```matlab
classdef oven_interface < matlab.apps.AppBase

    % Properties that correspond to app components
    properties (Access = public)
        UIFigure matlab.ui.Figure
        Slot1CheckBox matlab.ui.control.CheckBox
        Slot2CheckBox matlab.ui.control.CheckBox
        Slot3CheckBox matlab.ui.control.CheckBox
        Slot4CheckBox matlab.ui.control.CheckBox
        Slot5CheckBox matlab.ui.control.CheckBox
        Slot6CheckBox matlab.ui.control.CheckBox
        Slot7CheckBox matlab.ui.control.CheckBox
        Slot8CheckBox matlab.ui.control.CheckBox
        Slot9CheckBox matlab.ui.control.CheckBox
        Slot10CheckBox matlab.ui.control.CheckBox
        Slot11CheckBox matlab.ui.control.CheckBox
        Slot12CheckBox matlab.ui.control.CheckBox
        CupcakeColourDropDownLabel matlab.ui.control.Label
        CupcakeColourDropDown matlab.ui.control.DropDown
        OvenAssitaBotLabel matlab.ui.control.Label
        Joint1SliderLabel matlab.ui.control.Label
        Joint1Slider matlab.ui.control.Slider
        Joint2SliderLabel matlab.ui.control.Label
        Joint2Slider matlab.ui.control.Slider
        Joint3SliderLabel matlab.ui.control.Label
        Joint3Slider matlab.ui.control.Slider
        Joint4SliderLabel matlab.ui.control.Label
        Joint4Slider matlab.ui.control.Slider
        Joint5SliderLabel matlab.ui.control.Label
        Joint5Slider matlab.ui.control.Slider
        Joint6SliderLabel matlab.ui.control.Label
        Joint6Slider matlab.ui.control.Slider
        JointMovementLabel matlab.ui.control.Label
        EndEffectorControlLabel matlab.ui.control.Label
        XEditFieldLabel matlab.ui.control.Label
        XEditField matlab.ui.control.NumericEditField
        YEditFieldLabel matlab.ui.control.Label
        YEditField matlab.ui.control.NumericEditField
        ZEditFieldLabel matlab.ui.control.Label
        ZEditField matlab.ui.control.NumericEditField
        UpdateJointsButton matlab.ui.control.Button
        UpdatePositionButton matlab.ui.control.Button
        CupcakePrepLabel matlab.ui.control.Label
        Label matlab.ui.control.Label
        STARTButton matlab.ui.control.Button
        ESTOPButton matlab.ui.control.Button
        JoystickControlButton matlab.ui.control.Button
        EResumeButton matlab.ui.control.Button
        SetBatterButton matlab.ui.control.Button
        LightCurtainOnButton matlab.ui.control.Button
        LightCurtainOffButton matlab.ui.control.Button
        SafetyDemoButton matlab.ui.control.Button
```

```matlab
end

properties (Access = private)
control; % Description
q_joint_slider = [0 0 0 0 0 0];
x_goal;
y_goal;
z_goal;
roll_goal;
pitch_goal;
yaw_goal;
end

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

% Code that executes after component creation
function startupFcn(app)
%clear all
%close all
%clc
app.control = Spawn;

end

% Button pushed function: STARTButton
function StartEvent(app, event)
app.control.robot.stop_status = 0;
app.control.robot.returnRobotJoints();
%app.control.SpawnRMRCPoint(0.04,0.68,0.68, 0, 0, 0, 0);
% No Movement Tied
app.control.robot.mode=1;
%Move to Oven Door
fprintf('Move To Oven \n');
app.control.SpawnRMRCPoint(-0.1,0.7,0.68, 0, -pi/2, pi/2, 5);
pause(5);
%Door Movement Tied
app.control.robot.mode = 2;
%Open Oven
fprintf('Moving Oven \n');
app.control.SpawnRMRCPoint(-0.1,1.02,0.47, -pi/4, -pi/2, pi/2, 5);
pause(5);
%No Movement Tied
app.control.robot.mode = 1;
fprintf('Move To Bottle \n');
app.control.SpawnRMRCPoint(app.control.bottle_x,app.control.bottle_y+0.2,app.control.bottle_z, -
pi/2, 0, pi/2, 5);
%Bottle Movement Tied
%Function for each cake movement and pause
pause(5);
app.control.robot.mode=3;
fprintf('Take Bottle Out');
```

```matlab
app.control.SpawnRMRCPoint(app.control.tray_x,app.control.tray_y,app.control.bottle_z, -pi/2, 0,
pi/2, 2)
app.control.CakeLocationSpawn();
fprintf('Return Bottle Location (Include Rotation in an arc) \n');
app.control.SpawnRMRCPoint(app.control.bottle_x,app.control.bottle_y+0.2,app.control.bottle_z, -
pi/2, 0, pi/2, 5);
%No Movement Tied
pause(5);
app.control.robot.mode=1;
%app.control.SpawnRMRCPoint(-0.623, 0.45, 1.27, 0, 0, 0, 5);
fprintf('Move to Tray \n');
app.control.SpawnRMRCPoint(app.control.tray_x,app.control.tray_y+0.1,app.control.tableZ+0.2, -
pi/2, 0, pi, 5);
% Tray movement tied
pause(5);
app.control.robot.mode=4;
fprintf('Move Tray to Oven \n');
app.control.SpawnRMRCPoint(0.25,0.5,0.55, -pi/2, 0, pi, 5);
pause(5);
%No Movement Tied
app.control.robot.mode =1;
%Move To Door New
fprintf('Move To Oven \n');
app.control.SpawnRMRCPoint(-0.15,1.02,0.47, 0, -pi/2, pi/2, 5);
%Door Movement Tied
app.control.robot.mode = 7;
%Move Door
fprintf('Moving Oven \n');
app.control.SpawnRMRCPoint(-0.1,0.68,0.68, 0, -pi/2, pi/2, 5);
%End
end

% Button pushed function: ESTOPButton
function EmergencyStop(app, event)
app.control.stop_status = 1;
fprintf('Stopping \n');
%app.control.eStop();
%Make a certain value a certain thing
end

% Value changed function: Slot1CheckBox
function CakeSlot1(app, event)
value = app.Slot1CheckBox.Value;
app.control.CakeSlotChoice(1);
end

% Value changed function: Slot2CheckBox
function CakeSlot2(app, event)
value = app.Slot2CheckBox.Value;
app.control.CakeSlotChoice(2);
end
```

```matlab
% Value changed function: Slot3CheckBox
function CakeSlot3(app, event)
value = app.Slot3CheckBox.Value;
app.control.CakeSlotChoice(3);
end

% Value changed function: Slot4CheckBox
function CakeSlot4(app, event)
value = app.Slot4CheckBox.Value;
app.control.CakeSlotChoice(4);
end

% Value changed function: Slot5CheckBox
function CakeSlot5(app, event)
value = app.Slot5CheckBox.Value;
app.control.CakeSlotChoice(5);
end

% Value changed function: Slot6CheckBox
function CakeSlot6(app, event)
value = app.Slot6CheckBox.Value;
app.control.CakeSlotChoice(6);
end

% Value changed function: Slot7CheckBox
function CakeSlot7(app, event)
value = app.Slot7CheckBox.Value;
app.control.CakeSlotChoice(7);
end

% Value changed function: Slot8CheckBox
function CakeSlot8(app, event)
value = app.Slot8CheckBox.Value;
app.control.CakeSlotChoice(8);
end

% Value changed function: Slot9CheckBox
function CakeSlot9(app, event)
value = app.Slot9CheckBox.Value;
app.control.CakeSlotChoice(9);
end

% Value changed function: Slot10CheckBox
function CakeSlot10(app, event)
value = app.Slot10CheckBox.Value;
app.control.CakeSlotChoice(10);
end

% Value changed function: Slot11CheckBox
function CakeSlot11(app, event)
value = app.Slot11CheckBox.Value;
app.control.CakeSlotChoice(11);
```

```
        end

        % Value changed function: Slot12CheckBox
        function CakeSlot12(app, event)
        value = app.Slot12CheckBox.Value;
        app.control.CakeSlotChoice(12);
        end

        % Value changed function: CupcakeColourDropDown
        function ColourChoice(app, event)
        value = app.CupcakeColourDropDown.Value;
        end

        % Callback function
        function UpdateJoint0(app, event)
        value = app.Joint0Slider.deg2rad(value);
        %N/A
        end

        % Value changed function: Joint1Slider
        function UpdateJoint1(app, event)
        value = app.Joint1Slider.Value;
        app.q_joint_slider(1,1)=deg2rad(value);
        %Make the value signify a q plan in the first point, using 6
        %points in total through the 6 sliders
        end

        % Value changed function: Joint2Slider
        function UpdateJoint2(app, event)
        value = app.Joint2Slider.Value;
        app.q_joint_slider(1,2)=deg2rad(value);
        end

        % Value changed function: Joint3Slider
        function UpdateJoint3(app, event)
        value = app.Joint3Slider.Value;
        app.q_joint_slider(1,3)=deg2rad(value);
        end

        % Value changed function: Joint4Slider
        function UpdateJoint4(app, event)
        value = app.Joint4Slider.Value;
        app.q_joint_slider(1,4)=deg2rad(value);
        end

        % Value changed function: Joint5Slider
        function UpdateJoint5(app, event)
        value = app.Joint5Slider.Value;
        app.q_joint_slider(1,5)=deg2rad(value);
        end

        % Value changed function: Joint6Slider
```

```matlab
function UpdateJoint6(app, event)
value = app.Joint6Slider.Value;
app.q_joint_slider(1,6)=deg2rad(value);
end

% Button pushed function: UpdateJointsButton
function JointImplementUpdates(app, event)
q_value = app.q_joint_slider
app.control.RobotPoseAnimate(q_value);
%app.control.robot.RMRC(q_value);
T = app.control.robot.model.fkine(q_value);
app.XEditField.Value = T(1,4);
app.YEditField.Value = T(2,4);
app.ZEditField.Value = T(3,4);
eulZYX = rotm2eul(tform2rotm(T));
%app.RollEditField = eulZYX(1,1);
%app.PitchEditField = eulZYX(1,2);
%app.YawEditField = eulZYX(1,3);

end

% Value changed function: XEditField
function EndEffectorXAim(app, event)
value = app.XEditField.Value;
app.x_goal = value;
end

% Value changed function: YEditField
function EndEffectorYAim(app, event)
value = app.YEditField.Value;
app.y_goal = value;
end

% Value changed function: ZEditField
function EndEffectorZAim(app, event)
value = app.ZEditField.Value;
app.z_goal = value;
end

% Button pushed function: JoystickControlButton
function JoyConControl(app, event)
%Activate content similar to Lab week 11
app.control.robot.FreeMovement();
end

% Button pushed function: EResumeButton
function EResumeButtonPushed(app, event)
app.control.eStopResume()
%app.control.SpawnRMRCPoint(app.control.tray_x,app.control.tray_y+0.55,app.control.tableZ+0.05, -pi/2, 0, 0, 5);

fprintf('Resume Button Activate \n');
```

```
end

% Button pushed function: UpdatePositionButton
function UpdatePositionButtonPushed(app, event)
%use app.xyz_goal to get a q value
%Then call app.control.robot.RMRC(q);
app.control.SpawnRMRCPoint(app.x_goal, app.y_goal, app.z_goal, 0, 0, 0, 1);
%Alternatively derive q joints from these values
end

% Callback function
function Joint7SliderValueChanged(app, event)
value = app.Joint7Slider.Value;
app.q_joint_slider(1,7)=deg2rad(value);

end

% Callback function
function RollEditFieldValueChanged(app, event)
value = app.RollEditField.Value;
app.roll_goal = value;
end

% Callback function
function PitchEditFieldValueChanged(app, event)
value = app.PitchEditField.Value;
app.pitch_goal = value;
end

% Callback function
function YawEditFieldValueChanged(app, event)
value = app.YawEditField.Value;
app.yaw_goal = value;
end

% Button pushed function: SetBatterButton
function SetBatterButtonPushed(app, event)
value = app.CupcakeColourDropDown.Value;
if (strcmp(app.CupcakeColourDropDown.Value, 'Yellow'))
app.control.ColourChoice('yellow');
end
if (strcmp(app.CupcakeColourDropDown.Value, 'Red'))
app.control.ColourChoice('red');
end
if (strcmp(app.CupcakeColourDropDown.Value, 'Blue'))
app.control.ColourChoice('blue');
end
fprintf('Event');
%if yellow 1, if blue 2, if green 3 etc
%control.PaperColourChoice(colour);
end
```

```matlab
% Button pushed function: LightCurtainOnButton
function LightCurtainOnButtonPushed(app, event)
%Put Light Curtain In
%% Light Curtain
planeXntersect1 = 1.3;
planeBounds = [planeXntersect1-eps,planeXntersect1+eps,0,1.4,0,1.5];
[Y,Z] = meshgrid(planeBounds(3):0.1:planeBounds(4),planeBounds(5):0.1:planeBounds(6));
X = repmat(planeXntersect1,size(Y,1),size(Y,2));
s = meshz(X,Y,Z,'FaceAlpha',0.3)

planeXntersect2 = -2.6;
planeBounds = [planeXntersect2-eps,planeXntersect2+eps,0,1.4,0,1.5];
[Y,Z] = meshgrid(planeBounds(3):0.1:planeBounds(4),planeBounds(5):0.1:planeBounds(6));
X = repmat(planeXntersect2,size(Y,1),size(Y,2));
s = meshz(X,Y,Z,'FaceAlpha',0.3)

planeXntersect = 1.4;
planeBounds = [planeXntersect-eps,planeXntersect+eps,-2.6,1.3,0,1.5];
[X,Z] = meshgrid(planeBounds(3):0.1:planeBounds(4),planeBounds(5):0.1:planeBounds(6));
Y = repmat(planeXntersect,size(X,1),size(X,2));
s = meshz(X,Y,Z,'FaceAlpha',0.3)
end

% Button pushed function: LightCurtainOffButton
function LightCurtainOffButtonPushed(app, event)
end

% Button pushed function: SafetyDemoButton
function SafetyDemoButtonPushed(app, event)
[f,v,data] = plyread('Scotty.ply','tri');
ScottyVertexCount = size(v,1);

% Move center point to origin
midPoint = sum(v)/ScottyVertexCount;
ScottyVerts = v - repmat(midPoint,ScottyVertexCount,1);

% Create a transform to describe the location (at the origin, since it's centered
ScottyPose = transl(0,2,0.5);
vertexColours = [data.vertex.red, data.vertex.green, data.vertex.blue] / 255;

% Then plot the trisurf
ScottyMesh_h = trisurf(f,ScottyVerts(:,1),ScottyVerts(:,2), ScottyVerts(:,3) ...
,'FaceVertexCData',vertexColours,'EdgeColor','interp','EdgeLighting','flat');

% Move forwards (facing in -y direction)
forwardTR = makehgtform('translate',[0,-0.01,0]);
ScottyPose = ScottyPose * forwardTR
updatedPoints = [ScottyPose * [ScottyVerts,ones(ScottyVertexCount,1)]']';

% Now update the Vertices
ScottyMesh_h.Vertices = updatedPoints(:,1:3)
```

```matlab
% Now move it many times
while 1
pose1 = transl(0, 1.5,0.85);
steps = 75;
gripperInitial = zeros(1,6);
variable = app.control.robot.model.ikcon(pose1);
gripperInitial = [gripperInitial;variable];
gp7qmatrix = jtraj(gripperInitial(1,:),gripperInitial(2,:),steps);

for i=1:steps
animate(app.control.robot.model, gp7qmatrix(i,:));
drawnow();
ScottyPose = ScottyPose * forwardTR
updatedPoints = [ScottyPose * [ScottyVerts,ones(ScottyVertexCount,1)]']';
% Update the mesh vertices in the patch handle
ScottyMesh_h.Vertices = updatedPoints(:,1:3);
if ScottyPose(2,4) <= 1.6;
disp('WatchOut!')
return
end

drawnow();
end
drawnow;
end


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.Position = [100 100 736 675];
app.UIFigure.Name = 'MATLAB App';

% Create Slot1CheckBox
app.Slot1CheckBox = uicheckbox(app.UIFigure);
app.Slot1CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot1, true);
app.Slot1CheckBox.Text = 'Slot 1';
app.Slot1CheckBox.Position = [478 478 53 22];

% Create Slot2CheckBox
app.Slot2CheckBox = uicheckbox(app.UIFigure);
app.Slot2CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot2, true);
app.Slot2CheckBox.Text = 'Slot 2';
app.Slot2CheckBox.Position = [565 478 53 22];
```

```
% Create Slot3CheckBox
app.Slot3CheckBox = uicheckbox(app.UIFigure);
app.Slot3CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot3, true);
app.Slot3CheckBox.Text = 'Slot 3';
app.Slot3CheckBox.Position = [643 478 53 22];

% Create Slot4CheckBox
app.Slot4CheckBox = uicheckbox(app.UIFigure);
app.Slot4CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot4, true);
app.Slot4CheckBox.Text = 'Slot 4';
app.Slot4CheckBox.Position = [478 441 53 22];

% Create Slot5CheckBox
app.Slot5CheckBox = uicheckbox(app.UIFigure);
app.Slot5CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot5, true);
app.Slot5CheckBox.Text = 'Slot 5';
app.Slot5CheckBox.Position = [565 441 53 22];

% Create Slot6CheckBox
app.Slot6CheckBox = uicheckbox(app.UIFigure);
app.Slot6CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot6, true);
app.Slot6CheckBox.Text = 'Slot 6';
app.Slot6CheckBox.Position = [643 441 53 22];

% Create Slot7CheckBox
app.Slot7CheckBox = uicheckbox(app.UIFigure);
app.Slot7CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot7, true);
app.Slot7CheckBox.Text = 'Slot 7';
app.Slot7CheckBox.Position = [478 404 53 22];

% Create Slot8CheckBox
app.Slot8CheckBox = uicheckbox(app.UIFigure);
app.Slot8CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot8, true);
app.Slot8CheckBox.Text = 'Slot 8';
app.Slot8CheckBox.Position = [565 404 53 22];

% Create Slot9CheckBox
app.Slot9CheckBox = uicheckbox(app.UIFigure);
app.Slot9CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot9, true);
app.Slot9CheckBox.Text = 'Slot 9';
app.Slot9CheckBox.Position = [643 404 53 22];

% Create Slot10CheckBox
app.Slot10CheckBox = uicheckbox(app.UIFigure);
app.Slot10CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot10, true);
app.Slot10CheckBox.Text = 'Slot 10';
app.Slot10CheckBox.Position = [478 369 59 22];

% Create Slot11CheckBox
app.Slot11CheckBox = uicheckbox(app.UIFigure);
app.Slot11CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot11, true);
```

```
app.Slot11CheckBox.Text = 'Slot 11';
app.Slot11CheckBox.Position = [565 369 58 22];

% Create Slot12CheckBox
app.Slot12CheckBox = uicheckbox(app.UIFigure);
app.Slot12CheckBox.ValueChangedFcn = createCallbackFcn(app, @CakeSlot12, true);
app.Slot12CheckBox.Text = 'Slot 12';
app.Slot12CheckBox.Position = [643 369 59 22];

% Create CupcakeColourDropDownLabel
app.CupcakeColourDropDownLabel = uilabel(app.UIFigure);
app.CupcakeColourDropDownLabel.BackgroundColor = [0.9294 0.6941 0.1255];
app.CupcakeColourDropDownLabel.HorizontalAlignment = 'center';
app.CupcakeColourDropDownLabel.FontWeight = 'bold';
app.CupcakeColourDropDownLabel.Position = [465 332 100 22];
app.CupcakeColourDropDownLabel.Text = 'Cupcake Colour';

% Create CupcakeColourDropDown
app.CupcakeColourDropDown = uidropdown(app.UIFigure);
app.CupcakeColourDropDown.Items = {'Yellow', 'Red', 'Blue'};
app.CupcakeColourDropDown.ValueChangedFcn = createCallbackFcn(app, @ColourChoice, true);
app.CupcakeColourDropDown.FontWeight = 'bold';
app.CupcakeColourDropDown.BackgroundColor = [0.9294 0.6941 0.1255];
app.CupcakeColourDropDown.Position = [579 332 73 22];
app.CupcakeColourDropDown.Value = 'Yellow';

% Create OvenAssitaBotLabel
app.OvenAssitaBotLabel = uilabel(app.UIFigure);
app.OvenAssitaBotLabel.BackgroundColor = [0.502 0.502 0.502];
app.OvenAssitaBotLabel.HorizontalAlignment = 'center';
app.OvenAssitaBotLabel.FontSize = 22;
app.OvenAssitaBotLabel.FontWeight = 'bold';
app.OvenAssitaBotLabel.Position = [1 576 736 100];
app.OvenAssitaBotLabel.Text = 'Oven Assita-Bot';

% Create Joint1SliderLabel
app.Joint1SliderLabel = uilabel(app.UIFigure);
app.Joint1SliderLabel.HorizontalAlignment = 'right';
app.Joint1SliderLabel.Position = [27 488 41 22];
app.Joint1SliderLabel.Text = 'Joint 1';

% Create Joint1Slider
app.Joint1Slider = uislider(app.UIFigure);
app.Joint1Slider.Limits = [-170 170];
app.Joint1Slider.ValueChangedFcn = createCallbackFcn(app, @UpdateJoint1, true);
app.Joint1Slider.Position = [89 497 150 3];

% Create Joint2SliderLabel
app.Joint2SliderLabel = uilabel(app.UIFigure);
app.Joint2SliderLabel.HorizontalAlignment = 'right';
app.Joint2SliderLabel.Position = [30 422 41 22];
app.Joint2SliderLabel.Text = 'Joint 2';
```

```matlab
% Create Joint2Slider
app.Joint2Slider = uislider(app.UIFigure);
app.Joint2Slider.Limits = [-65 145];
app.Joint2Slider.MajorTicks = [-65 -35 0 25 55 85 115 145];
app.Joint2Slider.ValueChangedFcn = createCallbackFcn(app, @UpdateJoint2, true);
app.Joint2Slider.Position = [92 431 150 3];

% Create Joint3SliderLabel
app.Joint3SliderLabel = uilabel(app.UIFigure);
app.Joint3SliderLabel.HorizontalAlignment = 'right';
app.Joint3SliderLabel.Position = [27 366 41 22];
app.Joint3SliderLabel.Text = 'Joint 3';

% Create Joint3Slider
app.Joint3Slider = uislider(app.UIFigure);
app.Joint3Slider.Limits = [-70 190];
app.Joint3Slider.MajorTicks = [-70 -18 0 34 86 138 190];
app.Joint3Slider.ValueChangedFcn = createCallbackFcn(app, @UpdateJoint3, true);
app.Joint3Slider.Position = [89 375 150 3];

% Create Joint4SliderLabel
app.Joint4SliderLabel = uilabel(app.UIFigure);
app.Joint4SliderLabel.HorizontalAlignment = 'right';
app.Joint4SliderLabel.Position = [28 309 41 22];
app.Joint4SliderLabel.Text = 'Joint 4';

% Create Joint4Slider
app.Joint4Slider = uislider(app.UIFigure);
app.Joint4Slider.Limits = [-190 190];
app.Joint4Slider.MajorTicks = [-190 -114 -38 0 38 114 190];
app.Joint4Slider.ValueChangedFcn = createCallbackFcn(app, @UpdateJoint4, true);
app.Joint4Slider.Position = [90 318 150 3];

% Create Joint5SliderLabel
app.Joint5SliderLabel = uilabel(app.UIFigure);
app.Joint5SliderLabel.HorizontalAlignment = 'right';
app.Joint5SliderLabel.Position = [28 252 41 22];
app.Joint5SliderLabel.Text = 'Joint 5';

% Create Joint5Slider
app.Joint5Slider = uislider(app.UIFigure);
app.Joint5Slider.Limits = [-135 135];
app.Joint5Slider.ValueChangedFcn = createCallbackFcn(app, @UpdateJoint5, true);
app.Joint5Slider.Position = [90 261 150 3];

% Create Joint6SliderLabel
app.Joint6SliderLabel = uilabel(app.UIFigure);
app.Joint6SliderLabel.HorizontalAlignment = 'right';
app.Joint6SliderLabel.Position = [29 189 41 22];
app.Joint6SliderLabel.Text = 'Joint 6';
```

```matlab
% Create Joint6Slider
app.Joint6Slider = uislider(app.UIFigure);
app.Joint6Slider.Limits = [-360 360];
app.Joint6Slider.ValueChangedFcn = createCallbackFcn(app, @UpdateJoint6, true);
app.Joint6Slider.Position = [91 198 150 3];

% Create JointMovementLabel
app.JointMovementLabel = uilabel(app.UIFigure);
app.JointMovementLabel.BackgroundColor = [0.851 0.3255 0.098];
app.JointMovementLabel.HorizontalAlignment = 'center';
app.JointMovementLabel.FontSize = 16;
app.JointMovementLabel.FontWeight = 'bold';
app.JointMovementLabel.FontColor = [1 1 1];
app.JointMovementLabel.Position = [1 517 260 60];
app.JointMovementLabel.Text = 'Joint Movement';

% Create EndEffectorControlLabel
app.EndEffectorControlLabel = uilabel(app.UIFigure);
app.EndEffectorControlLabel.BackgroundColor = [0.4941 0.1843 0.5569];
app.EndEffectorControlLabel.HorizontalAlignment = 'center';
app.EndEffectorControlLabel.FontSize = 16;
app.EndEffectorControlLabel.FontWeight = 'bold';
app.EndEffectorControlLabel.FontColor = [1 1 1];
app.EndEffectorControlLabel.Position = [260 517 198 60];
app.EndEffectorControlLabel.Text = 'End Effector Control';

% Create XEditFieldLabel
app.XEditFieldLabel = uilabel(app.UIFigure);
app.XEditFieldLabel.HorizontalAlignment = 'right';
app.XEditFieldLabel.Position = [277 475 25 22];
app.XEditFieldLabel.Text = 'X';

% Create XEditField
app.XEditField = uieditfield(app.UIFigure, 'numeric');
app.XEditField.ValueChangedFcn = createCallbackFcn(app, @EndEffectorXAim, true);
app.XEditField.Position = [317 475 105 22];

% Create YEditFieldLabel
app.YEditFieldLabel = uilabel(app.UIFigure);
app.YEditFieldLabel.HorizontalAlignment = 'right';
app.YEditFieldLabel.Position = [277 433 25 22];
app.YEditFieldLabel.Text = 'Y';

% Create YEditField
app.YEditField = uieditfield(app.UIFigure, 'numeric');
app.YEditField.ValueChangedFcn = createCallbackFcn(app, @EndEffectorYAim, true);
app.YEditField.Position = [317 433 105 22];

% Create ZEditFieldLabel
app.ZEditFieldLabel = uilabel(app.UIFigure);
app.ZEditFieldLabel.HorizontalAlignment = 'right';
app.ZEditFieldLabel.Position = [277 390 25 22];
```

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app.ZEditFieldLabel.Text = 'Z';

% Create ZEditField
app.ZEditField = uieditfield(app.UIFigure, 'numeric');
app.ZEditField.ValueChangedFcn = createCallbackFcn(app, @EndEffectorZAim, true);
app.ZEditField.Position = [317 390 105 22];

% Create UpdateJointsButton
app.UpdateJointsButton = uibutton(app.UIFigure, 'push');
app.UpdateJointsButton.ButtonPushedFcn = createCallbackFcn(app, @JointImplementUpdates,
true);
app.UpdateJointsButton.BackgroundColor = [0.851 0.3255 0.098];
app.UpdateJointsButton.FontWeight = 'bold';
app.UpdateJointsButton.Position = [28 91 223 49];
app.UpdateJointsButton.Text = 'Update Joints';

% Create UpdatePositionButton
app.UpdatePositionButton = uibutton(app.UIFigure, 'push');
app.UpdatePositionButton.ButtonPushedFcn = createCallbackFcn(app,
@UpdatePositionButtonPushed, true);
app.UpdatePositionButton.BackgroundColor = [0.4941 0.1843 0.5569];
app.UpdatePositionButton.FontWeight = 'bold';
app.UpdatePositionButton.Position = [301 310 129 47];
app.UpdatePositionButton.Text = 'Update Position';

% Create CupcakePrepLabel
app.CupcakePrepLabel = uilabel(app.UIFigure);
app.CupcakePrepLabel.BackgroundColor = [0.9294 0.6941 0.1255];
app.CupcakePrepLabel.HorizontalAlignment = 'center';
app.CupcakePrepLabel.FontSize = 16;
app.CupcakePrepLabel.FontWeight = 'bold';
app.CupcakePrepLabel.FontColor = [1 1 1];
app.CupcakePrepLabel.Position = [457 517 280 60];
app.CupcakePrepLabel.Text = 'Cupcake Prep';

% Create Label
app.Label = uilabel(app.UIFigure);
app.Label.BackgroundColor = [0.8 0.8 0.8];
app.Label.Position = [277 1 460 298];
app.Label.Text = '';

% Create STARTButton
app.STARTButton = uibutton(app.UIFigure, 'push');
app.STARTButton.ButtonPushedFcn = createCallbackFcn(app, @StartEvent, true);
app.STARTButton.BackgroundColor = [0 1 0];
app.STARTButton.FontSize = 18;
app.STARTButton.FontWeight = 'bold';
app.STARTButton.Position = [429 10 128 130];
app.STARTButton.Text = 'START';

% Create ESTOPButton
app.ESTOPButton = uibutton(app.UIFigure, 'push');
```

```
app.ESTOPButton.ButtonPushedFcn = createCallbackFcn(app, @EmergencyStop, true);
app.ESTOPButton.BackgroundColor = [1 0 0];
app.ESTOPButton.FontSize = 18;
app.ESTOPButton.FontWeight = 'bold';
app.ESTOPButton.Position = [579 10 151 130];
app.ESTOPButton.Text = 'E-STOP';

% Create JoystickControlButton
app.JoystickControlButton = uibutton(app.UIFigure, 'push');
app.JoystickControlButton.ButtonPushedFcn = createCallbackFcn(app, @JoyConControl, true);
app.JoystickControlButton.BackgroundColor = [0.4667 0.6745 0.1882];
app.JoystickControlButton.FontSize = 18;
app.JoystickControlButton.FontWeight = 'bold';
app.JoystickControlButton.Position = [287 158 117 131];
app.JoystickControlButton.Text = {'Joystick'; ' Control'};

% Create EResumeButton
app.EResumeButton = uibutton(app.UIFigure, 'push');
app.EResumeButton.ButtonPushedFcn = createCallbackFcn(app, @EResumeButtonPushed, true);
app.EResumeButton.BackgroundColor = [1 0.4118 0.1608];
app.EResumeButton.FontSize = 16;
app.EResumeButton.FontWeight = 'bold';
app.EResumeButton.Position = [287 10 117 130];
app.EResumeButton.Text = 'E-Resume';

% Create SetBatterButton
app.SetBatterButton = uibutton(app.UIFigure, 'push');
app.SetBatterButton.ButtonPushedFcn = createCallbackFcn(app, @SetBatterButtonPushed, true);
app.SetBatterButton.BackgroundColor = [0.9294 0.6941 0.1255];
app.SetBatterButton.FontWeight = 'bold';
app.SetBatterButton.Position = [657.5 332 72 22];
app.SetBatterButton.Text = 'Set Batter';

% Create LightCurtainOnButton
app.LightCurtainOnButton = uibutton(app.UIFigure, 'push');
app.LightCurtainOnButton.ButtonPushedFcn = createCallbackFcn(app,
@LightCurtainOnButtonPushed, true);
app.LightCurtainOnButton.BackgroundColor = [0.7176 0.2745 1];
app.LightCurtainOnButton.FontSize = 14;
app.LightCurtainOnButton.FontWeight = 'bold';
app.LightCurtainOnButton.Position = [431 231 126 52];
app.LightCurtainOnButton.Text = 'Light Curtain On';

% Create LightCurtainOffButton
app.LightCurtainOffButton = uibutton(app.UIFigure, 'push');
app.LightCurtainOffButton.ButtonPushedFcn = createCallbackFcn(app,
@LightCurtainOffButtonPushed, true);
app.LightCurtainOffButton.BackgroundColor = [0.0745 0.6235 1];
app.LightCurtainOffButton.FontSize = 14;
app.LightCurtainOffButton.FontWeight = 'bold';
app.LightCurtainOffButton.Position = [431 162 128 55];
app.LightCurtainOffButton.Text = 'Light Curtain Off';
```

```
% Create SafetyDemoButton
app.SafetyDemoButton = uibutton(app.UIFigure, 'push');
app.SafetyDemoButton.ButtonPushedFcn = createCallbackFcn(app, @SafetyDemoButtonPushed,
true);
app.SafetyDemoButton.BackgroundColor = [0.0588 1 1];
app.SafetyDemoButton.FontSize = 18;
app.SafetyDemoButton.FontWeight = 'bold';
app.SafetyDemoButton.Position = [585 167 136 110];
app.SafetyDemoButton.Text = {'Safety Demo'; ''};

% 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 = oven_interface

% Create UIFigure and components
createComponents(app)

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

% Execute the startup function
runStartupFcn(app, @startupFcn)

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
```