#### A Project Report on

**“The Digital clock Based On Seven Segment Display Using Matlab** ”

#### Submitted in partial fulfillment of the requirements of the degree of

**Bachelor of Technology Submitted by**

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##### Under the Supervision of

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ELECTRONICS AND COMMUNICATION ENGINEERING RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES

ONGOLECAMPUS 2022-2023

## Approval Sheet

This report entitled “Digital Clock Based On Seven Segment Dsiplay Using MATLAB” by Addanki Likhitha--(O180891), Sankatala Amrutha Priya-(O181020) and Gouthu Ramya- (O180978), is approved for the degree of Bachelor of Technology Electronics and Communication Engineering.

**Examiner(s)**

**Supervisor(s)**

**Chairman**

**Date:**

**Place:**

## Candidate’s Declaration

I declare that this written submission represents my ideas in my own words and where others ideas or words have been included.I have adequately cited and referenced the original sources .I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penaltation from the sources which have thus not been properly cited or from whom proper permission had not been taken when needed.

**Signature**

**Addanki Likhitha (O180891)**

**Gouthu Ramya (O180978)**

**Sankatala Amrutha Priya (O181020)**

**Date:**

# DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

**RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES ONGOLE CAMPUS**



## Certificate

This is to certify that the report entitled “Digital Clock Based On Seven Segment Display using MATLAB” submitted by Addanki Likhitha- (O180891), Sankatala Amrutha Priya- (O181020) and Gouthu Ramya- (O180978) in partial fulfilment of the requirements for the award of Bachelor of Technology in Electronics and Communication Engineering is a bonafide work carried by them under my supervision and guidance.

**Project Internal Guide Head of theDepartment**

Mrs.Nasreen Mr.G.Bala Nagireddy

Assistant Professor Assistant Professor

Department of ECE Department of ECE

## Acknowledgement

I would like to express my sincere gratitude to **Mrs. Nasreen**, my project guide for valuable suggestions and keen interest through out the progress of my course and research.

I am grateful to **Mr. G. Bala Nagireddy**, HOD of Electronics & Communication Engineering, for providing excellent computing facilities and a congenial atmosphere for progressing with my project.

I would like to thank Prof. **B. Jayarami Reddy**, director of RAJIV GANDHI UNIVERSITY OF KNOWLEDGE TECHNOLOGIES,

ONGOLE for providing all the necessary resources for the successful completion of my course work. At last, but not the least I thank my teammates and other students for their physical and moral support.

**With Sincere Regards,** Addanki Likhitha -O180891 Sankatala Amrutha Priya -O181020 Gouthu Ramya -O180978

**Date:**

## Abstract

The “Digital Clock Based on Seven Segment Display” using Matlab project aims to design and implement a digital clock using matlab , a visual programming environment for modeling ,simulating and analyzing dynamic systems .The digital clock is more accurate and light .The clock will be designed using matlab code blocks and will feature a real time clock module to ensure accurate time-keeping The clock will display the time in 24-hour format and will be able to switch between displaying the time and date .Additionally the project will explore the use of simulink built-in analysis tools for evaluating the clocks performance and accuracy .The signal processing algorithms will be used to compensate for any inaccuracy in the clock’s timekeeping ,ensuring that the clock remains accurate over time .Various simulation scenarios will be used to test the clocks ability to maintain accurate timekeeping during power outages for other disruptions Additionally a user interface will be developed for the clock ,allowing users to set the time and date through a graphical interface .The user interface will be designed to be user friendly ,making it easy for users to configure the clock to their desired time anddate.

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# CHAPTER-1

### INTRODUCTION

##### Project Objective:

The world as it stands now can be said to be digitalized in every rampification and as such this project is aimed at looking for the way to change the way the time of the day is computed and displayed to the end user. In this process we design clock using Matlab result in the digitalized form on a series of matrix seven segment display

Infra red signals will be the line of communication between the digital clock

and user through which the digital clock’s time can be modify/set.

##### Aims:

The objective of this project is to develop Digital clock.

Expected achievements in order to fulfill the objectives are:

To be able to display the time in a digitalized form on a matrix seven segment display

##### Significance of the project:

Digital clocks are being a very useful components of our lives.Regarding the changethe need of accurate and simple materials also dramatically increasing.

Our Proposed project using Matlab that satisify the need of those materials.

##### Scope of the Project

This project will extend its range till the far possible reach having neglisible delay ,a setting buttons and second display.

The scope of study is quite large: from applications of software compilers to hardware.

# CHAPTER-2

### LITERATURE REVIEW

In all walks of life, digitals system are making sophisticated approach to the mankind. Of course

the machines cannot be replaced by human beings in exact accuracy in some fields. For a long

time humans were using analog devices in our case analog clocks in their daily life.

The first digital pocket watch was the invention of Austrian engineer Josef Pallweber who

created his "jump-hour" mechanism in 1883. Instead of a conventional dial, the jump-hour

featured two windows in an enamel dial, through which the hours and minutes are visible on

rotating discs. The second hand remained conventional. By 1885 Pallweber mechanism was

already on the market in pocket watches by Cortébert and IWC; arguably contributing to the

subsequent rise and commercial success of IWC. The principles of Pallweber jump-hour

movement had appeared in wristwatches by the 1920s (Cortébert) and are still used today

(Chronoswiss Digiteur). While the original inventor didn't have a watch brand at the time, his

name has since been resurrected by a newly established watch manufacturer.

Plato clocks used a similar idea but a different layout. These spring-wound pieces consisted of a

glass cylinder with a column inside, affixed to which were small digital cards with numbers

printed on them, which flipped as time passed. The Plato clocks were introduced at the St. Louis

World Fair in 1904, produced by Ansonia Clock Company. Eugene Fitch of New York patented

the clock design in 1903. 13 years earlier Josef Pallweber had patented the same invention using

digital cards (different from his 1885 patent using moving disks) in Germany (DRP No.

54093).The German factory Aktiengesellschaft für Uhrenfabrikation Lenzkirch made such digital

clocks in 1893 and 1894.

The earliest patent for a digital alarm clock was registered by D.E Protzmann and others on

October 23, 1956, in the United States. Protzmann and his associates also patented another

digital clock in 1970, which was said to use a minimal amount of moving parts. Two side-plates

held digital numerals between them, while an electric motor and cam gear outside controlled

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**Review of Literature:**

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In 1970,the first digital wristwatch with an LED display was mass-produced. called the pulsar, and produced by the Hamilton watch company, this watch was hinted at two years prior when the same company created a prototype digital watch for Kubrick’s 2001:A space Odyssey. Throughout the 1970’s despite the initial hefty cost of digital watches, the popularity of said devices steadly rose

# CHAPTER-3

### INTRODUCTION TO SEVEN SEGMENT DISPLAY

##### Seven Segment Display

Digital displays link the digital world of ones and zeros with numerics of the human world. You have seen how parallel combinations of ones and zeros can represent binary, hexadecimal, or digital numbers. For most simple instruments, digital displays use the numbers 0-9 and are represented by seven segmented displays. Each segment is controlled by a single bit, and combinations of segments turned ON or OFF can display all the numbers 0-9 and a few characters, such as a, b, c, d, e, and f.

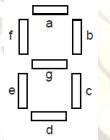


Fig 3.1 Seven Segment Display

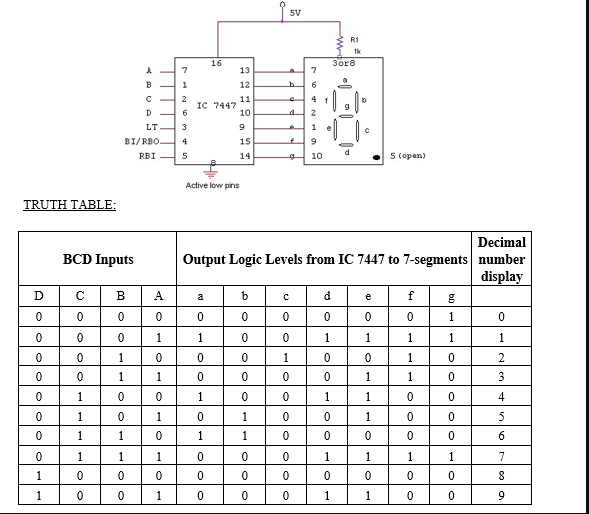


Fig 3.2 Circuit Diagram

##### Types of Seven Segment Displays

* 1. LED’s are basically of two typesCommon Cathode (CC) -All the 8 anode legs uses only one cathode, which is common.
  2. Common Anode (CA)-The common leg for all the cathode is of Anode type.

### ****Common Cathode(CC) Seven Segment Display****

The common cathode display is commonly called CC display. In this type the common pin on the seven-segment display is connected to all the eight Cathode pins of the LEDs. So In order to make this type of seven segment display to work we should connect he Com pin to the Ground pin and power the other pins with Vcc (+5V typically)

### ****Common Anode(CA) Seven Segment Display****

The common anode display is commonly called CA display. In this type the common pin on the **seven-segment display** is connected to all the eight Anode pins of the LEDs. So In order to make this type of seven segment display to work we should connect he Com pin to the Vcc (+5V typically) and ground the required segment pin to turn it on.

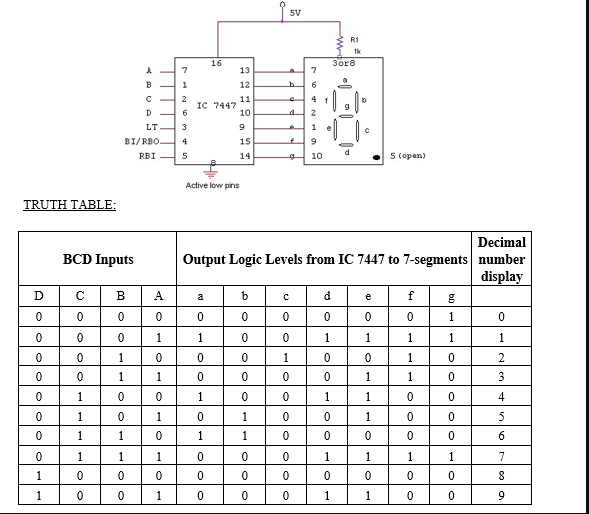


Table 3.1 Truth table of seven segment display

##### Infra Red Light ( Seven segment Display)

Infrared light has a difference with ordinary light in general. We can see clearly when a light or light on an object.

As with the infrared light we can not see the manifestation of these rays. Frankly I can not answer when asked why the infrared rays are not visible in the eyes of us. So at night do not hope you can make light by using infrared light. One thing that is often heard from many people that infrared light can utilized for the functions of a camera that can see in dark conditions is often called an infrared camera.Actually I have explained the working principles of electronic circuit section in this blog is about the basic working principle of a series of **Infra red**  sensors are simple. To design this sensor circuit you should not find trouble if you ever make another series of sensors. It's just that the sensor circuit consists of the transmitter and receiver, to learn the basic principles of this series of infrared you can see in the Basic Principles Series Infrared Transmitter and Receiver. In the circuit this time I try to utilize the output of this sensor circuit as a trigger circuit counter or counters.

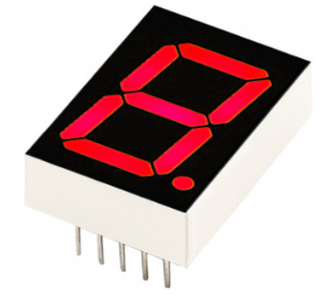


Fig 3.3 Infra Red light in seven segment display

##### Features of Seven Segment Display

* Available in two modes Common Cathode (CC) and Common Anode (CA)
* Available in many different sizes like 9.14mm,14.20mm,20.40mm,38.10mm,57.0mm and 100mm (Commonly used/available size is 14.20mm)
* Available colours : White, Blue, Red, Yellow and Green (Res is commonly used)
* Low current operation
* Better, brighter and larger display than conventional LCD displays.
* Current consumption : 30mA / segment
* Peak current : 70mA

**Applications**

* Used in applications where font size is required to be bigger
* Microcontroller Independent, hence used in small circuit projects
* Used in combination with four segments to display measurement/sensor value  with four characters
* Has bright illumination, hence used where display are required to work in low light or dark conditions

# CHAPTER-4

### FLOWCHARTDESCRIPTION

**Fig4: FlowChart**

Creating

Patches

Creating Seven

Segment Display

Displaying Number On

Seven segment Display

Creating

Digital Clocks

Extracting

Digits

Updating

Digital CLock

##### Creating Patches

A patch graphics object is composed of one or more polygons that may or may not be connected. Patches are useful for modeling real-world objects such as airplanes or automobiles, and for drawing 2- or 3-D polygons of arbitrary shape.

To create one patch, specify X and Y as vectors. To create multiple polygons, specify X and Y as matrices where each column corresponds to a different polygon. C determines the patch colors. patch( X , Y , Z , C ) creates the polygons in 3-D coordinates using X , Y , and Z .

##### Create Seven Segment Display

A seven-segment LED is a digital display module specialized to display numerical information. Light-emitting diodes (LEDs) arranged in the shape of numbers offer an easily visible display. They are sometimes called "seven-segment displays" or "seven-segment indicators."Working of the system. By using the patches only seven segment Display is created in Matlab.

##### Create Digital Clock

A digital clock is an alternative to a traditional analogue clock. This type of clock shows numbers to display the time in a digital format, such as on a watch, phone or an alarm clock. This can be in both 12 and 24-hour formats. By using seven segment display function mentioned above is used to create the digital clock in matlab.

##### Updating Digital clock

The clock function calculates the current date and time from the system time. [c tf] = clock returns a second output argument that is 1 ( true ) if the current date and time occur during daylight saving time (DST) in your system's time zone, and 0 ( false ) otherwise.

# CHAPTER-5

### SOFTWARE IMPLEMENTATION

##### MATLAB

MATLAB (Matrix Laboratory) is a high-level programming language and numerical computing environment widely used in academia and industry. It offers a wide range of tools for data analysis, visualization, and algorithm development. Some of its key features include: Built-in mathematical functions: MATLAB provides a comprehensive set of mathematical functions, including linear algebra, optimization, and statistics. Interactive environment: The MATLAB environment allows users to interact with their data and algorithms in a intuitive way, making it easy to test and debug code.Visualization tools: MATLAB provides powerful tools for data visualization, including 2D and 3D plotting, and animations.

Toolboxes and add-ons: MATLABoffers avariety of tool boxes and add-ons for specific domains such as signal processing, control systems, and image processing. Integrations: MATLAB can integrate with other programming languages, such as C,C++, and Java, allowing users to combine the best of both worlds.In conclusion, MATLAB is a versatile tool for numerical computing and data analysis that can be applied to a wide range of applications. MATLAB offers a comprehensive and user-friendly environment for developing and testing your algorithms.

##### Uses of Matlab:

* Performing numerical linear algebra
* Numerical computation of Matrices
* Data analysis and visualization
* Plotting graphs for larger datasets
* Developing algorithms
* Creating interfaces for the user that is the GUI- Graphical User Interface and other applications that is the API – Application Programming Interface

##### COMMANDS IN MATLAB:

1. disp–display a message or the value of a variable in the Command Window
2. clear–clear workspace variables and command history
3. clc–clear the Command Window
4. closeall–close all figures
5. plot–plot data in a 2D line plot
6. xlabel and ylabel–add labels to the x-axis and y-axis, respectively
7. title–add a title to the plot
8. grid–display gridlines on the plot
9. legend–add a legend to the plot
10. subplot–divide the figure into multiple subplots
11. mean–compute the mean of a vector or matrix
12. median–compute the median of a vector or matrix
13. std–compute the standard deviation of a vector or matrix
14. var–compute the variance of a vector or matrix
15. sort–sort the elements of a vector or matrix in ascending or descending order
16. size–compute the size of a matrix
17. length–compute the length of a vector
18. sum–compute the sum of the elements of a vector or matrix
19. prod–compute the product of the elements of a vector or matrix
20. find–find the indices of non-zero elements in a vector or matrix

# CHAPTER 6

# CODE IMPLEMENTATION

##### Matlab Code:

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

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

disp(1).bottomcenter=[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).bottomleft=[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).bottomright=[5,5,4,4,5 ;-6.5,-11.5,-10.5,-7.5,-6.5];

dispincrement=[0,6,14,20,28,34,40,46];

%Date

for i=2:8

    disp(i)=disp(1);

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

    disp(i).middlecenter(1,:)=disp(1).middlecenter(1,:)+dispincrement(i);

    disp(i).bottomcenter(1,:)=disp(1).bottomcenter(1,:)+dispincrement(i);

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

    disp(i).bottomleft(1,:)=disp(1).bottomleft(1,:)+dispincrement(i);

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

    disp(i).bottomright(1,:)=disp(1).bottomright(1,:)+dispincrement(i);

end

h=figure;

set(h,'position',[0,0,450,265]);

axes('position',[0.075,0.45,0.75,0.5]);

count=1;

for i=1:8

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

    count=count+1;

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

    count=count+1;

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

    count=count+1;

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

    count=count+1;

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

    count=count+1;

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

    count=count+1;

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

    count=count+1;

end

%Time

for i=2:6

    disp(i)=disp(1);

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

    disp(i).middlecenter(1,:)=disp(1).middlecenter(1,:)+dispincrement(i);

    disp(i).bottomcenter(1,:)=disp(1).bottomcenter(1,:)+dispincrement(i);

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

    disp(i).bottomleft(1,:)=disp(1).bottomleft(1,:)+dispincrement(i);

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

    disp(i).bottomright(1,:)=disp(1).bottomright(1,:)+dispincrement(i);

end

axes('position',[0.025,0.015,0.75,0.5]);

count=1;

for i=1:6

    digit2(count)=patch(disp(i).topcenter(1,:),disp(i).topcenter(2,:),'b','EdgeAlpha',0);

    count=count+1;

    digit2(count)=patch(disp(i).middlecenter(1,:),disp(i).middlecenter(2,:),'b','EdgeAlpha',0);

    count=count+1;

    digit2(count)=patch(disp(i).bottomcenter(1,:),disp(i).bottomcenter(2,:),'b','EdgeAlpha',0);

    count=count+1;

    digit2(count)=patch(disp(i).topleft(1,:),disp(i).topleft(2,:),'b','EdgeAlpha',0);

    count=count+1;

    digit2(count)=patch(disp(i).bottomleft(1,:),disp(i).bottomleft(2,:),'b','EdgeAlpha',0);

    count=count+1;

    digit2(count)=patch(disp(i).topright(1,:),disp(i).topright(2,:),'b','EdgeAlpha',0);

    count=count+1;

    digit2(count)=patch(disp(i).bottomright(1,:),disp(i).bottomright(2,:),'b','EdgeAlpha',0);

    count=count+1;

end

%date

c=clock;

%day

cur\_digit(1)=floor(c(3)/10);

cur\_digit(2)=c(3)-(cur\_digit(1)\*10);

%month

cur\_digit(3)=floor(c(2)/10);

cur\_digit(4)=c(2)-(cur\_digit(3)\*10);

%year

cur\_digit(5)=floor(c(1)/1000);

cur\_digit(6)=floor(c(1)/100)-(cur\_digit(5)\*10);

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

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

%updateclock

for i=1:8

if cur\_digit(i)==0

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

elseif cur\_digit(i)==1

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

elseif cur\_digit(i)==2

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

    set(digit1(i\*7),'FaceAlpha',0);

elseif cur\_digit(i)==3

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

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

elseif cur\_digit(i)==4

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

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

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

elseif cur\_digit(i)==5

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

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

elseif cur\_digit(i)==6

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

elseif cur\_digit(i)==7

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

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

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

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

elseif cur\_digit(i)==9

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

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

end

end

decode=1;

while decode~=0

c=clock;

%hours

cur\_digit2(1)=floor(c(4)/10);

cur\_digit2(2)=c(4)-(cur\_digit2(1)\*10);

%minutes

cur\_digit2(3)=floor(c(5)/10);

cur\_digit2(4)=c(5)-(cur\_digit2(3)\*10);

%seconds

c(6)=round(c(6));

cur\_digit2(5)=floor(c(6)/10);

cur\_digit2(6)=c(6)-(cur\_digit2(5)\*10);

if cur\_digit2(5)==6

    cur\_digit2(5)=0;

    cur\_digit2(6)=1;

end

for i=1:42

    set(digit2(i),'FaceAlpha',1);

end

%updatetime

for i=1:6

if cur\_digit2(i)==0

    set(digit2(i\*7-5),'FaceAlpha',0);

elseif cur\_digit2(i)==1

    set(digit2(i\*7-6:i\*7-2),'FaceAlpha',0);

elseif cur\_digit2(i)==2

    set(digit2(i\*7-3),'FaceAlpha',0);

    set(digit2(i\*7),'FaceAlpha',0);

elseif cur\_digit2(i)==3

    set(digit2(i\*7-3),'FaceAlpha',0);

    set(digit2(i\*7-2),'FaceAlpha',0);

elseif cur\_digit2(i)==4

    set(digit2(i\*7-6),'FaceAlpha',0);

    set(digit2(i\*7-2),'FaceAlpha',0);

    set(digit2(i\*7-4),'FaceAlpha',0);

elseif cur\_digit2(i)==5

    set(digit2(i\*7-2),'FaceAlpha',0);

    set(digit2(i\*7-1),'FaceAlpha',0);

elseif cur\_digit2(i)==6

    set(digit2(i\*7-1),'FaceAlpha',0);

elseif cur\_digit2(i)==7

    set(digit2(i\*7-5),'FaceAlpha',0);

    set(digit2(i\*7-4),'FaceAlpha',0);

    set(digit2(i\*7-3),'FaceAlpha',0);

    set(digit2(i\*7-2),'FaceAlpha',0);

elseif cur\_digit2(i)==9

    set(digit2(i\*7-4),'FaceAlpha',0);

    set(digit2(i\*7-2),'FaceAlpha',0);

end

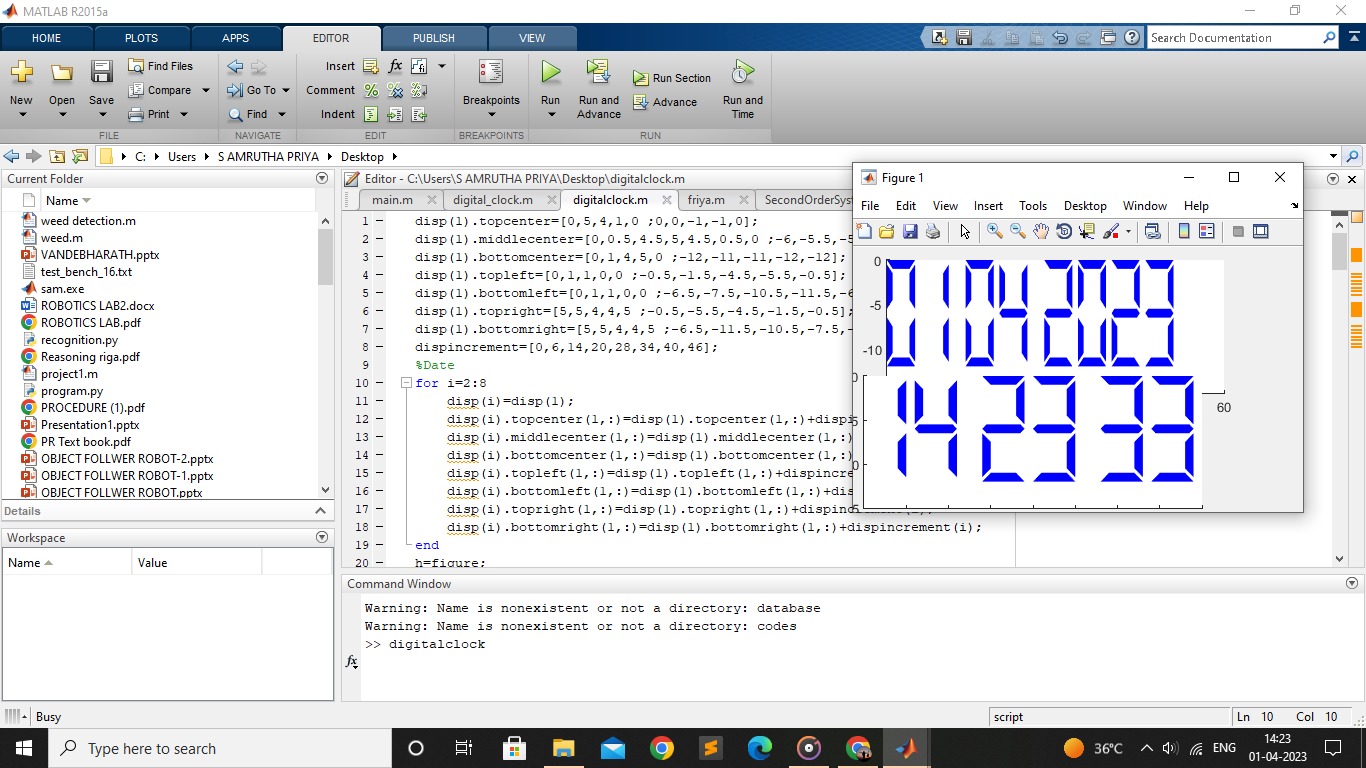
end

drawnow;

end

# CHAPTER-7

**RESULTS**



# CHAPTER-8

#### Advantages of Digital clock

* Digital clocks provide superior readability during tense, time-sensitive scenarios, and some digital models can help people track the time with the help of a countdown timer. They can help to get students to their next classroom on time. Medical staff can rely on the countdown timer during medical procedures.
* It is light and compact.
* The first thing you can expect from a digital clock is a more accurate time-sheet that is extremely hard to forge that gives accurate tracking of employee hour.
* Secure records-most employee attendance software is cloud-based. This means that any information accumulated by a digital clock will be stored in the cloud. In short, employee time-sheets cannot be misplaced or lost, and unauthorized persons cannot access the records.
* Easy tracking-with a digital clock, employee time tracking records will not only be accurate, safe and secure, it will be extremely easy to track the exact number of hours each employee has logged in.
* Exact time resume-if there is any power failure, there will not be any time display on the clocks. But as soon as the electric power resumes, the clock will show the right time automatically.

**CONCLUSION**

Seven Segment Displays are very commonly used in low power electronic devices like remote controls ,watches,clocks,digit measuring instrument etc….. from the above discussion we may conclude that a seven segment display consists of seven LED segments that are illuminated in a pattern to display the numbers from 0 to 9.Seven segment displays are also used to display some basic characters.The clock is expected to operate normally with desired accuracy.

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In all walks of life, digitals system are making sophisticated approach to the mankind. Of course

the machines cannot be replaced by human beings in exact accuracy in some fields. For a long

time humans were using analog devices in our case analog clocks in their daily life.

The first digital pocket watch was the invention of Austrian engineer Josef Pallweber who

created his "jump-hour" mechanism in 1883. Instead of a conventional dial, the jump-hour

featured two windows in an enamel dial, through which the hours and minutes are visible on

rotating discs. The second hand remained conventional. By 1885 Pallweber mechanism was

already on the market in pocket watches by Cortébert and IWC; arguably contributing to the

subsequent rise and commercial success of IWC. The principles of Pallweber jump-hour

movement had appeared in wristwatches by the 1920s (Cortébert) and are still used today

(Chronoswiss Digiteur). While the original inventor didn't have a watch brand at the time, his

name has since been resurrected by a newly established watch manufacturer.

Plato clocks used a similar idea but a different layout. These spring-wound pieces consisted of a

glass cylinder with a column inside, affixed to which were small digital cards with numbers

printed on them, which flipped as time passed. The Plato clocks were introduced at the St. Louis

World Fair in 1904, produced by Ansonia Clock Company. Eugene Fitch of New York patented

the clock design in 1903. 13 years earlier Josef Pallweber had patented the same invention using

digital cards (different from his 1885 patent using moving disks) in Germany (DRP No.

54093).The German factory Aktiengesellschaft für Uhrenfabrikation Lenzkirch made such digital

clocks in 1893 and 1894.

The earliest patent for a digital alarm clock was registered by D.E Protzmann and others on

October 23, 1956, in the United States. Protzmann and his associates also patented another

digital clock in 1970, which was said to use a minimal amount of moving parts. Two side-plates

held digital numerals between them, while an electric motor and cam gear outside controlled

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