```
classdef projectile < matlab.apps.AppBase

    % Properties that correspond to app components
    properties (Access = public)
        UIFigure                        matlab.ui.Figure
        gravitationalaccelerationEditField  matlab.ui.control.NumericEditField
        gravitationalaccelerationEditFieldLabel  matlab.ui.control.Label
        initialangleEditField           matlab.ui.control.NumericEditField
        initialangleEditFieldLabel      matlab.ui.control.Label
        ms2Label                        matlab.ui.control.Label
        degLabel                        matlab.ui.control.Label
        initialheightEditField          matlab.ui.control.NumericEditField
        initialheightEditFieldLabel     matlab.ui.control.Label
        initialvelocityEditField        matlab.ui.control.NumericEditField
        initialvelocityEditFieldLabel   matlab.ui.control.Label
        mLabel                          matlab.ui.control.Label
        PARAMETERSPanel                 matlab.ui.container.Panel
        RangeEditField                  matlab.ui.control.NumericEditField
        RangeEditFieldLabel             matlab.ui.control.Label
        mLabel_2                        matlab.ui.control.Label
        maxheightEditField              matlab.ui.control.NumericEditField
        maxheightEditFieldLabel         matlab.ui.control.Label
        FlighttimeEditField             matlab.ui.control.NumericEditField
        FlighttimeEditFieldLabel        matlab.ui.control.Label
        mLabel_3                        matlab.ui.control.Label
        secLabel                        matlab.ui.control.Label
        msLabel                         matlab.ui.control.Label
        PROJECTILEMOTION2DLabel         matlab.ui.control.Label
        MEASUREButton                   matlab.ui.control.Button
        UIAxes                          matlab.ui.control.UIAxes
    end

    % Callbacks that handle component events
    methods (Access = private)

        % Button pushed function: MEASUREButton
        function MEASUREButtonPushed(app, event)
            Uo = app.initialvelocityEditField.Value;
            yo = app.initialheightEditField.Value;
            theta = app.initialangleEditField.Value;
            g = app.gravitationalaccelerationEditField.Value;
            xo =  0;
            x_t = Uo*cos(pi*(theta/180));
            y_t = Uo*sin(pi*(theta/180));
            a = -g/2;
            c = yo;
            %calculation of flight time
            t_flight =(2*x_t)/g;
            %to show this in result box
            app.FlighttimeEditField.Value = t_flight;
            %calculation of range
            range = x_t*t_flight;
            %to show this in result box
            app.RangeEditField.Value = range;
            %components of velocity
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            t = linspace(0,t_flight,30);

            %calculation of maximum height
            max_y = yo+(Uo^2)*(sin(pi*(theta/180)))^2/(2*g);
            app.maxheightEditField.Value = max_y;

            x = xo + x_t*t;
            y = yo+y_t*t-(g/2)*t.^2;
            %plotting the graph
            plot(app.UIAxes,x,y)
            legend(app.UIAxes,'projectile')
        end
    end

    % Component initialization
    methods (Access = private)

        % Create UIFigure and components
        function createComponents(app)

            % Create UIFigure and hide until all components are created
            app.UIFigure = uifigure('Visible', 'off');
            app.UIFigure.Color = [0.4706 0.4471 0.4471];
            app.UIFigure.Position = [100 100 778 565];
            app.UIFigure.Name = 'MATLAB App';

            % Create UIAxes
            app.UIAxes = uiaxes(app.UIFigure);
            title(app.UIAxes, 'PATH')
            xlabel(app.UIAxes, 'X')
            ylabel(app.UIAxes, 'Y')
            zlabel(app.UIAxes, 'Z')
            app.UIAxes.FontName = 'Lucida Handwriting';
            app.UIAxes.FontWeight = 'bold';
            app.UIAxes.XGrid = 'on';
            app.UIAxes.YGrid = 'on';
            app.UIAxes.FontSize = 12;
            app.UIAxes.Position = [343 16 412 317];

            % Create MEASUREButton
            app.MEASUREButton = uibutton(app.UIFigure, 'push');
            app.MEASUREButton.ButtonPushedFcn = createCallbackFcn(app,
@MEASUREButtonPushed, true);
            app.MEASUREButton.BackgroundColor = [0 0 0];
            app.MEASUREButton.FontName = 'ItalicT';
            app.MEASUREButton.FontWeight = 'bold';
            app.MEASUREButton.FontColor = [0.651 0.651 0.651];
            app.MEASUREButton.Position = [176 303 108 30];
            app.MEASUREButton.Text = 'MEASURE';

            % Create PROJECTILEMOTION2DLabel
            app.PROJECTILEMOTION2DLabel = uilabel(app.UIFigure);
            app.PROJECTILEMOTION2DLabel.HorizontalAlignment = 'center';
            app.PROJECTILEMOTION2DLabel.FontName = 'ISOCT2';
            app.PROJECTILEMOTION2DLabel.FontSize = 18;
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app.PROJECTILEMOTION2DLabel.FontWeight = 'bold';
app.PROJECTILEMOTION2DLabel.Position = [232 498 294 32];
app.PROJECTILEMOTION2DLabel.Text = 'PROJECTILE MOTION-2D';

% Create msLabel
app.msLabel = uilabel(app.UIFigure);
app.msLabel.FontName = 'Lucida Handwriting';
app.msLabel.FontWeight = 'bold';
app.msLabel.Position = [293 426 29 22];
app.msLabel.Text = 'm/s';

% Create PARAMETERSPanel
app.PARAMETERSPanel = uipanel(app.UIFigure);
app.PARAMETERSPanel.ForegroundColor = [0 1 0];
app.PARAMETERSPanel.BorderWidth = 6;
app.PARAMETERSPanel.TitlePosition = 'centertop';
app.PARAMETERSPanel.Title = 'PARAMETERS';
app.PARAMETERSPanel.BackgroundColor = [0.1412 0.1255 0.1255];
app.PARAMETERSPanel.FontName = 'ISOCT2';
app.PARAMETERSPanel.FontWeight = 'bold';
app.PARAMETERSPanel.FontSize = 14;
app.PARAMETERSPanel.Position = [50 33 274 239];

% Create secLabel
app.secLabel = uilabel(app.PARAMETERSPanel);
app.secLabel.FontName = 'Lucida Handwriting';
app.secLabel.FontWeight = 'bold';
app.secLabel.FontColor = [0 1 0];
app.secLabel.Position = [227 106 25 22];
app.secLabel.Text = 'sec';

% Create mLabel_3
app.mLabel_3 = uilabel(app.PARAMETERSPanel);
app.mLabel_3.FontName = 'Lucida Handwriting';
app.mLabel_3.FontWeight = 'bold';
app.mLabel_3.FontColor = [0 1 0];
app.mLabel_3.Position = [227 52 25 22];
app.mLabel_3.Text = 'm';

% Create FlighttimeEditFieldLabel
app.FlighttimeEditFieldLabel = uilabel(app.PARAMETERSPanel);
app.FlighttimeEditFieldLabel.HorizontalAlignment = 'right';
app.FlighttimeEditFieldLabel.FontName = 'Lucida Handwriting';
app.FlighttimeEditFieldLabel.FontWeight = 'bold';
app.FlighttimeEditFieldLabel.FontColor = [0 1 0];
app.FlighttimeEditFieldLabel.Position = [25 106 80 22];
app.FlighttimeEditFieldLabel.Text = 'Flight time';

% Create FlighttimeEditField
app.FlighttimeEditField = uieditfield(app.PARAMETERSPanel, 'numeric');
app.FlighttimeEditField.FontName = 'Lucida Handwriting';
app.FlighttimeEditField.FontWeight = 'bold';
app.FlighttimeEditField.FontColor = [1 0 0];
app.FlighttimeEditField.Position = [120 106 100 22];
```

```
% Create maxheightEditFieldLabel
app.maxheightEditFieldLabel = uilabel(app.PARAMETERSPanel);
app.maxheightEditFieldLabel.HorizontalAlignment = 'right';
app.maxheightEditFieldLabel.FontName = 'Lucida Handwriting';
app.maxheightEditFieldLabel.FontWeight = 'bold';
app.maxheightEditFieldLabel.FontColor = [0 1 0];
app.maxheightEditFieldLabel.Position = [24 52 83 22];
app.maxheightEditFieldLabel.Text = 'max height';

% Create maxheightEditField
app.maxheightEditField = uieditfield(app.PARAMETERSPanel, 'numeric');
app.maxheightEditField.FontName = 'Lucida Handwriting';
app.maxheightEditField.FontWeight = 'bold';
app.maxheightEditField.FontColor = [1 0 0];
app.maxheightEditField.Position = [122 52 100 22];

% Create mLabel_2
app.mLabel_2 = uilabel(app.PARAMETERSPanel);
app.mLabel_2.FontName = 'Lucida Handwriting';
app.mLabel_2.FontWeight = 'bold';
app.mLabel_2.FontColor = [0 1 0];
app.mLabel_2.Position = [227 158 25 22];
app.mLabel_2.Text = 'm';

% Create RangeEditFieldLabel
app.RangeEditFieldLabel = uilabel(app.PARAMETERSPanel);
app.RangeEditFieldLabel.HorizontalAlignment = 'right';
app.RangeEditFieldLabel.FontName = 'Lucida Handwriting';
app.RangeEditFieldLabel.FontWeight = 'bold';
app.RangeEditFieldLabel.FontColor = [0 1 0];
app.RangeEditFieldLabel.Position = [56 158 49 22];
app.RangeEditFieldLabel.Text = 'Range';

% Create RangeEditField
app.RangeEditField = uieditfield(app.PARAMETERSPanel, 'numeric');
app.RangeEditField.FontName = 'Lucida Handwriting';
app.RangeEditField.FontWeight = 'bold';
app.RangeEditField.FontColor = [1 0 0];
app.RangeEditField.Position = [120 158 100 22];

% Create mLabel
app.mLabel = uilabel(app.UIFigure);
app.mLabel.FontName = 'Lucida Handwriting';
app.mLabel.FontWeight = 'bold';
app.mLabel.Position = [674 426 25 22];
app.mLabel.Text = 'm';

% Create initialvelocityEditFieldLabel
app.initialvelocityEditFieldLabel = uilabel(app.UIFigure);
app.initialvelocityEditFieldLabel.HorizontalAlignment = 'right';
app.initialvelocityEditFieldLabel.FontName = 'Lucida Handwriting';
app.initialvelocityEditFieldLabel.FontWeight = 'bold';
app.initialvelocityEditFieldLabel.Position = [63 426 105 22];
app.initialvelocityEditFieldLabel.Text = 'initial velocity';
```

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            % Create initialvelocityEditField
            app.initialvelocityEditField = uieditfield(app.UIFigure, 'numeric');
            app.initialvelocityEditField.FontName = 'Lucida Handwriting';
            app.initialvelocityEditField.Position = [183 426 100 22];

            % Create initialheightEditFieldLabel
            app.initialheightEditFieldLabel = uilabel(app.UIFigure);
            app.initialheightEditFieldLabel.HorizontalAlignment = 'right';
            app.initialheightEditFieldLabel.FontName = 'Lucida Handwriting';
            app.initialheightEditFieldLabel.FontWeight = 'bold';
            app.initialheightEditFieldLabel.Position = [450 426 99 22];
            app.initialheightEditFieldLabel.Text = 'initial height';

            % Create initialheightEditField
            app.initialheightEditField = uieditfield(app.UIFigure, 'numeric');
            app.initialheightEditField.FontName = 'Lucida Handwriting';
            app.initialheightEditField.Position = [564 426 100 22];

            % Create degLabel
            app.degLabel = uilabel(app.UIFigure);
            app.degLabel.FontName = 'Lucida Handwriting';
            app.degLabel.FontWeight = 'bold';
            app.degLabel.Position = [294 371 30 22];
            app.degLabel.Text = 'deg';

            % Create ms2Label
            app.ms2Label = uilabel(app.UIFigure);
            app.ms2Label.FontName = 'Lucida Handwriting';
            app.ms2Label.FontWeight = 'bold';
            app.ms2Label.Position = [674 371 45 22];
            app.ms2Label.Text = 'm/s^2';

            % Create initialangleEditFieldLabel
            app.initialangleEditFieldLabel = uilabel(app.UIFigure);
            app.initialangleEditFieldLabel.HorizontalAlignment = 'right';
            app.initialangleEditFieldLabel.FontName = 'Lucida Handwriting';
            app.initialangleEditFieldLabel.FontWeight = 'bold';
            app.initialangleEditFieldLabel.Position = [75 371 94 22];
            app.initialangleEditFieldLabel.Text = 'initial angle';

            % Create initialangleEditField
            app.initialangleEditField = uieditfield(app.UIFigure, 'numeric');
            app.initialangleEditField.FontName = 'Lucida Handwriting';
            app.initialangleEditField.Position = [184 371 100 22];

            % Create gravitationalaccelerationEditFieldLabel
            app.gravitationalaccelerationEditFieldLabel = uilabel(app.UIFigure);
            app.gravitationalaccelerationEditFieldLabel.HorizontalAlignment =
'right';
            app.gravitationalaccelerationEditFieldLabel.FontName = 'Lucida
Handwriting';
            app.gravitationalaccelerationEditFieldLabel.FontWeight = 'bold';
            app.gravitationalaccelerationEditFieldLabel.Position = [358 371 191 22];
            app.gravitationalaccelerationEditFieldLabel.Text = 'gravitational
acceleration';
```

```
            % Create gravitationalaccelerationEditField
            app.gravitationalaccelerationEditField = uieditfield(app.UIFigure,
'numeric');
            app.gravitationalaccelerationEditField.FontName = 'Lucida Handwriting';
            app.gravitationalaccelerationEditField.Position = [564 371 100 22];

            % Show the figure after all components are created
            app.UIFigure.Visible = 'on';
        end
    end

    % App creation and deletion
    methods (Access = public)

        % Construct app
        function app = projectile

            % Create UIFigure and components
            createComponents(app)

            % Register the app with App Designer
            registerApp(app, app.UIFigure)

            if nargout == 0
                clear app
            end
        end

        % Code that executes before app deletion
        function delete(app)

            % Delete UIFigure when app is deleted
            delete(app.UIFigure)
        end
    end
end
```