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10 Circuit design tips and tricks:

1. Coupling and De-Coupling Capacitors:

When we place the capacitor in parallel to the power supply, then this arrangement is called De-Coupling of capacitor. De-Coupling capacitor is very useful in provision of very smooth DC supply, because in every DC source there will be a presence of some minor fluctuations in its output and De-coupling capacitor remedies it.

It is generally said to use big Electrolytic Capacitor near the power source and to use Ceramic Capacitor near the Chips.

When we place the capacitor in series to the power supply, then this arrangement is called Coupling of Capacitor. Coupling Capacitor helps in eliminating the low frequency or DC noise from the signal. This is widely used in Amplifiers and High-Speed Circuits. Value of capacitor depends on the frequency we need to allow. Capacitance value decreases when allowed frequency goes up.

1. Using Pull-Up and Pull-Down Resistors:

In digital circuits we often want to use switches or push-button to control our circuits. But in doing so, we run into the risk of leaving the input pins in a floating state. Floating state is where the input pins of a chip cannot detect input logic, and this leads to unexpected output. In order to avoid this, we use resistors of a specific values are used. These are called Pull-Up or Pull-Down Resistors.

Pull-Up resistor connects the input pin to the making the chip read the logic “1”.

Pull-Down resistor connects the input pin to the GND making the chip read the logic “0”.

1. Discharge Time of Batteries:

In making of a portable electronic project, we need to use the battery and we must also know the discharge rate of that battery. If a battery is used in a project discharge much quicker than it’s specified discharge rate then that might cause battery damage. It’s a rule of thumb that we should always choose a battery which has 1.5 times more capacity than the circuit’s total consumption in order to have long lasting battery life and optimum performance, but it also depends on the battery’s chemistry. Therefore, it is advised that we should check the datasheet of that battery.

For example, if a circuit consumes 1 Amps in 1 Hour or say the circuit consumption rate is 1 Ah then we will be better off with choosing a battery whose capacity is 1.5 Ah or say a battery which can supply 1.5 Amps for 1 Hour.

1. Watch out for Resistive Wattage:

While designing a circuit we should use resistor of a proper wattage rating. If one uses a resistor of improper wattage rating and the circuit consumption draws more ampere than resistor’s rating then that resistor will fail and may cause smokes and fire.

Wattage rating in here means . This is also meaning power dissipation through heat. Higher the wattage rating, higher will be the capacity to dissipate power through heat.

The resistor’s wattage rating must be greater than the maximum power drawn by the circuit. First calculate the maximum power consumed by the circuit using formula, then find the loss this will finally give a better outlook on what must be the calibre of resistor.

1. Usage of Micro-Controller:

Don’t spend too much time creating an all-Analog circuit. Micro-Controllers in now days provides many features that will save a lot of time & money and will make project completion far easier.

1. Using Transistor pairs or arrays:

Transistors are used as switch or amplifiers.

While using it as a switch, we might see some transistor may not be able to provide enough current to switch ON the load. So, in order to overcome this problem we use Darlington pair or Transistors in pair. The gain in normal transistor may range between 100 to 200. But in Darlington transistor the gain is 1000. /\*Stopping at 5:38\*/.