VIETNAM NATIONAL UNIVERSITY HO CHI MINH CITY

HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY

FALCUTY OF ELECTRICAL AND ELECTRONICS ENGINEERING

EMBEDDED SYSTEM

PROJECT: TWO-LED DICE GAME

Instructor: Bùi Quốc Bảo Group: 05 Class: TT01

Sinh viên thực hiện	**Mã số sinh viên**
Nguyễn Thái Bình Dương	2051103
Nguyễn Quốc Lợi	2151225
Bùi Đức Tiến	2151263
Trần Đỉnh Hoàng Kỳ Anh	2151173

Ho Chi Minh City, February, 27th, 2024

CONTENT

CHAPTER 2: INTRODUCTION TO COMPONENTS, HARDWARE AND SOFTWARE

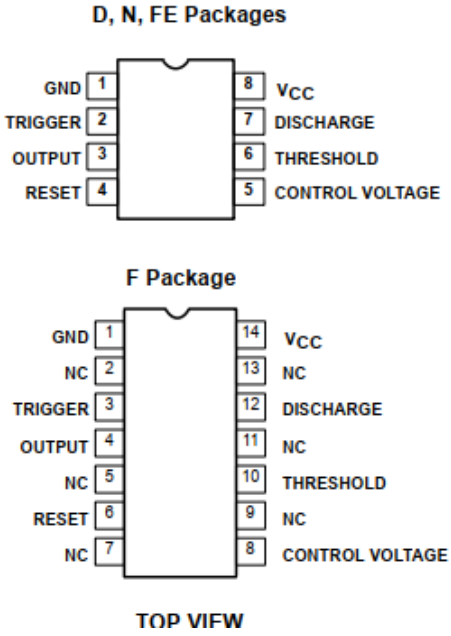
2.1 HARDWARE

2.1.1 Timer NE555

- Description:

The 555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays, or oscillation. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor. For a stable operation as an oscillator, the free running frequency and the duty cycle are both accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output structure can source or sink up to 200mA.

- Pin Configurations:



- Application:

- Precision timer circuit
- Square wave generator
- Inverter circuit

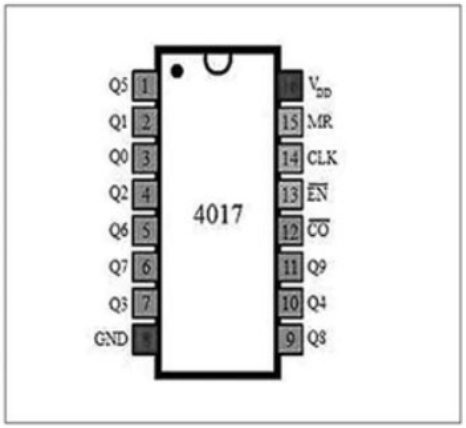
- PWM generators and motor control
- PPM (Pulse Position Modulation)
- Linear Ramp Generator

2.1.2 IC CD4017

➢ Description:

The CD4017 IC is a 5-stage CMOS Decade counter that counts to 10. It has 10 decoded outputs and a carry out pin that represents numbers 1 to 10. It also has a single clock pin, so for every clock pulse ,the counting increases with one. The IC can be powered from a 3V to 5V supply voltage with a clock speed of 5MHz.

➢ Configuration:

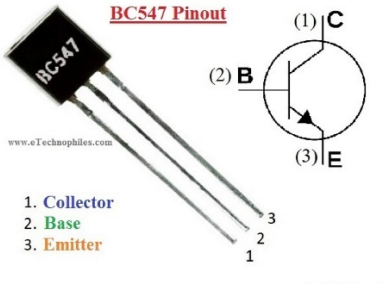


Pin Name	Pin Number	Description
VDD	16	Supply Voltage (+3 to +15V)
GND	8	Ground (0V)
Q0-Q9	1-7 and 9-11	Qx is high when the counter is x
CO	12	Carry Out. Goes high after ten clock pulses
CI	13	Clock Inhibit. Ignores clock inputs
CLK	14	Clock Input. Increases the counter with one
MR	15	Resets the counter to 0

- Application:
- Binary counter
- Decoder
- Frequency divider
- LED chaser
- LED matrix

2.1.3 Other Electronic Components

Capacitor

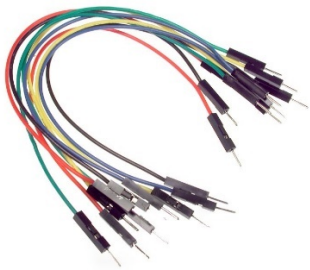


BC547 Transistor

Resistors

Diode 1N4148

Female to Female wire testboard



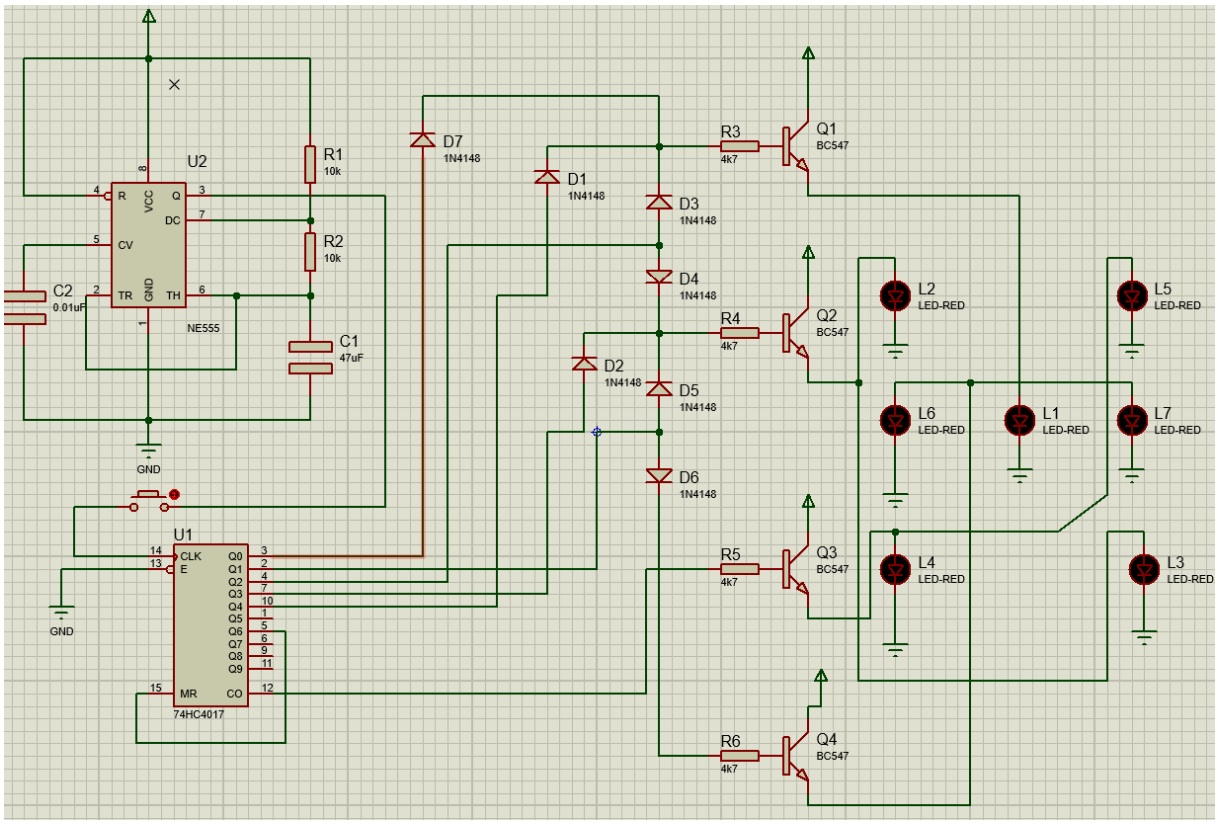
Male to Male wire testboard

Button

Battery 9V

2.2 SOFTWARE

2.2.1 Circuit Simulation Software



Proteus is a printed circuit design and simulation software. Cover software consists of two components: ISIS and AREA.

ISIS is a circuit simulator, it can simulate both digital and analog circuits.

However, its strongest point is that it integrates many digital and special component libraries. Especially microcontrollers. In the process of designing digital circuits, software simulation is needed of microcontrollers like PIC, AVR, 8051... then this is the most ideal software.

Besides, it also integrates analog circuit simulation and language simulation

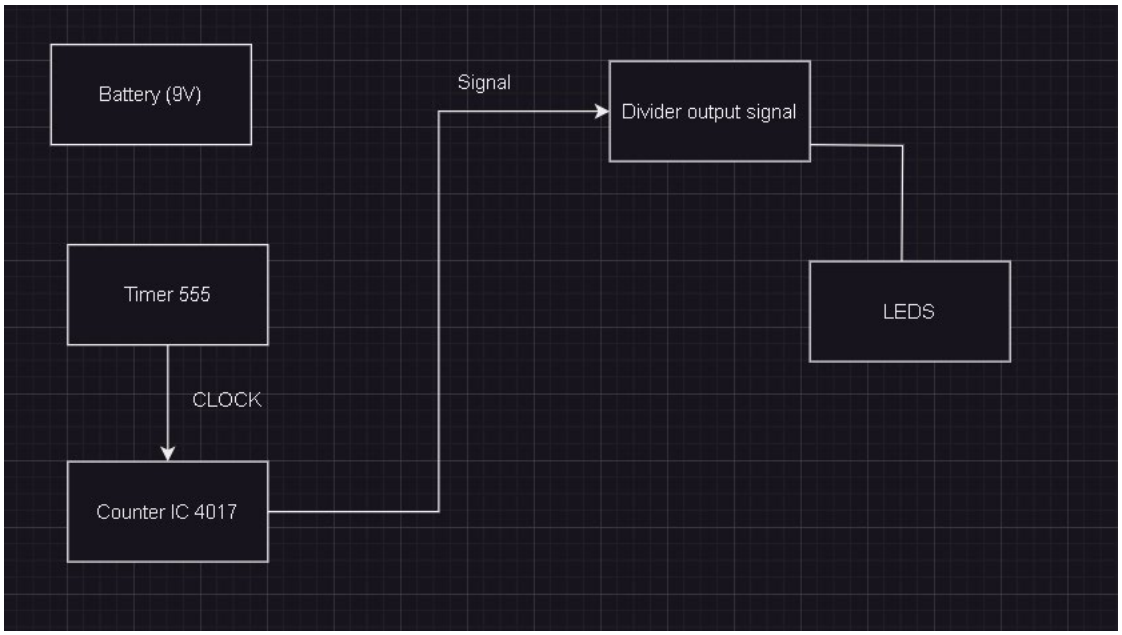
Verilog hardware description, ...

AREA is the printed circuit design part, quite light, quite smart wiring,

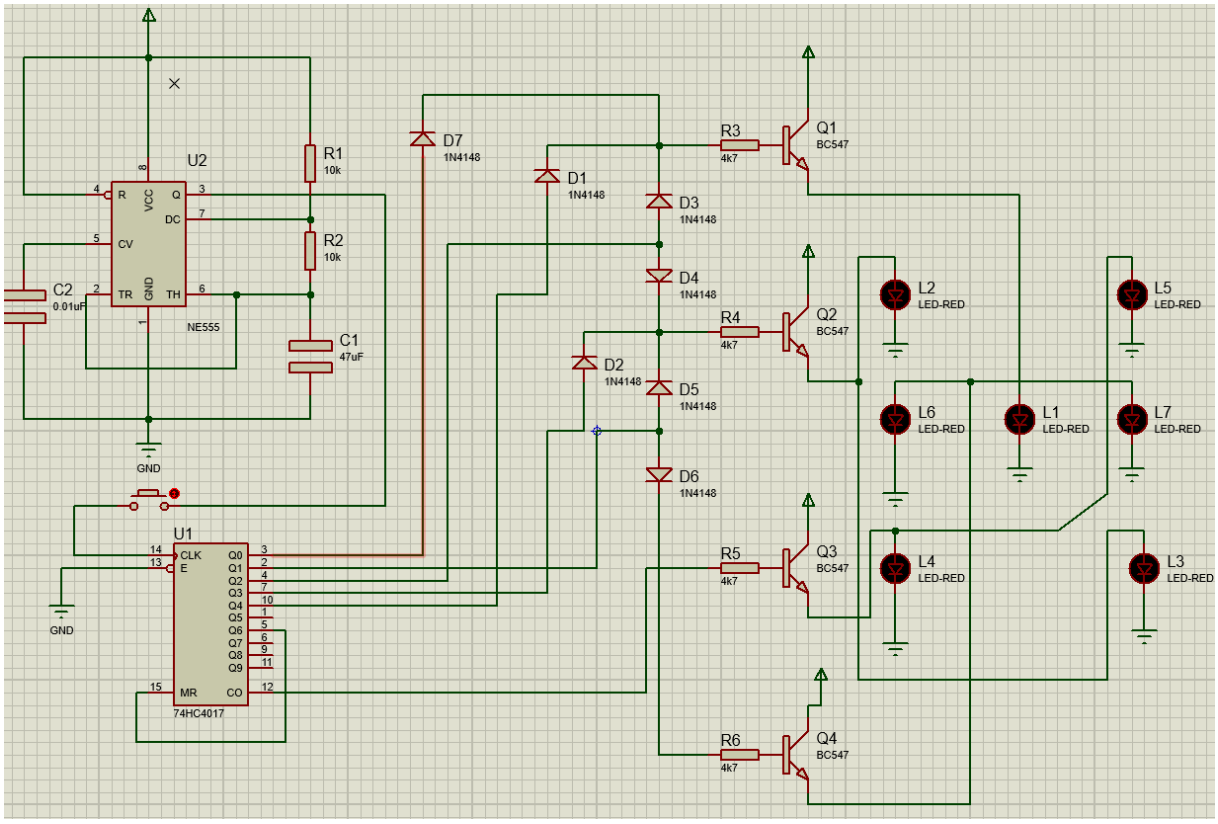
However, the management and arrangement of locations when there are many components is not very effective.

CHAPTER 3: HARDWARE OVERVIEW DESIGN

3.1 Block Diagram



3.2 Schematic



We have used 555 timer IC in Astable mode. The oscillated output generated at PIN 3 of 555 has been applied to the PIN 14, so that the output can be advanced

with each clock pulse. We can control the speed of flashing LEDs by using the potienmeter (RV1), rotating the potentonmeter knob will change oscillator frequency of 555 timer, hence the rate of the clock pulse. The frequency of the 555 can be calculated using this formula:

$$F = \frac{1.44}{((R1 + 2 \times RV1) * C1)}$$

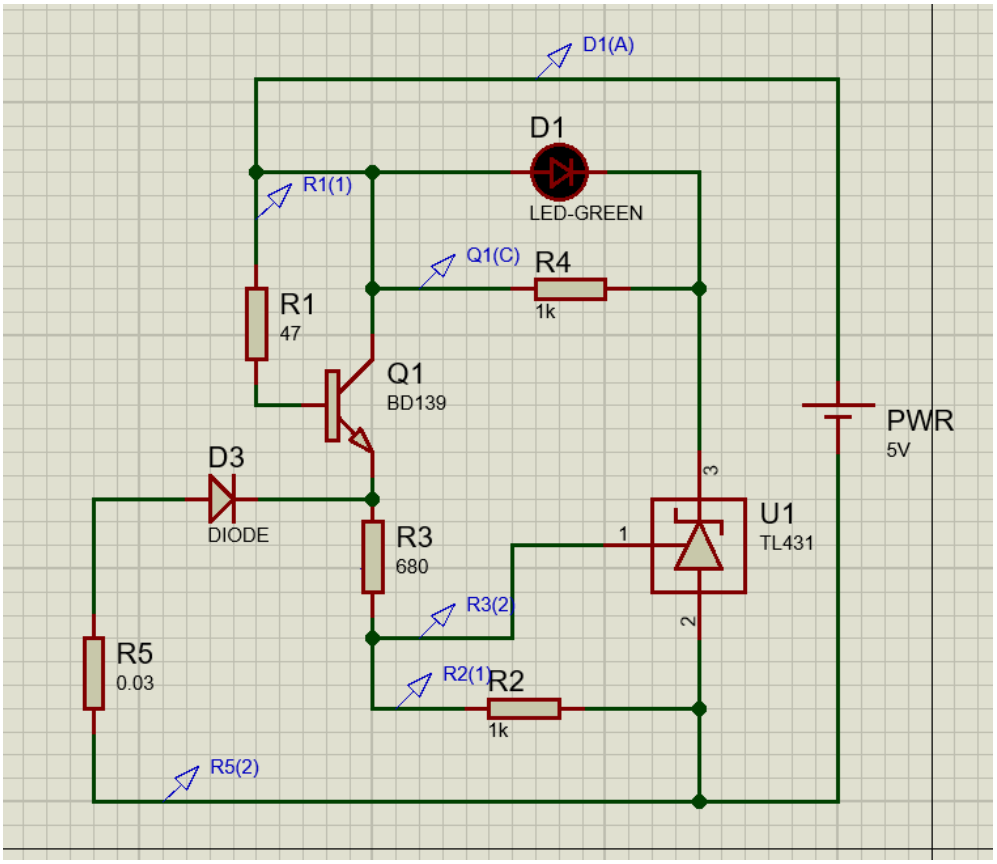
Normally this IC number will be Decade counter with 10 decoded outputs IC.

But in at this, we joint pin 5 and 15 together.

Then, taking output at pin 7 to reset pin 15 as soon as pin 7 has an output in a fraction of a second. It will reset the IC, to move the output to pin 3 that is the first position.

Therefore, the output that we have really just 6 volts only. And every time that we press button. Next, IC1 will change the output position to emit.

For in the third sector is a display of this circuit is set as the matrix diode. The matrix diode act as a divider output signal of IC to each place of LEDs from 1 to 6 LEDs. We use 7 LEDs, because of the position of the LED dice like that. Especially at 1, 3, 5 pts. If using LED just 6 LEDs only will cause LED is not the center does not look reasonable, so, so I added another one.



This circuit is a charging circuit with auto-cutoff as a safety feature for a 3.7V Li-Po battery. The circuit combines two main components: a charging stage and a cutoff stage. The first stage involves input voltage entering the base of the NPN transistor. This voltage also feeds into a Zener diode. The transistor uses negative feedback from R1 to control the current flowing to the battery. If the current feedback from the battery exceeds a certain point (in this case, 4V), it biases the Zener diode and allows more current into the negative feedback loop from the transistor. This action causes the NPN transistor to slowly decrease current and voltage, simultaneously triggering the LED to light up.