖ Create drawing views
- ❖ Create the front view and projection views
- ❖ [Industry Project](#) - Creating Standard Views of a Model

#### **14. Handling Text in Drawings**

- ❖ Access text objects in a drawing document
- ❖ [Industry Project](#) - Automatic Title Block Updater Program

#### **15. 2D objects in Drawings**

- ❖ Creating 2D objects in a drawing document
- ❖ Accessing 2D elements and its geometrical properties

#### **16. Parametric Parts**

- ❖ Control parametric part
- ❖ Expression and formulas - dimensions and variables
- ❖ [Industry Project](#) - Modify features of a parametric shaft with a keyway

#### **17. Solid Edge Assembly Generation**

- ❖ Inserting parts into a product
- ❖ Positioning components in an assembly

### **Module 3: Machine Learning and AI**

#### **18. Machine Learning - NumPy**

- Arrays.
- One Dimensional Array.
- Multidimensional Array.
- Create Arrays from Data.
- Create array from Ranges.
- Shape.
- Array Intersection.
- Array Difference.
- Sum.
- Slicing Array.

#### **19. Machine Learning - Pandas**

- Series.
- DataFrames.
- Dataframe Indexing.
- Dataframe Head, Tail.
- Dataframe Shape.
- Read DataFrame from CSV.

## **20. Matplotlib Visualization**

- Line Plots.
- Sub Plots.
- Plot Properties - Color, Style.
- Grid, xLabel, yLabel.
- Bar Plots.
- Bar SubPlots and Orientation.
- Scatter Plots and Subplots.
- Mixed Plots and Overlapping.
- Markers and LineWidth.
- Exporting Plots.
- Pie Charts.

## **21. Decision Trees**

- Decision Tree Classifiers.
- Dataframe.
- Extracting Features & Labels from a Dataframe.
- Fitting Features & Labels into a decision algorithm.
- Predicting values based on classification.
- Dual Classification and Multiclass classification.
- Reading CSV data into Dataframes.
- Separating input and output.
- Dropping frames from dataframes.
- Label Encoders.
- Fit Transforms.
- Predicting results.

## **22. Linear Regression Analysis**

- Reading a CSV data file.
- Create Linear regression model.
- Fit data columns directly to the algorithm.
- Determine coefficient and intercept.
- Reading inputs data from CSV.
- Predicting output for entire column.
- Exporting output dataframes to CSV.
- Create a scatter plot of the data.

## **23. K-Means Clustering**

- Importing data.
- Determining clusters.
- Determining the cluster to which a point belongs.
- Visualize cluster using scatter plots.
- Visualize cluster centers.

## 24. How to use ChatGPT for API Development

- Creating smart queries.
- Enhancing queries for best results.
- Refining queries for exploring more APIs.
- ChatGPT Code cleanup and adaptation.

## 25. Integrate AI and ML in Automation

- ❖ **Capstone Project** Integrate Automation with Machine Learning to create AI-enabled apps.
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### **Other eBooks and Training Programs from CADVertex:**

- ❖ CATIA Automation: VB.Net or CSharp or Python
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- ❖ NX Open: VB.Net or CSharp with Win Forms
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- ❖ NX Automation and Machine Learning with Python
- ❖ Solid Edge Automation with Python + Machine Learning
- ❖ SolidWorks Automation with Python + Machine Learning
- ❖ Inventor Automation with Python + Machine Learning
- ❖ Fast track course in Python with Machine Learning for VB.Net experts
- ❖ Fast track course in Python with Machine Learning for CSharp experts

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