



## ***Electronic Systems***

### ***Fastest Finger First Experiment***

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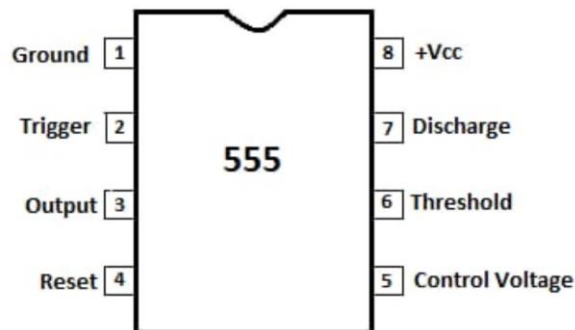
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- **Introduction**

- **Fastest Finger First** circuit is a competitive and interactive electronic setup designed for **quiz events**.
- It accurately identifies the **first participant** to press their buzzer, ensuring a fair and swift determination of who answered first.
- This circuit is built around the **555 Timer IC**, a versatile component used in various timing and oscillation applications.
- Each contestant or team is assigned a module consisting of a momentary push button and an LED indicator.
- The circuit also includes a monostable arrangement that can activate a light or buzzer for a brief moment, signaling the first action.
- Essential for any quiz master, this circuit adds excitement and precision to the game.

- **Circuit Components**

- **555 Timer IC**: A versatile integrated circuit used for timing and pulse generation.



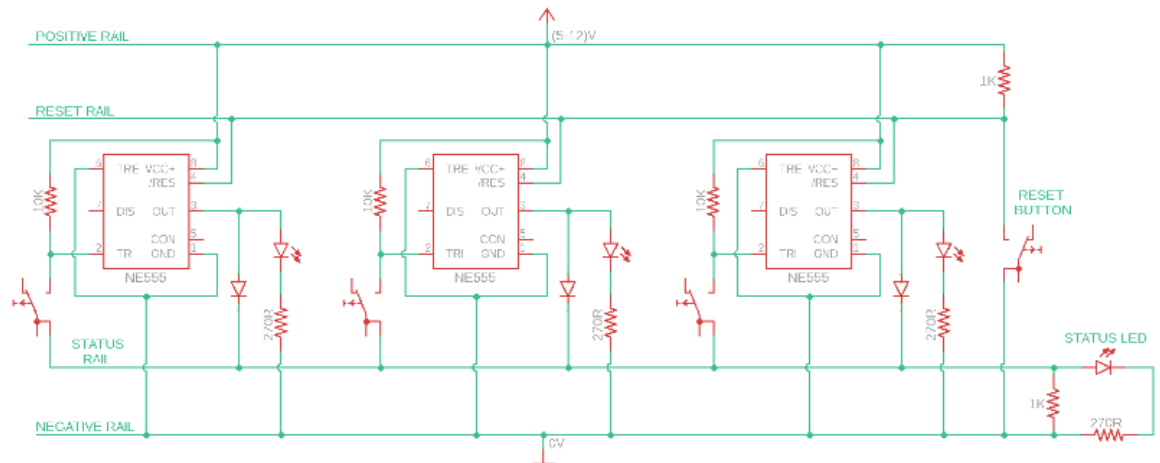
- **Momentary Push Button**: A type of switch that is only active when pressed.
- **PN Diode (1N4148)**: A diode used for directing current flow and protecting the circuit from voltage spikes.
- **LED + Series Resistor (270R)**: An LED with a resistor to limit current and prevent damage.
- **Resistors**: Specifically, a **10K** Resistor for each module and **2 x 1K** Resistors common for all modules.
  - These components are used to build a **Fastest Finger First Circuit**, which identifies the **first quiz taker** to press their button. The circuit uses a **monostable** arrangement to trigger a light or buzzer. For **resetting**, a dedicated push button applies **0V to the reset pin of all the 555 ICs**.

## • Circuit Operation

### ❖ Monostable mode in the 555 timer IC

- **Triggering Mechanism:** In **monostable** mode, the **555 timer** acts as a one-shot pulse generator. The output remains low until an external trigger is applied to pin 2, which must drop below  $1/3$  of the supply voltage, so when a quiz taker presses their button, if the status rail is at 0V, the corresponding **555 IC's** output turns ON, indicating they were the fastest.
- **Output Activation:** Upon triggering, the output at pin 3 goes high and stays high for a duration determined by an external resistor and capacitor connected to pin 6 (threshold) and pin 7 (discharge).
- **Timing Control:** The time period for which the output remains high is given by the formula  $T=1.1 \times R \times C$ , where (T) is the time period, (R) is the resistance in ohms, and (C) is the capacitance in farads.

### ❖ Circuit Diagram and Wiring Details



- **Power Supply:** Connect the positive rail to pin 8 (**Vcc**) and the negative rail to pin 1 (**GND**) of the **555 IC**.
- **Trigger and Reset:** Connect a momentary push button switch to pin 2 for triggering. For resetting, connect another push button to the reset rail, which is tied to pin 4 (**reset**) of all modules.
- **Reset Function:** A separate reset button applies 0V to the reset pin of all **555 ICs**, turning off all outputs and preparing the system for the next round.
- **Status Feedback:** Use diodes to connect the output of each module to the status/feedback rail. This ensures that once a module is triggered, it prevents others from being triggered.

- **LED Indication:** Attach an LED with a series resistor to the output to indicate the active state of the module.
- **The 1k ohm resistor between the positive rail and reset rail:** is used to pull up the reset line to the positive voltage by default. This ensures that the **555** timer's reset pin (pin 4) is held high under normal conditions, preventing any unwanted resets. When the reset button is pressed, it momentarily connects the reset pin to ground, triggering a reset.
- **The 1k ohm resistor between the negative rail and status rail:** is likely used to pull down the status rail to 0V by default. This configuration ensures that the status LED is off by default. When a button is pressed and the corresponding 555 timer's output goes high, the status LED will light up, indicating that a button has been pressed.

## ● Conclusion

- **The Fastest Finger First Circuit using the 555 IC** is a brilliant solution for organizing quizzes. It ensures fairness by accurately identifying the first respondent through a clever use of electronics.
- **The circuit's design** is modular, allowing for easy scalability to accommodate multiple participants.
- By utilizing components like the **555 Timer IC**, **momentary push buttons**, **PN diodes**, and **LEDs**, the circuit provides a reliable and visual indication of the fastest responder.
- The inclusion of a **monostable** arrangement adds functionality, enabling a light or buzzer to signal the first action.
- This **project** not only demonstrates practical applications of electronic principles but also enhances the interactive experience of quiz competitions.