clear

clc

close all

%% Seven Segment Display Consruction

% For Date

% Patch coordinates for digits

% Date section, left digit

disp(1).topcenter1 = [0 5 4 1 0;0 0 -1 -1 0];

disp(1).midcenter1 = [0 0.5 4.5 5 4.5 0.5 0;-6 -5.5 -5.5 -6 -6.5 -6.5 -6];

disp(1).botcenter1 = [0 1 4 5 0;-12 -11 -11 -12 -12];

disp(1).topleft1 = [0 1 1 0 0;-0.5 -1.5 -4.5 -5.5 -0.5];

disp(1).botleft1 = [0 1 1 0 0;-6.5 -7.5 -10.5 -11.5 -6.5];

disp(1).topright1 = [5 5 4 4 5;-0.5 -5.5 -4.5 -1.5 -0.5];

disp(1).botright1 = [5 5 4 4 5;-6.5 -11.5 -10.5 -7.5 -6.5];

disp\_increment1 = [0 6 14 20 28 34 40 46];

% Defining patch coordinates for all other digits based on the first digit

for i = 2:8

disp(i) = disp(1);

disp(i).topcenter1(1,:) = disp(i).topcenter1(1,:) + disp\_increment1(i);

disp(i).midcenter1(1,:) = disp(i).midcenter1(1,:) + disp\_increment1(i);

disp(i).botcenter1(1,:) = disp(i).botcenter1(1,:) + disp\_increment1(i);

disp(i).topleft1(1,:) = disp(i).topleft1(1,:) + disp\_increment1(i);

disp(i).botleft1(1,:) = disp(i).botleft1(1,:) + disp\_increment1(i);

disp(i).topright1(1,:) = disp(i).topright1(1,:) + disp\_increment1(i);

disp(i).botright1(1,:) = disp(i).botright1(1,:) + disp\_increment1(i);

end

% Create circles to seperate date/month/year

R = 0.5;

theta = 0;

i = 1;

n = 72;

circle = zeros(8,71);

while theta <= 2 \* pi - 0.1

circle(1,i) = R \* cos(theta) + 12.5;

circle(2,i) = R \* sin(theta) - 3.5;

theta = theta + ( 2\* pi) / n;

i = i + 1;

end

circle(3,:) = circle(1,:);

circle(4,:) = circle(2,:) - 5;

circle(5,:) = circle(1,:) + 14;

circle(6,:) = circle(2,:);

circle(7,:) = circle(5,:);

circle(8,:) = circle(4,:);

% Create patches for display

% Open figure window

h = figure('Name','Date & Time','NumberTitle','off');

set(h,'Color',[1 1 1],'OuterPosition',[0 0 450 265],'Resize','off')

axes('Position',[0.075 0.45 0.75 0.5])

count = 1;

% Create patches for digits

for i = 1:8

digit1(count) = patch(disp(i).topcenter1(1,:),disp(i).topcenter1(2,:),'r','EdgeAlpha',0);

count = count + 1;

digit1(count) = patch(disp(i).midcenter1(1,:),disp(i).midcenter1(2,:),'r','EdgeAlpha',0);

count = count + 1;

digit1(count) = patch(disp(i).botcenter1(1,:),disp(i).botcenter1(2,:),'r','EdgeAlpha',0);

count = count + 1;

digit1(count) = patch(disp(i).topleft1(1,:),disp(i).topleft1(2,:),'r','EdgeAlpha',0);

count = count + 1;

digit1(count) = patch(disp(i).botleft1(1,:),disp(i).botleft1(2,:),'r','EdgeAlpha',0);

count = count + 1;

digit1(count) = patch(disp(i).topright1(1,:),disp(i).topright1(2,:),'r','EdgeAlpha',0);

count = count + 1;

digit1(count) = patch(disp(i).botright1(1,:),disp(i).botright1(2,:),'r','EdgeAlpha',0);

count = count + 1;

end

% For Time

% Patch coordinates for digits

% Hour section, left digit

disp(1).topcenter = [0 5 4 1 0;0 0 -1 -1 0];

disp(1).midcenter = [0 0.5 4.5 5 4.5 0.5 0;-6 -5.5 -5.5 -6 -6.5 -6.5 -6];

disp(1).botcenter = [0 1 4 5 0;-12 -11 -11 -12 -12];

disp(1).topleft = [0 1 1 0 0;-0.5 -1.5 -4.5 -5.5 -0.5];

disp(1).botleft = [0 1 1 0 0;-6.5 -7.5 -10.5 -11.5 -6.5];

disp(1).topright = [5 5 4 4 5;-0.5 -5.5 -4.5 -1.5 -0.5];

disp(1).botright = [5 5 4 4 5;-6.5 -11.5 -10.5 -7.5 -6.5];

disp\_increment = [0 6 14 20 28 34];

% Defines patch coordinates for all other digits based on the first digit

for i = 2:6

disp(i) = disp(1);

disp(i).topcenter(1,:) = disp(i).topcenter(1,:) + disp\_increment(i);

disp(i).midcenter(1,:) = disp(i).midcenter(1,:) + disp\_increment(i);

disp(i).botcenter(1,:) = disp(i).botcenter(1,:) + disp\_increment(i);

disp(i).topleft(1,:) = disp(i).topleft(1,:) + disp\_increment(i);

disp(i).botleft(1,:) = disp(i).botleft(1,:) + disp\_increment(i);

disp(i).topright(1,:) = disp(i).topright(1,:) + disp\_increment(i);

disp(i).botright(1,:) = disp(i).botright(1,:) + disp\_increment(i);

end

% Create circles to separate hours/minutes/seconds

for i = 1:4

circle(i) = patch(circle(i \* 2 - 1,:),circle(i \* 2,:),'r','EdgeAlpha',0);

end

% Define axis coordinates, scale and figure properties

axis equal

axis([-1 60 -13 1])

set(gca,'XTick',[],'YTick',[],'XColor',[1 1 1],'YColor',[1 1 1],'ZColor',[1 1 1])

% Create circles to seperate hours/minutes/seconds

R = 0.5;

theta = 0;

i = 1;

n = 72;

circle = zeros(8,71);

while theta <= 2 \* pi - 0.1

circle(1,i) = R \* cos(theta) + 12.5;

circle(2,i) = R \* sin(theta) - 3.5;

theta = theta + ( 2\* pi) / n;

i = i + 1;

end

circle(3,:) = circle(1,:);

circle(4,:) = circle(2,:) - 5;

circle(5,:) = circle(1,:) + 14;

circle(6,:) = circle(2,:);

circle(7,:) = circle(5,:);

circle(8,:) = circle(4,:);

% Patches for display

% Open figure window

%h = figure('Name','Date & Time','NumberTitle','off');

set(h,'Color',[1 1 1],'OuterPosition',[200 300 450 265],'Resize','on')

axes('Position',[0.025 0.015 0.75 0.5])

% text(.1,12.5,['DIGITAL'])

% text(9,12.5,['CLOCK'])

% uicontrol('style','pushbutton',...

% 'string','Close',...

% 'position',[350 75 85 25],...

% 'callback','close');

count = 1;

% Create patches for digits

for i = 1:6

digit(count) = patch(disp(i).topcenter(1,:),disp(i).topcenter(2,:),'b','EdgeAlpha',0);

count = count + 1;

digit(count) = patch(disp(i).midcenter(1,:),disp(i).midcenter(2,:),'b','EdgeAlpha',0);

count = count + 1;

digit(count) = patch(disp(i).botcenter(1,:),disp(i).botcenter(2,:),'b','EdgeAlpha',0);

count = count + 1;

digit(count) = patch(disp(i).topleft(1,:),disp(i).topleft(2,:),'b','EdgeAlpha',0);

count = count + 1;

digit(count) = patch(disp(i).botleft(1,:),disp(i).botleft(2,:),'b','EdgeAlpha',0);

count = count + 1;

digit(count) = patch(disp(i).topright(1,:),disp(i).topright(2,:),'b','EdgeAlpha',0);

count = count + 1;

digit(count) = patch(disp(i).botright(1,:),disp(i).botright(2,:),'b','EdgeAlpha',0);

count = count + 1;

end

% Create circles to separate hours/minutes/seconds

for i = 1:4

circle(i) = patch(circle(i \* 2 - 1,:),circle(i \* 2,:),'b','EdgeAlpha',0);

end

% Define axis coordinates, scale and figure properties

axis equal

axis([-1 40 -13 1])

set(gca,'XTick',[],'YTick',[],'XColor',[1 1 1],'YColor',[1 1 1],'ZColor',[1 1 1])

% Operation of Date

C = clock;

for i = 1:56

set(digit1(i),'FaceAlpha',1)

end

% Determining date digits

cur\_digit1(1) = floor(C(3) / 10);

cur\_digit1(2) = C(3) - (cur\_digit1(1) \* 10);

% Determining month digits

cur\_digit1(3) = floor(C(2) / 10);

cur\_digit1(4) = C(2) - (cur\_digit1(3) \* 10);

% Determining year digits

cur\_digit1(5) = floor(C(1) / 1000);

cur\_digit1(6) = ((floor(C(1) / 100))-(cur\_digit1(5)\*10));

cur\_digit1(7) = ((floor(C(1) / 10)) - ((cur\_digit1(5) \* 100)+(cur\_digit1(6) \* 10)));

cur\_digit1(8) = (C(1) - ((cur\_digit1(5) \* 1000)+(cur\_digit1(6) \* 100)+(cur\_digit1(7) \* 10)));

% Update digits to display time by reducing opacity of sections which do no need to be displayed

for i = 1:8

if cur\_digit1(i) == 1

set(digit1(-6 + (i \* 7):-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit1(i) == 2

set(digit1(-3 + (i \* 7)),'FaceAlpha',0)

set(digit1(i \* 7),'FaceAlpha',0)

elseif cur\_digit1(i) == 3

set(digit1(-3 + (i \* 7):-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit1(i) == 4

set(digit1(-6 + (i \* 7)),'FaceAlpha',0)

set(digit1(-4 + (i \* 7)),'FaceAlpha',0)

set(digit1(-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit1(i) == 5

set(digit1(-2 + (i \* 7):-1 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit1(i) == 6

set(digit1(-1 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit1(i) == 7

set(digit1(-5 + (i \* 7):-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit1(i) == 9

set(digit1(-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit1(i) == 0

set(digit1(-5 + (i \* 7)),'FaceAlpha',0)

end

end

% Operation of Time (Loop to update time)

count = 1;

while count ~= 0

C = clock;

% Reset digit opacity to full

for i = 1:42

set(digit(i),'FaceAlpha',1)

end

% Determining hour digits

cur\_digit(1) = floor(C(4) / 10);

cur\_digit(2) = C(4) - (cur\_digit(1) \* 10);

% Determining minute digits

cur\_digit(3) = floor(C(5) / 10);

cur\_digit(4) = C(5) - (cur\_digit(3) \* 10);

% Determining second digits

C(6) = round(C(6));

cur\_digit(5) = floor(C(6) / 10);

cur\_digit(6) = C(6) - (cur\_digit(5) \* 10);

if cur\_digit(5) == 6

cur\_digit(5) = 0;

end

% Update digits to display time by reducing opacity of sections which do no need to be displayed

for i = 1:6

if cur\_digit(i) == 1

set(digit(-6 + (i \* 7):-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit(i) == 2

set(digit(-3 + (i \* 7)),'FaceAlpha',0)

set(digit(i \* 7),'FaceAlpha',0)

elseif cur\_digit(i) == 3

set(digit(-3 + (i \* 7):-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit(i) == 4

set(digit(-6 + (i \* 7)),'FaceAlpha',0)

set(digit(-4 + (i \* 7)),'FaceAlpha',0)

set(digit(-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit(i) == 5

set(digit(-2 + (i \* 7):-1 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit(i) == 6

set(digit(-1 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit(i) == 7

set(digit(-5 + (i \* 7):-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit(i) == 9

set(digit(-2 + (i \* 7)),'FaceAlpha',0)

elseif cur\_digit(i) == 0

set(digit(-5 + (i \* 7)),'FaceAlpha',0)

end

end

% Make dots flash on every alternate second

if (cur\_digit(6) == 1)||(cur\_digit(6) == 3)||(cur\_digit(6) == 5)||(cur\_digit(6) == 7)||(cur\_digit(6) == 9)

set(circle(1:4),'FaceAlpha',0.15)

else

set(circle(1:4),'FaceAlpha',1)

end

% Update figure

drawnow

end

