



CADVertex Solutions

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CATIA Automation with ML & AI

Language: **VB.Net or CSharp**

Training Structure

- Module 1:** VB.Net or CSharp Programming.
- Module 2:** CATIA 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



5 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. Build Assembly

Module 1: VB.Net or CSharp.Net Programming

1. Installing Visual Studio

- Installing Visual Studio Community version.
- Setting the default language.
- Customizing the layout.
- Solution Explorer, Toolbox and the Properties windows.

2. Introduction to Programming

- Selecting a project template.
- Setting up user interaction and collecting inputs.
- Variable types - Double, Integer, and String.
- Acquiring user input from textboxes into variables.
- Calculations and display outputs.
- Using the .Net Math library functions.
- Various files and their meaning in the project structure.
- Separating source code from the executable.

3. Creating a Windows Forms Application

- Setting dialog box properties.
- Adding controls: Button, TextBox, Label, Checkbox, RadioButton.
- Adding images to PictureBox and other controls.
- Aligning text and images on controls.
- Composite controls: ListBox and ComboBox.
- Adjusting various properties for each type of control.

4. Arrays and Loops

- Filling arrays and reading array elements.
- Filling ListBoxes with array elements.
- ForEach loop.

5. Functions and Subroutines

- Arguments.
- Return Types.
- Return Values in Functions.
- Function Overloading.

6. Multi-Form Projects

- Adding Forms to a project.
- Form Constructor and object variables.
- Form objects and invoking Forms.
- Exchanging data between Forms.

7. Object Oriented Programming

- Creating a class.
- Adding member functions.
- Public and Private methods.
- Adding member variables.
- Encapsulation.
- Polymorphism.

Module 2: CAD Automation

8. Getting Started

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

9. Documents Automation

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

10. File Handling

- ❖ Standard file dialogs to select files
- ❖ Setting file filters
- ❖ [Industry Project](#) – Batch Processor

11. Managing Sheets in Drawings

- ❖ Creating drawing sheets
- ❖ Accessing sheets in a drawing
- ❖ Counting and extracting sheet info
- ❖ Switching between sheets

12. Drawing Views

- ❖ Create drawing views
- ❖ [Industry Project](#) - Creating standard views of 3D models

13. Handling Text in Drawings

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

14. 2D objects in Drawings

- ❖ Creating 2D objects in a drawing document

15. Parametric Parts

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

16. Assembly Generation

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

Module 3: Machine Learning and AI

17. Python and IDE Installation

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

18. Python 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.

19. List, Tuples, and Loops

- Lists, Tuples, Dictionaries and Sets.
- 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.

20. Functions and Modules

- Defining Functions and Arguments.
- Functions: Arguments, Return Statements and values.
- Functions: Multiple Return Values.
- Function Help and DocStrings.
- Modules and the Python standard library.
- Importing from modules.
- Creating Aliases.

21. Exception Handling

- Errors - syntax, logical and exceptions.
- Exception handling.
- Try Catch Except.
- Debugging Python Functions.
- Adding breakpoints and inspecting values.
- Determine source of error.
- Troubleshooting and fixing errors in the code.

22. 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.

23. Machine Learning - NumPy

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

24. Machine Learning - Pandas

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

25. 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.

26. Decision Trees

- Decision Tree Classifiers.
- 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 and Predicting results.

27. 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.

28. K-Means Clustering

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

29. 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.

30. Integrate AI and ML in Automation

- ❖ **Capstone Project** Integrate Automation with Machine Learning to create AI-enabled apps.
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- ❖ NX Open: VB.Net or CSharp with Win Forms
- ❖ NX Open: VB.Net or CSharp with Block UI Styler
- ❖ Knowledge Fusion
- ❖ Knowledge Fusion with Block UI Styler

- ❖ [Revit API – Plugin creation using CSharp and Python, Dynamo](#)
- ❖ [Tekla Open API programming](#)

- ❖ cMayoCAD: Learn to build a new CAD program from scratch using a Geometric Modeling Kernel and CSharp

- ❖ Machine Learning for Engineers with Python
- ❖ CATIA Automation with Python and Machine Learning
- ❖ 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
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