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1 classdef Khanna_SF4_2_code < matlab.apps.AppBase
2
3     % Properties that correspond to app components
4     properties (Access = public)
5         UIFigure                matlab.ui.Figure
6         Image                    matlab.ui.control.Image
7         Label                    matlab.ui.control.Label
8         Label_2                  matlab.ui.control.Label
9         Label_3                  matlab.ui.control.Label
10        ALabel                    matlab.ui.control.Label
11        BLabel                    matlab.ui.control.Label
12        CLabel                    matlab.ui.control.Label
13        PlayerAHeadsorTailsEditFieldLabel matlab.ui.control.Label
14        PlayerAHeadsorTailsEditField matlab.ui.control.EditField
15        STARTGAMEButton          matlab.ui.control.Button
16        TicTacToeLabel            matlab.ui.control.Label
17        LandedonLabel            matlab.ui.control.Label
18        XsandRedareLabel          matlab.ui.control.Label
19        OsandBlueareLabel         matlab.ui.control.Label
20        ThecorrespondinglightLabel matlab.ui.control.Label
21        onthebreadboardsshowsLabel matlab.ui.control.Label
22        whosturnitisLabel         matlab.ui.control.Label
23        GamehasbeenLabel          matlab.ui.control.Label
24        WinnerLabel               matlab.ui.control.Label
25        PressbuttononbreadboardtoconfirmLabel matlab.ui.control.Label
26        WhichRowEditFieldLabel    matlab.ui.control.Label
27        WhichRowEditField         matlab.ui.control.NumericEditField
28        WhichColumnEditFieldLabel matlab.ui.control.Label
29        WhichColumnEditField      matlab.ui.control.EditField
30        A1Label                    matlab.ui.control.Label
31        B1Label                    matlab.ui.control.Label
32        C1Label                    matlab.ui.control.Label
33        C2Label                    matlab.ui.control.Label

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34        B2Label                    matlab.ui.control.Label
35        A2Label                    matlab.ui.control.Label
36        A3Label                    matlab.ui.control.Label
37        B3Label                    matlab.ui.control.Label
38        C3Label                    matlab.ui.control.Label
39        InvalidLabel               matlab.ui.control.Label
40    end
41
42
43    properties (Access = private)
44        aBoard % creates an empty object that the arduino properties will be stored into
45    end
46
47    methods (Access = private)
48
49    end
50
51    % Callbacks that handle component events
52    methods (Access = private)
53
54        % Code that executes after component creation
55        function startupFcn(app)
56            app.aBoard=arduino('COM4', 'uno'); %connects the arduino to MatLab
57        end
58
59        % Button pushed function: STARTGAMEButton
60        function STARTGAMEButtonPushed(app, event)
61            %defaults everything to simulate a new game whenever the start button
62            %is pushed
63            app.A1Label.Text = " ";
64            app.B1Label.Text = " ";
65            app.C1Label.Text = " ";

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67 - app.A2Label.Text = " ";
68 - app.B2Label.Text = " ";
69 - app.C2Label.Text = " ";
70 - app.A3Label.Text = " ";
71 - app.B3Label.Text = " ";
72 - app.C3Label.Text = " ";
73 - app.WinnerLabel.Text = " ";
74 - app.InvalidLabel.Text = "Invalid?: ";
75
76
77 %creates a variable for the userinput heads or tails
78 - flip = app.PlayerAHeadsorTailsEditField.Value;
79 %sets a current variable for x(the variable used as the player choice)
80 - x=2;
81
82 %code simulates a coin flip by having a 50/50 chance of being 0 or 1
83 %(heads or tails) and saves that to a variable to later be compared
84 %with the player choice
85 - y=randi([0,1]);
86
87 %this if/elseif statement converts playera's choice into a variable to
88 %be compared with y (the coin flip)
89 - if (flip=="Heads" || flip == "heads")
90 -     x=0;
91 - elseif (flip=="Tails" || flip == "tails")
92 -     x=1;
93 - end
94
95 %creates a variable for if player a or player b goes first, 0 means they
96 %currently go second
97 - playerafirst=0;
98 - playerbfirst=0;
99
100 %if the coin flip landed on heads and player a guessed correctly, player a is assigned to
101 %going first (assigning the variable to 1 means they go first), while
102 %player b remains at going second
103 - if x==y&&y==0
104 -     app.LandedonLabel.Text = ("Landed on heads");
105 -     app.XsandRedareLabel.Text = ("Xs and Red are Player A");
106 -     app.OsandBlueareLabel.Text = ("Os and Blue are Player B");
107 -     playerafirst=1;
108
109 %if the coin flip landed on tails and player a guessed correctly, player a is assigned to
110 %going first, while player b remains at going second
111 - elseif x==y&&y==1
112 -     app.LandedonLabel.Text = ("Landed on tails");
113 -     app.XsandRedareLabel.Text = ("Xs and Red are Player A");
114 -     app.OsandBlueareLabel.Text = ("Os and Blue are Player B");
115 -     playerafirst=1;
116
117 %if the coin flip landed on heads and player a did not guess correctly, player b is assigned to
118 %going first, while player a remains at going second
119 - elseif x~=y&&y==0
120 -     app.LandedonLabel.Text = ("Landed on heads");
121 -     app.XsandRedareLabel.Text = ("Xs and Red are Player B");
122 -     app.OsandBlueareLabel.Text = ("Os and Blue are Player A");
123 -     playerbfirst=1;
124
125 %if the coin flip landed on tails and player a did not guess correctly, playerb is assigned to
126 %going first, while player a remains at going second
127 - elseif x~=y&&y==1
128 -     app.LandedonLabel.Text = ("Landed on tails");
129 -     app.XsandRedareLabel.Text = ("Xs and Red are Player B");
130 -     app.OsandBlueareLabel.Text = ("Os and Blue are Player A");
131 -     playerbfirst = 1;
132 - end

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133
134 %creates an array of zeros to store the Xs and Os to check if
135 %the game has been won or if a spot has already been taken
136 - TTT = zeros(3,3);
137 %sets default for win variable and turns starting at 1
138 - win= 0;
139 - turns = 1;
140 %creates a while loop so that if the game has not been won it
141 %continues as well as a while loop for total amount of turns
142 - while win ~= 1
143 -     while turns <= 9
144         %creates a variable determining the remainder of the
145         %current amount of turns, helping determine whos turn it is
146 -         r =rem(turns,2);
147         % if player a is the one to go first and the remainder is odd,
148         % all the lines under the if statement are run through
149 -         if r == 1 && playerafirst == 1
150             %sets a variable named valid to false for a while loop
151 -             valid = false;
152 -             while valid == false
153                 %turns off the blue light and turns on the red
154                 %light to indicate it is Xs turn and variables for the input
155                 %of row and column are created
156 -                 app.aBoard.writeDigitalPin('D12',0);
157 -                 app.aBoard.writeDigitalPin('D13',1);
158 -                 row = app.WhichRowEditField.Value;
159 -                 col = app.WhichColumnEditField.Value;
160                 %converts the user's input of string into a
161                 %number to make it easy for the matrix
162 -                 if (col== "A")
163 -                     acol = 1;
164 -                 elseif (col == "B")
165 -                     acol = 2;
166 -                 elseif (col == "C")
167 -                     acol = 3;
168 -                 end
169
170                 %a function checking if the spot inserted by
171                 %the user was valid
172 -                 if (row>3||row<1||acol>3||acol<1||TTT(row,acol)==1||TTT(row,acol)==2)
173 -                     check = 1;
174 -                 else
175 -                     check = 0;
176 -                 end
177                 %creates a pause for the user to make sure they choose that location,
178                 %and once the button the button is pressed, it breaks out of the loop, proce
179 -                 while (readDigitalPin(app.aBoard, 'D6') == 1)
180 -                     if (readDigitalPin(app.aBoard, 'D6') == 0)
181 -                         break;
182 -                     end
183 -                 end
184
185                 % if the spot by the user was not valid, it
186                 % displays that they must try again, and
187                 % continues the loop
188 -                 if (check == 1)
189 -                     app.InvalidLabel.Text = "Invalid?: Yes, try again";
190 -                     valid = false;
191                 %else, it shows that the spot was not invalid, sets the spot on the matrix to 1
192                 %according to whatever spot the user chose and sets valid as true to break out
193 -                 else
194 -                     app.InvalidLabel.Text = "Invalid?: No, next turn";
195 -                     TTT(row,acol)=1;
196 -                     if (row == 1 && acol == 1)
197 -                         app.A1Label.Text = "X";
198 -                     elseif (row == 1 && acol == 2)

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199 -         app.B1Label.Text = "X";
200 -     elseif (row == 1 && acol == 3)
201 -         app.C1Label.Text = "X";
202 -     elseif (row == 2 && acol == 1)
203 -         app.A2Label.Text = "X";
204 -     elseif (row == 2 && acol == 2)
205 -         app.B2Label.Text = "X";
206 -     elseif (row == 2 && acol == 3)
207 -         app.C2Label.Text = "X";
208 -     elseif (row == 3 && acol == 1)
209 -         app.A3Label.Text = "X";
210 -     elseif (row == 3 && acol == 2)
211 -         app.B3Label.Text = "X";
212 -     elseif (row == 3 && acol == 3)
213 -         app.C3Label.Text = "X";
214 -     end
215 -     valid = true;
216 - end
217
218 %an if/elseif statement is used to check if the
219 %game has been won by a certain user using the
220 %matrix
221 - if (TTT(1,1)==1&&TTT(1,2)==1&&TTT(1,3)==1 || TTT(2,1)==1&&...
222 - TTT(2,2)==1&& TTT(2,3)==1 || TTT(3,1)==1&&TTT(3,2)==1&&TTT(3,3)==1 ||...
223 - TTT(1,1)==1&&TTT(2,1)==1&&TTT(3,1)==1 || TTT(1,2)==1&&TTT(2,2)==1&&TTT(3,2)==1 ...
224 - || TTT(1,3)==1&&TTT(2,3)==1&&TTT(3,3)==1 || TTT(1,1)==1&&TTT(2,2)==1&&TTT(3,3)==1 ...
225 - || TTT(1,3)==1&&TTT(2,2)==1&&TTT(3,1)==1)
226
227 -         win = 1;
228
229 -     elseif (TTT(1,1)==2&&TTT(1,2)==2&&TTT(1,3)==2 || TTT(2,1)==2&& TTT(2,2)==2&&...
230 - TTT(2,3)==2 || TTT(3,1)==2&&TTT(3,2)==2&&TTT(3,3)==2 || TTT(1,1)==2&&TTT(2,1)==2&&...
231 - TTT(3,1)==2 || TTT(1,2)==2&&TTT(2,2)==2&&TTT(3,2)==2 || TTT(1,3)==2&&TTT(2,3)==2&&...

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232 - TTT(3,3)==2 || TTT(1,1)==2&&TTT(2,2)==2&&TTT(3,3)==2 || TTT(1,3)==2&&TTT(2,2)==2&&TTT(3,1)==2)
233
234 -         win = 2;
235
236 -     else
237 -         win = 0;
238 -     end
239
240 %if the game was won by Xs, it displays that
241 %the game has been won by Player A and advances
242 %all the turns to exit out of the loop
243 - if (win == 1)
244 -     app.winnerLabel.Text = "Won by Player A!";
245 -     turns = turns + 6;
246 - end
247 - end
248
249 % elseif player b is the one to go second and the remainder is even,
250 % all the lines under the if statement are run through
251 - elseif r == 0 && playerbfirst == 0
252 -     %sets a variable named valid to false for a while loop
253 -     valid = false;
254 -     while valid == false
255 -         %turns off the red light and turns on the blue
256 -         %light to indicate it is Os turn and variables for the input
257 -         %of row and column are created
258 -         app.aBoard.writeDigitalPin('D13',0);
259 -         app.aBoard.writeDigitalPin('D12',1);
260 -         row = app.WhichRowEditField.Value;
261 -         col = app.WhichColumnEditField.Value;
262
263 %same function as code above
264 -         if (col== "A")

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265 -         acol = 1;
266 -     elseif (col == "B")
267 -         acol = 2;
268 -     elseif (col == "C")
269 -         acol = 3;
270 -     end
271 -
272 - %same function as code above
273 - if (row>3||row<1||acol>3||acol<1||TTT(row,acol)==1||TTT(row,acol)==2)
274 -     check = 1;
275 - else
276 -     check = 0;
277 - end
278 - %same function as code above
279 - while (readDigitalPin(app.aBoard, 'D6') == 1)
280 -     if (readDigitalPin(app.aBoard, 'D6') == 0)
281 -         break;
282 -     end
283 - end
284 -
285 - %same function as code above
286 - if (check == 1)
287 -     app.InvalidLabel.Text = "Invalid?: Yes, try again";
288 -     valid = false;
289 -
290 - %else, it shows that the spot was not invalid, sets the spot on the matrix to 2, and it plots the
291 - %according to whatever spot the user chose and sets valid as true to break out of the player loop
292 - else
293 -     app.InvalidLabel.Text = "Invalid?: No, next turn";
294 -     TTT(row,acol)=2;
295 -     if (row == 1 && acol == 1)
296 -         app.A1Label.Text = "O";
297 -     elseif (row == 1 && acol == 2)
298 -
299 -         app.B1Label.Text = "O";
300 -     elseif (row == 1 && acol == 3)
301 -         app.C1Label.Text = "O";
302 -     elseif (row == 2 && acol == 1)
303 -         app.A2Label.Text = "O";
304 -     elseif (row == 2 && acol == 2)
305 -         app.B2Label.Text = "O";
306 -     elseif (row == 2 && acol == 3)
307 -         app.C2Label.Text = "O";
308 -     elseif (row == 3 && acol == 1)
309 -         app.A3Label.Text = "O";
310 -     elseif (row == 3 && acol == 2)
311 -         app.B3Label.Text = "O";
312 -     elseif (row == 3 && acol == 3)
313 -         app.C3Label.Text = "O";
314 -     end
315 -     valid = true;
316 - end
317 -
318 - %same function as code above
319 - if (TTT(1,1)==1&&TTT(1,2)==1&&TTT(1,3)==1 || TTT(2,1)==1&&...
320 -     TTT(2,2)==1&& TTT(2,3)==1 || TTT(3,1)==1&&TTT(3,2)==1&&TTT(3,3)==1 ||...
321 -     TTT(1,1)==1&&TTT(2,1)==1&&TTT(3,1)==1 || TTT(1,2)==1&&TTT(2,2)==1&&TTT(3,2)==1 ...
322 -     || TTT(1,3)==1&&TTT(2,3)==1&&TTT(3,3)==1 || TTT(1,1)==1&&TTT(2,2)==1&&TTT(3,3)==1 ...
323 -     || TTT(1,3)==1&&TTT(2,2)==1&&TTT(3,1)==1)
324 -
325 -     win = 1;
326 -
327 - elseif (TTT(1,1)==2&&TTT(1,2)==2&&TTT(1,3)==2 || TTT(2,1)==2&& TTT(2,2)==2&&...
328 -     TTT(2,3)==2 || TTT(3,1)==2&&TTT(3,2)==2&&TTT(3,3)==2 || TTT(1,1)==2&&TTT(2,1)==2&&...
329 -     TTT(3,1)==2 || TTT(1,2)==2&&TTT(2,2)==2&&TTT(3,2)==2 || TTT(1,3)==2&&TTT(2,3)==2&&...
330 -     TTT(3,3)==2 || TTT(1,1)==2&&TTT(2,2)==2&&TTT(3,3)==2 || TTT(1,3)==2&&TTT(2,2)==2&&TTT(3,1)==2)

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331 -         win = 2;
332 -
333 -     else
334 -         win = 0;
335 -     end
336 -
337 -     %if the game was won by Os, it displays that
338 -     %the game has been won by Player B and advances
339 -     %all the turns to exit out of the loop
340 -     if (win == 2)
341 -         app.WinnerLabel.Text = "Won by Player B!";
342 -         turns = turns + 6;
343 -     end
344 - end
345 -
346 - % if player b is the one to go first and the remainder is odd,
347 - % all the lines under the if statement are run through
348 - elseif r == 1 && playerbfirst == 1
349 -     %sets a variable named valid to false for a while loop
350 -     valid = false;
351 -     while valid == false
352 -         %turns off the blue light and turns on the red
353 -         %light to indicate it is Xs turn and variables for the input
354 -         %of row and column are created
355 -         app.aBoard.writeDigitalPin('D12',0);
356 -         app.aBoard.writeDigitalPin('D13',1);
357 -         row = app.WhichRowEditField.Value;
358 -         col = app.WhichColumnEditField.Value;
359 -
360 -         %same function as code above
361 -         if (col == "A")
362 -             acol = 1;
363 -         elseif (col == "B")
364 -
365 -             acol = 2;
366 -         elseif (col == "C")
367 -             acol = 3;
368 -         end
369 -
370 -         %same function as code above
371 -         if (row>3||row<1||acol>3||acol<1||TTT(row,acol)==1||TTT(row,acol)==2)
372 -             check = 1;
373 -         else
374 -             check = 0;
375 -         end
376 -         %same function as code above
377 -         while (readDigitalPin(app.aBoard, 'D6') == 1)
378 -             if (readDigitalPin(app.aBoard, 'D6') == 0)
379 -                 break;
380 -             end
381 -         end
382 -
383 -         %same function as code above
384 -         if (check == 1)
385 -             app.InvalidLabel.Text = "Invalid?: Yes, try again";
386 -             valid = false;
387 -         %same function as code above
388 -         else
389 -             app.InvalidLabel.Text = "Invalid?: No, next turn";
390 -             TTT(row,acol)=1;
391 -             if (row == 1 && acol == 1)
392 -                 app.A1Label.Text = "X";
393 -             elseif (row == 1 && acol == 2)
394 -                 app.B1Label.Text = "X";
395 -             elseif (row == 1 && acol == 3)
396 -                 app.C1Label.Text = "X";
397 -             elseif (row == 2 && acol == 1)
398 -                 app.A2Label.Text = "X";
399 -             elseif (row == 2 && acol == 2)
400 -                 app.B2Label.Text = "X";
401 -             elseif (row == 2 && acol == 3)

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402 -         elseif (row == 3 && acol == 1)
403 -             app.A3Label.Text = "X";
404 -         elseif (row == 3 && acol == 2)
405 -             app.B3Label.Text = "X";
406 -         elseif (row == 3 && acol == 3)
407 -             app.C3Label.Text = "X";
408 -         end
409 -         valid = true;
410 -     end
411
412     %same function as code above
413 -     if (TTT(1,1)==1&&TTT(1,2)==1&&TTT(1,3)==1 || TTT(2,1)==1&&...
414 -         TTT(2,2)==1&& TTT(2,3)==1 || TTT(3,1)==1&&TTT(3,2)==1&&TTT(3,3)==1 ||...
415 -         TTT(1,1)==1&&TTT(2,1)==1&&TTT(3,1)==1 || TTT(1,2)==1&&TTT(2,2)==1&&TTT(3,2)==1 ...
416 -         || TTT(1,3)==1&&TTT(2,3)==1&&TTT(3,3)==1 || TTT(1,1)==1&&TTT(2,2)==1&&TTT(3,3)==1 ...
417 -         || TTT(1,3)==1&&TTT(2,2)==1&&TTT(3,1)==1)
418
419 -         win = 1;
420
421 -     elseif (TTT(1,1)==2&&TTT(1,2)==2&&TTT(1,3)==2 || TTT(2,1)==2&& TTT(2,2)==2&&...
422 -         TTT(2,3)==2 || TTT(3,1)==2&&TTT(3,2)==2&&TTT(3,3)==2 || TTT(1,1)==2&&TTT(2,1)==2&&...
423 -         TTT(3,1)==2 || TTT(1,2)==2&&TTT(2,2)==2&&TTT(3,2)==2 || TTT(1,3)==2&&TTT(2,3)==2&&...
424 -         TTT(3,3)==2 || TTT(1,1)==2&&TTT(2,2)==2&&TTT(3,3)==2 || TTT(1,3)==2&&TTT(2,2)==2&&TTT(3,1)==2)
425
426 -         win = 2;
427
428 -     else
429 -         win = 0;
430 -     end
431
432     %if the game was won by Xs, it displays that
433     %the game has been won by Player B and advances
434     %all the turns to exit out of the loop
435 -     if (win == 1)
436 -         app.WinnerLabel.Text = "Won by Player B!";
437 -         turns = turns + 6;
438 -     end
439 - end

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440
441     % if player a is the one to go second and the remainder is even,
442     % all the lines under the if statement are run through
443 -     elseif r == 0 && playerafirst == 0
444         %sets a variable named valid to false for a while loop
445 -         valid = false;
446 -         while valid == false
447             %turns off the red light and blue on the red
448             %light to indicate it is Os turn and variables for the input
449             %of row and column are created
450 -             app.aBoard.writeDigitalPin('D13',0);
451 -             app.aBoard.writeDigitalPin('D12',1);
452 -             row = app.WhichRowEditField.Value;
453 -             col = app.WhichColumnEditField.Value;
454
455             %same function as code above
456 -             if (col== "A")
457 -                 acol = 1;
458 -             elseif (col == "B")
459 -                 acol = 2;
460 -             elseif (col == "C")
461 -                 acol = 3;
462 -             end
463
464             %same function as code above
465 -             if (row>3||row<1||acol>3||acol<1||TTT(row,acol)==1||TTT(row,acol)==2)
466 -                 check = 1;
467 -             else
468 -                 check = 0;
469 -             end
470
471             %same function as code above
472 -             while (readDigitalPin(app.aBoard, 'D6') == 1)
473 -                 if (readDigitalPin(app.aBoard, 'D6') == 0)
474 -                     break;
475 -                 end
476 -             end
477

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478 %same function as code above
479 if (check == 1)
480     app.InvalidLabel.Text = "Invalid?: Yes, try again";
481     valid = false;
482
483 %same function as code above
484 else
485     app.InvalidLabel.Text = "Invalid?: No, next turn";
486     TTT(row,acol)=2;
487     if (row == 1 && acol == 1)
488         app.A1Label.Text = "O";
489     elseif (row == 1 && acol == 2)
490         app.B1Label.Text = "O";
491     elseif (row == 1 && acol == 3)
492         app.C1Label.Text = "O";
493     elseif (row == 2 && acol == 1)
494         app.A2Label.Text = "O";
495     elseif (row == 2 && acol == 2)
496         app.B2Label.Text = "O";
497     elseif (row == 2 && acol == 3)
498         app.C2Label.Text = "O";
499     elseif (row == 3 && acol == 1)
500         app.A3Label.Text = "O";
501     elseif (row == 3 && acol == 2)
502         app.B3Label.Text = "O";
503     elseif (row == 3 && acol == 3)
504         app.C3Label.Text = "O";
505     end
506     valid = true;
507 end
508
509 %same function as code above
510 if (TTT(1,1)==1&&TTT(1,2)==1&&TTT(1,3)==1 || TTT(2,1)==1&&...
511     TTT(2,2)==1&& TTT(2,3)==1 || TTT(3,1)==1&&TTT(3,2)==1&&TTT(3,3)==1 ||...
512     TTT(1,1)==1&&TTT(2,1)==1&&TTT(3,1)==1 || TTT(1,2)==1&&TTT(2,2)==1&&TTT(3,2)==1 ...
513     || TTT(1,3)==1&&TTT(2,3)==1&&TTT(3,3)==1 || TTT(1,1)==1&&TTT(2,2)==1&&TTT(3,3)==1 ...
514     || TTT(1,3)==1&&TTT(2,2)==1&&TTT(3,1)==1)
515

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```

516 win = 1;
517
518 elseif (TTT(1,1)==2&&TTT(1,2)==2&&TTT(1,3)==2 || TTT(2,1)==2&& TTT(2,2)==2&&...
519     TTT(2,3)==2 || TTT(3,1)==2&&TTT(3,2)==2&&TTT(3,3)==2 || TTT(1,1)==2&&TTT(2,1)==2&&...
520     TTT(3,1)==2 || TTT(1,2)==2&&TTT(2,2)==2&&TTT(3,2)==2 || TTT(1,3)==2&&TTT(2,3)==2&&...
521     TTT(3,3)==2 || TTT(1,1)==2&&TTT(2,2)==2&&TTT(3,3)==2 || TTT(1,3)==2&&TTT(2,2)==2&&TTT(3,1)==2)
522
523 win = 2;
524
525 else
526     win = 0;
527 end
528
529 %If the game was won by Os, it displays that
530 %the game has been won by Player A and advances
531 %all the turns to exit out of the loop
532 if (win == 2)
533     app.WinnerLabel.Text = "Won by Player A!";
534     turns = turns + 6;
535 end
536 end
537
538 % a turn counter is created to proceed the game
539 turns = turns + 1;
540 end
541
542 %sets win as equal to 1 to break out of the loop
543 win = 1;
544 end
545
546 %If the sum of the entire matrix is equal 13 (indicating entire matrix is full)
547 %it will display that the game has ended in a tie
548 if sum(TTT(1,:))+sum(TTT(2,:))+sum(TTT(3,:))==13
549     app.WinnerLabel.Text = "Ended in a tie.";
550 end
551 end
552
553 % Component initialization
554 methods (Access = private)
555
556 % Create UIFigure and components
557 function createComponents(app)
558
559 % Create UIFigure and hide until all components are created
560 app.UIFigure = uifigure('Visible', 'off');
561 app.UIFigure.Position = [100 100 761 530];

```



```

561 -         app.UIFigure.Name = 'UI Figure';
562 -
563 -         % Create Image
564 -         app.Image = uimage(app.UIFigure);
565 -         app.Image.ScaleMethod = 'stretch';
566 -         app.Image.Position = [56 1 373 359];
567 -         app.Image.ImageSource = 'tictactoe.jpg';
568 -
569 -         % Create Label
570 -         app.Label = uilabel(app.UIFigure);
571 -         app.Label.FontSize = 70;
572 -         app.Label.Position = [11 259 46 114];
573 -         app.Label.Text = '1';
574 -
575 -         % Create Label_2
576 -         app.Label_2 = uilabel(app.UIFigure);
577 -         app.Label_2.FontSize = 70;
578 -         app.Label_2.Position = [11 123 46 114];
579 -         app.Label_2.Text = '2';
580 -
581 -         % Create Label_3
582 -         app.Label_3 = uilabel(app.UIFigure);
583 -         app.Label_3.FontSize = 70;
584 -         app.Label_3.Position = [11 1 46 114];
585 -         app.Label_3.Text = '3';
586 -
587 -         % Create ALabel
588 -         app.ALabel = uilabel(app.UIFigure);
589 -         app.ALabel.FontSize = 60;
590 -         app.ALabel.Position = [91 363 52 93];
591 -         app.ALabel.Text = 'A';
592 -
593 -         % Create BLabel
594 -         app.BLabel = uilabel(app.UIFigure);
595 -         app.BLabel.FontSize = 60;
596 -         app.BLabel.Position = [217 371 52 76];
597 -         app.BLabel.Text = 'B';
598 -
599 -         % Create CLabel
600 -         app.CLabel = uilabel(app.UIFigure);
601 -         app.CLabel.FontSize = 60;
602 -         app.CLabel.Position = [345 363 56 93];
603 -         app.CLabel.Text = 'C';
604 -
605 -         % Create PlayerAHeadsonTailsEditFieldLabel
606 -         app.PlayerAHeadsonTailsEditFieldLabel = uilabel(app.UIFigure);
607 -         app.PlayerAHeadsonTailsEditFieldLabel.HorizontalAlignment = 'right';
608 -         app.PlayerAHeadsonTailsEditFieldLabel.FontSize = 15;
609 -         app.PlayerAHeadsonTailsEditFieldLabel.Position = [446 448 174 22];
610 -         app.PlayerAHeadsonTailsEditFieldLabel.Text = 'Player A: Heads or Tails?';
611 -
612 -         % Create PlayerAHeadsonTailsEditField
613 -         app.PlayerAHeadsonTailsEditField = uieditfield(app.UIFigure, 'text');
614 -         app.PlayerAHeadsonTailsEditField.Position = [630 446 76 22];
615 -
616 -         % Create STARTGAMEButton
617 -         app.STARTGAMEButton = uibutton(app.UIFigure, 'push');
618 -         app.STARTGAMEButton.ButtonPushedFcn = createCallbackFcn(app, @STARTGAMEButtonPushed, true);
619 -         app.STARTGAMEButton.FontSize = 15;
620 -         app.STARTGAMEButton.Position = [476 384 202 50];
621 -         app.STARTGAMEButton.Text = 'START GAME';
622 -
623 -         % Create TicTacToeLabel
624 -         app.TicTacToeLabel = uilabel(app.UIFigure);
625 -         app.TicTacToeLabel.HorizontalAlignment = 'center';
626 -         app.TicTacToeLabel.FontSize = 55;
627 -         app.TicTacToeLabel.Position = [101 446 285 68];
628 -         app.TicTacToeLabel.Text = 'Tic Tac Toe';
629 -
630 -         % Create LandedonLabel
631 -         app.LandedonLabel = uilabel(app.UIFigure);
632 -         app.LandedonLabel.FontSize = 20;
633 -         app.LandedonLabel.Position = [444 328 258 55];
634 -         app.LandedonLabel.Text = 'Landed on';
635 -
636 -         % Create XsandRedareLabel
637 -         app.XsandRedareLabel = uilabel(app.UIFigure);
638 -         app.XsandRedareLabel.FontSize = 20;
639 -         app.XsandRedareLabel.Position = [444 312 251 25];
640 -         app.XsandRedareLabel.Text = 'Xs and Red are';
641 -
642 -         % Create OsandBlueareLabel
643 -         app.OsandBlueareLabel = uilabel(app.UIFigure);
644 -         app.OsandBlueareLabel.FontSize = 20;
645 -         app.OsandBlueareLabel.Position = [445 279 250 25];
646 -         app.OsandBlueareLabel.Text = 'Os and Blue are';
647 -
648 -         % Create ThecorrespondinglightLabel

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```

649 ~ app.ThecorrespondinglightLabel = uilabel(app.UIFigure);
650 ~ app.ThecorrespondinglightLabel.FontSize = 20;
651 ~ app.ThecorrespondinglightLabel.Position = [445 245 216 25];
652 ~ app.ThecorrespondinglightLabel.Text = 'The corresponding light';
653
654 ~ % Create onthebreadboardshowsLabel
655 ~ app.onthebreadboardshowsLabel = uilabel(app.UIFigure);
656 ~ app.onthebreadboardshowsLabel.FontSize = 20;
657 ~ app.onthebreadboardshowsLabel.Position = [445 221 233 25];
658 ~ app.onthebreadboardshowsLabel.Text = 'on the breadboard shows';
659
660 ~ % Create whosturnitisLabel
661 ~ app.whosturnitisLabel = uilabel(app.UIFigure);
662 ~ app.whosturnitisLabel.FontSize = 20;
663 ~ app.whosturnitisLabel.Position = [445 197 137 25];
664 ~ app.whosturnitisLabel.Text = 'who's turn it is.';
665
666 ~ % Create GamehasbeenLabel
667 ~ app.GamehasbeenLabel = uilabel(app.UIFigure);
668 ~ app.GamehasbeenLabel.FontSize = 25;
669 ~ app.GamehasbeenLabel.Position = [436 38 194 40];
670 ~ app.GamehasbeenLabel.Text = 'Game has been.';
671
672 ~ % Create WinnerLabel
673 ~ app.WinnerLabel = uilabel(app.UIFigure);
674 ~ app.WinnerLabel.FontSize = 30;
675 ~ app.WinnerLabel.Position = [436 3 259 43];
676 ~ app.WinnerLabel.Text = '';
677
678 ~ % Create PressbuttononbreadboardtoconfirmLabel
679 ~ app.PressbuttononbreadboardtoconfirmLabel = uilabel(app.UIFigure);
680 ~ app.PressbuttononbreadboardtoconfirmLabel.FontSize = 18;
681 ~ app.PressbuttononbreadboardtoconfirmLabel.Position = [436 114 332 24];
682 ~ app.PressbuttononbreadboardtoconfirmLabel.Text = 'Press button on breadboard to confirm';
683
684 ~ % Create WhichRowEditFieldLabel
685 ~ app.WhichRowEditFieldLabel = uilabel(app.UIFigure);
686 ~ app.WhichRowEditFieldLabel.HorizontalAlignment = 'right';
687 ~ app.WhichRowEditFieldLabel.FontSize = 18;
688 ~ app.WhichRowEditFieldLabel.Position = [446 169 107 22];
689 ~ app.WhichRowEditFieldLabel.Text = 'Which Row?';
690
691 ~ % Create WhichRowEditField
692 ~ app.WhichRowEditField = uieditfield(app.UIFigure, 'numeric');
693 ~ app.WhichRowEditField.Position = [592 169 109 22];
694
695 ~ % Create WhichColumnEditFieldLabel

```

```

696 ~ app.WhichColumnEditFieldLabel = uilabel(app.UIFigure);
697 ~ app.WhichColumnEditFieldLabel.HorizontalAlignment = 'right';
698 ~ app.WhichColumnEditFieldLabel.FontSize = 18;
699 ~ app.WhichColumnEditFieldLabel.Position = [445 147 132 22];
700 ~ app.WhichColumnEditFieldLabel.Text = 'Which Column?';
701
702 ~ % Create WhichColumnEditField
703 ~ app.WhichColumnEditField = uieditfield(app.UIFigure, 'text');
704 ~ app.WhichColumnEditField.Position = [592 147 109 22];
705
706 ~ % Create A1Label
707 ~ app.A1Label = uilabel(app.UIFigure);
708 ~ app.A1Label.HorizontalAlignment = 'center';
709 ~ app.A1Label.FontSize = 100;
710 ~ app.A1Label.Position = [56 236 122 124];
711 ~ app.A1Label.Text = '';
712
713 ~ % Create B1Label
714 ~ app.B1Label = uilabel(app.UIFigure);
715 ~ app.B1Label.HorizontalAlignment = 'center';
716 ~ app.B1Label.FontSize = 100;
717 ~ app.B1Label.Position = [182 236 122 124];
718 ~ app.B1Label.Text = '';
719
720 ~ % Create C1Label
721 ~ app.C1Label = uilabel(app.UIFigure);
722 ~ app.C1Label.HorizontalAlignment = 'center';
723 ~ app.C1Label.FontSize = 100;
724 ~ app.C1Label.Position = [303 236 122 124];
725 ~ app.C1Label.Text = '';
726
727 ~ % Create C2Label
728 ~ app.C2Label = uilabel(app.UIFigure);
729 ~ app.C2Label.HorizontalAlignment = 'center';
730 ~ app.C2Label.FontSize = 100;
731 ~ app.C2Label.Position = [303 118 122 119];
732 ~ app.C2Label.Text = '';
733
734 ~ % Create B2Label
735 ~ app.B2Label = uilabel(app.UIFigure);
736 ~ app.B2Label.HorizontalAlignment = 'center';
737 ~ app.B2Label.FontSize = 100;
738 ~ app.B2Label.Position = [183 118 122 119];
739 ~ app.B2Label.Text = '';
740
741 ~ % Create A2Label
742 ~ app.A2Label = uilabel(app.UIFigure);

```

```

743 ~     app.A2Label.HorizontalAlignment = 'center';
744 ~     app.A2Label.FontSize = 100;
745 ~     app.A2Label.Position = [56 118 122 119];
746 ~     app.A2Label.Text = '';
747 ~
748 ~     % Create A3Label
749 ~     app.A3Label = uilabel(app.UIFigure);
750 ~     app.A3Label.HorizontalAlignment = 'center';
751 ~     app.A3Label.FontSize = 100;
752 ~     app.A3Label.Position = [56 0 122 119];
753 ~     app.A3Label.Text = '';
754 ~
755 ~     % Create B3Label
756 ~     app.B3Label = uilabel(app.UIFigure);
757 ~     app.B3Label.HorizontalAlignment = 'center';
758 ~     app.B3Label.FontSize = 100;
759 ~     app.B3Label.Position = [182 3 122 116];
760 ~     app.B3Label.Text = '';
761 ~
762 ~     % Create C3Label
763 ~     app.C3Label = uilabel(app.UIFigure);
764 ~     app.C3Label.HorizontalAlignment = 'center';
765 ~     app.C3Label.FontSize = 100;
766 ~     app.C3Label.Position = [307 0 122 119];
767 ~     app.C3Label.Text = '';
768 ~
769 ~     % Create InvalidLabel
770 ~     app.InvalidLabel = uilabel(app.UIFigure);
771 ~     app.InvalidLabel.FontSize = 27;
772 ~     app.InvalidLabel.Position = [436 77 307 34];
773 ~     app.InvalidLabel.Text = 'Invalid?';
774 ~
775 ~     % Show the figure after all components are created
776 ~     app.UIFigure.Visible = 'on';
777 ~ end
778 ~
779 ~
780 ~ % App creation and deletion
781 ~ methods (Access = public)
782 ~
783 ~     % Construct app
784 ~     function app = Khanna_SF4_2_code
785 ~
786 ~         % Create UIFigure and components
787 ~         createComponents(app)
788 ~
789 ~         % Register the app with App Designer

```

```

790 ~     registerApp(app, app.UIFigure)
791 ~
792 ~     % Execute the startup function
793 ~     runStartupFcn(app, @startupFcn)
794 ~
795 ~     if nargin == 0
796 ~         clear app
797 ~     end
798 ~ end
799 ~
800 ~ % Code that executes before app deletion
801 ~ function delete(app)
802 ~
803 ~     % Delete UIFigure when app is deleted
804 ~     delete(app.UIFigure)
805 ~ end
806 ~ end
807 ~ end

```