Automatic 3D modeling using visual programming

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Abstract: To create solid model in modeling software takes more time and it is required some standard procedure needed to create 3D models. Users require skills to create a solid model in modeling software. For creating a same kind of models again and again user need to follow same set of standard procedure in modeling software. To overcome the above set of problems in this project is automate the standard procedure that to be followed in modeling software. This automation is carried out by interfacing visual basic and solid works with help of VB codes.

Keywords: Visual Basic, Solid Works.

1. Introduction

As a result of the growth of the designing sectors creating 3D models has become one of the goal that need to be achieved as well as reducing 3D model creation time. The designer consider some factors and some standard procedure to create 3D part models it’s like plane selection, sketch, line, circle, exuded, dimensions this all problems and standard procedure are automated in this project.

Solid works was used as CAD software due to its exceptional 3D abilities for performing the modeling process making use if development of Solid Works with VB for creating automatic 3D models. In this project first one main form is there in that form some simple standard 3D models available. If designer want to create any 3D models just designer would select the model then the corresponding model form will open automatically in that model form designer should give the dimensions then 3D model will create automatically in the Solid Works.

In this project Cube, Rectangle, Cylinder, Cone Ellipse, etc., 3D part models are automated with Solid Works software and VB codes.

2. Literature survey

Jitendrasinh [1] Developing a GUI based design software in VB environment to integrate with CREO for design and modeling using case study of coupling. Design of a machine parts is the important step in the procedure and aim of the project creation of windows forms applications and property changes in the forms. In this forms they are created some buttons, labels, and text boxes from that easily user can create the some elements by certain input to obtain required output.
Abbishek C Lad [2] Design and drawing automation using solid works application programing interface. The solid works software and visual basic interfacing is done with help of Application Programming Interface (API). They are mainly using reference for in API interfacing methods is they are creating toolbox in the solid works software itself in this project is design and modeling od IC engine. they are using excel format file some values are stored in excel file is user giving input values means it will takes from excel file.

Tylee L [3] Learn visual basic the Microsoft visual basic programmer’s guide and Microsoft visual basic language reference manual visual basic is event driven meaning code remains idle until called depends on the user (like pressing button, giving values in text boxes,…). Visual basic is governed by an event processor. Nothing will happen until user working once an event is detected the code corresponding to that vent is executed. Program control is then returned to the processor.

3. Flow process

This is the flow chart of solid works background processes. In this project also the same background process the below process is automated. If designer gives values automatically 3D models will create in the solid works software.

In this background processes is follows:

![Flow Process Diagram](image)

**Figure 1. Flow Process**
In this project dimensions consider has a millimeter if user typing in the text boxes other than the numerical values it won’t accept. For easy understanding purpose in the shapes buttons the corresponding images available.

### 3.1 Solid Works and Visual Basic Interface

The solid works and Visual Basic interfacing is mostly using Application Programing Interface method but this is creating tools in Solid Works software. In this project Dynamic Link Library method used from that user can directly control the Solid Works software. To interface the visual basic and solid works mainly two VB codes are using

- `Imports SolidWorks.Interop.sldworks`
- `Imports SolidWorks.Interop.swconst`

For giving reference: Right click My Project → Add Reference → Browse → Local Disk(C) → Program Files → SolidWorksCrop → SolidWorkd. In that user should select reference files.

- `SolidWorks.Interop.SldWorks.dll`
- `SolidWorks.Interop.swcommands.dll`
- `SolidWorks.Interop.Swconst.dll`
- `SolidWorkstools.dll`
- `SolidWorks.microBuilder.dll`

This all are the Dynamic Link Library Reference these are acts as a background controller of solid works software.

### 3.2 Design of Main Form

This is the first step of the project creation of main form in this some buttons will be there in that some simple 3D models available. For designer easy understanding purpose corresponding 3D model diagram contains in the buttons.
Figure 2 is a main form of the project and it’s contains some 3D part models (like Cube, Rectangle, Cylinder, Cone, Ellipse, Hollow Cube, Hollow Rectangle, Hollow Cylinder, etc, figure 3.2). Depends on requirement the main form properties changed.

3.3 Design of Separate Forms for 3D Models

The main form contain basic 3D models if designer click any models the corresponding 3D model individual form will come in that form contains part model dimension parameters and one generate button then designer gives values and click generate button means the 3D model will generate in solid works software.

![Rectangle Parameter](image)

**Figure 3. Individual Form for Rectangle**

Figure 3 is the Individual form for rectangle 3D model and this form consists of three coordinate parameters (like Height, Width, Depth) and one generate button is available according to requirement properties changed.

| NAME           | TEXT  | TEXT ALIGN | FORE COLOR | FORNT     |
|----------------|-------|------------|------------|-----------|
| Rectangle form | Rectangle | T.Left      | Black      | MSSBold12 |
| Label1         | Height | T.Left      | Black      | MSSBold12 |
| Label2         | Width  | T.Left      | Black      | MSSBold12 |
| Label3         | Depth  | T.Left      | Black      | MSSBold12 |
| Button         | Generate | T.Left      | Black      | MSSBold12 |
| TextBox        | Empty | Center | ............. | ............. |

This procedure for all individual forms depends on the shapes the individual forms are available if designer clicking any shapes corresponding individual forms will come.
Figure 4. Individual Form for Cylinder

Figure 4 is the individual cylinder form and this form consists of two coordinate parameters (like Diameter, Length) and one generate button is available according to requirements properties changed. In this project main aim is without designing software knowledge also designer easily can create 3D models.

3.4 Rectangle 3D Part Models

To create rectangle 3D part in any modeling software is default first designer need to select plane, sketch, and 2D drawing then 2D to 3D conversions and three coordinates (Height, Width, Length) but in this project just three dimension parameters needed if designer know easily can create rectangle 3D model.

In this project this three parameters already fixed in the individual form if designer gives values the 3D rectangle will shows in solid works application.

vSkLines = Part.SketchManager.CreateCornerRectangle(0, 0, 0, X, Y, Z)

Figure 5. Rectangle 3D Part Model
Above the figure 5 code for 2D rectangle drawing in this (0, 0, 0) is this initial position of the 2D drawing and (X, Y, Z) is the drawing coordinate X is Height, Y is Width, and Z is Depth of the rectangle 3D part model.

3.5 Cylinder 3D Part Models

To create cylinder 3D model in any modeling software is default in this project designer just to know the two coordinate (Diameter, Length) if designer gives this values automatically 3D cylinder model will shows in the solid works application.

If designer click cylinder button it shows cylinder individual form without giving values designer click another button means the cylinder individual form will close another individual form will open at a time two or more forms won’t allow in this project.

```c
skSegment = Part.SketchManager.CreateCircle(0.0, 0.0, 0.0, X, 0.0, Z)
```
Above the Figure3.8 code is 2D circle drawing (0.0, 0.0, and 0.0) is the initial position of the 2D circle and it is the starting point of the circle. (X, 0.0, Z) is the drawing coordinate X is Diameter, Y is Length of the cylinder 3D part model.

4. Conclusion

From this project without modeling software knowledge designer can create 3D models. It will take express user approximately 30 seconds to create a simple rectangular block but in this project to create same kind of component reducing 70 percentage time taken. Part modeling standard procedure is automated.

In this project automatic 3D modeling of basic features have been done to the basic prismatic components (Cube, Rectangle, Cylinder, Cone, Ellipse, Hollow Cylinder, Hollow Rectangle) are modeled and created a form that contains commands that interact with the designer from the starting point to final 3D model.

5. Reference

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