**[DIGITAL STOP WATCH]**

Project submitted to the

SRM University – AP, Andhra Pradesh

for the partial fulfillment of the requirements to award the degree of

**Bachelor of Technology/Master of Technology**

In

**Computer Science and Engineering**

**School of Engineering and Sciences**

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**[APR, 2023]**

# Certificate

Date: 26-Apr-23

This is to certify that the work present in this Project entitled “**DIGITAL STOP WATCH**” has been carried out by **[TARUNSAI,CHARANSAI,HEMANTH]** under my/our supervision. The work is genuine, original, and suitable for submission to the SRM University – AP for the award of Bachelor of Technology/Master of Technology in **School of Engineering and Sciences**.

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# Abstract:

We shall be using all these library to make a working model of a stopwatch. The GUI shall have 3 buttons for interaction, namely, start (to start the time), reset (to reset the time to default value) and stop (to stop the timer).

1. When the start button is pressed, we start the timer. While the reset or the stop button isn’t pressed we shall keep the timer running i.e. we shall change the value of the timer (hh:mm:ss:ms) every 1 millisecond and update the screen.
2. When reset button is pressed, we shall stop the timer and set it to is default value (00:00:00:000).
3. When the stop button is pressed, we stop the timer with the value as it is.

INTRODUCTION:

The digital stopwatch we designed is a time-keeping device that is meant to measure the time elapsed from the start to end of any event. The stopwatch has several different functions including pause (which represents both start and stop), reset, write to the LCD, and is able to clear the hundredth of a second output. We used the Nexys4 Artix-7 FPGA Board and HD44780 LCD screen. The board was used to implement our digital stopwatch, and LCD screen was used to display the counter time and the elapsed time. The computing language that we used to write the program is VHDL, which works well to program the FPGA we used. For the functions, we used two switches and two push buttons to allow for user interactions.

METHODOLOGY

In this section, we will provide a background on the operation of our stopwatch. The operating principle of each component will be examined. A. Clock Counter The Nexys4 board has a 100 MHz internal clock. We needed a clock that would tick every 0.01 seconds so we had to slow down the internal clock by using a clock counter that generates a pulse at this interval. Then, the output of this counter will be connected to the enable of every counter in our data path system. The fastest digit of our counter is the hundredths of a second, which will run for 100 Hz. When we compared the internal clock speed to what we need to the clock digits to display we found that the internal clock is 10000000 MHZ faster (1 MHZ= 1000000 HZ).

**FLOWCHART:**

# CODE

import java.applet.\*;

import java.awt.\*;

import java.awt.event.ActionEvent;

import java.awt.event.ActionListener;

public class GeeksforGeeks extends Applet implements Runnable, ActionListener {

// Panel to keep all the buttons and labels

Panel p;

Label display;

// Button

Button start, stop, reset;

// Time

int hour, minute, second, millisecond;

// string to be displayed on the label

String disp;

// State of stopwatch on/off

boolean on;

// initialization

public void init()

{

// initially off

on = false;

p = new Panel();

// Setting layout of the panel

p.setLayout(new GridLayout(4, 1, 6, 10));

// initial time 00 : 00 : 00 : 000

hour = minute = second = millisecond = 0;

// Label

display = new Label();

disp = "00 : 00 : 00 : 000";

display.setText(disp);

p.add(display);

// Start button

start = new Button("Start");

start.addActionListener((ActionListener) this);

p.add(start);

// Reset button

reset = new Button("Reset");

reset.addActionListener((ActionListener) this);

p.add(reset);

// Stop button

stop = new Button("Stop");

stop.addActionListener((ActionListener) this);

p.add(stop);

add(p);

// starting thread

new Thread(this, "StopWatch").start();

}

// Reset Function

// reset to default value

public void reset()

{

try {

Thread.sleep(1);

}

catch (Exception e) {

System.out.println(e);

}

hour = minute = second = millisecond = 0;

}

// update function

// update the timer

public void update()

{

millisecond++;

if (millisecond == 1000) {

millisecond = 0;

second++;

if (second == 60) {

second = 0;

minute++;

if (minute == 60) {

minute = 0;

hour++;

}

}

}

}

// changing label

public void changeLabel()

{

// Properly formatting the display of the timer

if (hour < 10)

disp = "0" + hour + " : ";

else

disp = hour + " : ";

if (minute < 10)

disp += "0" + minute + " : ";

else

disp += minute + " : ";

if (second < 10)

disp += "0" + second + " : ";

else

disp += second + " : ";

if (millisecond < 10)

disp += "00" + millisecond;

else if (millisecond < 100)

disp += "0" + millisecond;

else

disp += millisecond;

display.setText(disp);

}

// thread.run function

public void run()

{

// while the stopwatch is on

while (on) {

try {

// pause 1 millisecond

Thread.sleep(1);

// update the time

update();

// changeLabel

changeLabel();

}

catch (InterruptedException e) {

System.out.println(e);

}

}

}

// actionPerformed

// To listen to the actions on the buttons

public void actionPerformed(ActionEvent e)

{

// start a thread when start button is clicked

if (e.getSource() == start) {

// stopwatch is on

on = true;

new Thread(this, "StopWatch").start();

}

// reset

if (e.getSource() == reset) {

// stopwatch off

on = false;

reset();

changeLabel();

}

if (e.getSource() == stop) {

// stopwatch off

on = false;

}

}

}

OUTPUT

