# Machine Vision Development Engineer Coding Exercise

Congratulations on your decision to apply for the open Machine Vision Development Engineer Position! As part of the application process, we would like you to complete a coding exercise. In this exercise, you will be creating a Windows desktop application that allows a user to view a collection of shapes.

Please submit your solution to the hiring manager in the form of a GitHub repository link at least one day before your interview.

* **Language**
  + Must be written in either C# or vb.net.
  + The UI must be developed using Windows Forms or WPF
* **Application Requirements**
  + You will be provided with a *csv* file that contains the initial definition for a collection of shapes. The predetermined list of available shape types is:
    - Square
    - Ellipse
    - Circle
    - Equilateral Triangle
    - Freeform polygon with an arbitrary number of vertices
  + Use the contents of this file to initialize a collection of shapes.
  + The UI must allow the user to select and visualize each shape in the collection. Additionally, the application must calculate and display the area and perimeter of each shape.
  + The UI must allow the user to change the color of each shape.
  + The user must be able to save and load the modified collection of shapes.
    - You may choose the data format and storage mechanism, but do not use the same CSV format that was provided to you.
  + The UI must calculate and display the total area and perimeter of all shapes in the collection.
* **Miscellaneous**
  + An incomplete submission is acceptable. Complete what your skillset allows.
  + This is not a closed book test. You are encouraged to use all available sources of information.
  + Do not use 3rd party libraries to calculate the area and perimeter of the shapes. This will require you to implement an algorithm to calculate the area of an arbitrary polygon.
  + *(internal candidates only)* Do not use any internally developed references in your solution. Do not include any proprietary code.
* **Bonus**
  + Bonus credit will be awarded for the addition of useful features not described in the application requirements, such as providing the user with the ability to edit the shape or size of each item in the collection.

**Shape Collection Initialization File**

The provided csv file should be used to initialize the shape collection. Each row contains the definition of a new shape. All orientation values are in radians and are relative to the positive X-axis.

* Circles are specified by their center and radius.
* Ellipses are specified by their center, the orientation of the main axis, the length of the larger half axis Radius1, and the length of the smaller half axis Radius2.
* Squares and equilateral triangles are specified by their center, the orientation of the one of their sides (radians), and their side length.
* Polygons are specified via a list of vertices.