## EE112 Project

## Grab Circuit

Group No. 3

## Team

| 170070010 | Soumya Chatterjee |
| :--- | :--- |
| 170070014 | Shriram Girish Lokhande |
| 170070035 | Farhan Ali |
| 170070053 | Ponnada Prem Sekhar |

## Project Description

There are four players, each is given a push button to indicate when he/she is ready with the answer. The aim of the project is to detect who is the first to press the button and also display how much time he/she took to press the button. The operator has two buttons to reset and start the circuit.

## Block Diagram



## Schematic and Description of Blocks

1. Clock From IC 555

The clock signal is generated by an IC 555 operating as an astable multivibrator. It produces a clock signal of frequency 10 Hz giving the circuit a resolution of 0.1 s .

Time constant $\tau=\left(R_{a}+2 R_{b}\right) C \ln 2$

$$
=(33 k+2 \times 56 k) \times(1 \mu) \times 0.693
$$

$$
=0.100 \mathrm{~s}
$$


2. Decade Counters and 7 Segment Displays


The clock generated by IC 555 drives a pair of 4033 ICs (decade counters with 7 segment outputs) displaying time from 0.0 s to 9.9 s . The counters can be stopped by the Clock Inhibit pin which becomes active when any of the players presses his/her button.
3. Start and Reset Buttons

The Start and Reset functions are implemented by using a RS NOR latch with the Start as R and Reset as S. On pressing Reset, Q becomes high resetting the 4033s and $\overline{\mathrm{Q}}$ becomes low resetting the player IC 555 s.
4. Player Pushbuttons (Quiz Buzzer)


The part of the circuit detecting which player has pressed the button first is implemented by using IC 555 in bistable mode. In this threshold is grounded which keeps R of the RS latch always low. Initially $Q$ (output) is low. Once $S$ becomes high (button is pressed), $Q$ becomes high and remains so till the IC is reset.
5. Mechanism to disable all other buttons after one is pressed

Once any one player has pressed his/her button, no other player should be able to do so. To achieve this, we have take OR of the four outputs from the IC 555s and connect it to one terminal of all the push buttons (the other terminal is pulled up through a resistor). When any button is pressed, both the treminals of the push buttons become high and 555s cannot be triggered. The OR of the outputs is also connected to the clock inhibit of the first 4033 to stop the timer.

## Component List



IC $4033 \times 2$
IC $555 \times 5$
IC $7402 \times 1$
IC $7432 \times 1$
7 Segment Display Common Cathode $\times 2$
Buzzer

