

**Do-it-yourself
projects**

21 *Electronics* Projects



Alarms, touch sensors, and many more circuits

Projects

- 1) How to Build a Touch Sensor Circuit 
- 2) How to Build a Sample-and-Hold Circuit 
- 3) How to Build a Flashing LED Circuit 
- 4) How to Build a Light-sensitive Alarm Circuit 
- 5) How to Build a DC Motor Speed Controller 
- 6) How to Build a Voltage Polarity Indicator 
- 7) How to Build an Audio Mixer 
- 8) How to Build a Moisture Meter 
- 9) How to Build a Light Meter 
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21) How to Build an Automatic Night Light



Summary of each project

Project – Touch Sensor Circuit



In this project, we will build a touch sensor circuit, which is a circuit that activates when a user touches the necessary part of it. Touch sensors have a wide variety of uses and applications. You've probably used or seen a lamp that when you touch the base of it, it turns on. We will be building a similar device in which when we touch wires, the LED in the circuit lights up. This project will teach you a lot about how touch sensor circuits work and how touching the circuit allows for activation.

Project – Sample-and-Hold Circuit



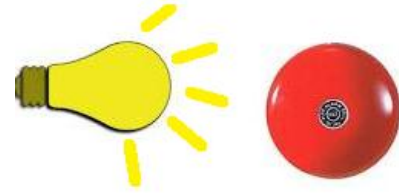
A Sample-and-hold circuit is a very important type of circuit. It is a circuit which takes a 'sample' of an analog signal and holds the signal, for any useful purpose, most of the time to be converted into a digital signal. In essence, a sample-and-hold circuit takes a snapshot of a signal and holds it, so that the signal can be used elsewhere. Think of the vast applications, such as for cameras, which take analog snapshots, which then need to be converted into digital signals. We will build such a circuit in this project.

Project – Flashing LED Circuit



In this project, we build a circuit with an LED that flashes at a rate which we set. We use an RC timing network to set the amount of flashes that occur in a certain time period. You will see how during this circuit setup, the LED can be made to flash any amount of times which we want it to. This circuit serves to teach you about RC networks and how an LED can be flashed in hardware. This is a very useful circuit as LED flashing is used in all types of devices, ranging from police sirens to fire alarms. You will see how this flashing can be achieved.

Project – Light-sensitive Alarm Circuit



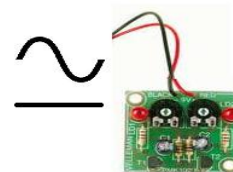
In this project, we build an alarm circuit which triggers when exposed to bright light and remains off when in darkness. This circuit has tremendous application to safeguard against items such as jewelry kept in a Chester drawer. If a burglar comes in at night and flashes the inside of the drawer with a flashlight or breaks in during the day exposing the circuit to light, the alarm goes off and the home keeper will hear its loud buzzing. This is a very practical circuit which you could even use in your very own home to safeguard your things.

Project - DC Motor Speed Controller



In this circuit, we build a device that efficiently sends out pulses of current, so that the speed of the DC motor which it powers can be adjusted. To increase motor speed, we send out higher-frequency pulses. To decrease motor speed, we send out lower-frequency pulses. In this project, we teach you how to build a device that can vary the pulse output to control the speed of a DC motor.

Project- Voltage Polarity Indicator



Using this device, a voltage polarity indicator, we can tell whether the signal input into the circuit is an AC signal or a DC signal. If it is DC, this circuit can tell whether it is DC in the forward direction or DC in the reverse direction. This circuit serves to teach about the properties of DC and AC current and how a device can be built to detect and indicate which type of signal is passing through. This is a very useful circuit if voltage type and polarity need to be known.

Project- Audio Mixer



In this project, we teach how to build an audio mixer, which is a device that can combine sounds together from multiple channels into one channel. So, for example, we can add together one sound input of a person singing a capella with another sound file of background music, and have both audio sounds on one channel. We teach how in this project, we can put together an audio mixer and how we can adjust the volume of each input entering the audio mixer to have desired output sound. This is a great project for learning about audio mixers and audio in general.

Project – Moisture Meter



In this project, we construct a meter which will indicate to us the amount of moisture which is in a medium, such as soil. In this project, you will learn how to build a moisture meter, how moisture meters work, and the properties that water exhibits that allow moisture meters to function as they do.

Project – Light Meter



In this project, we build a device that measures the intensity of light. This device serves to teach you specifically about a light-sensitive device, a LDR (or photoresistor), whose resistance changes dependent on the light striking it. You will learn about LDRs and how the complete circuit is constructed.

Project – Amplifier



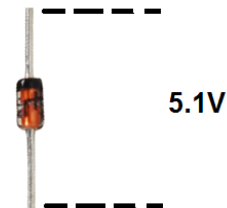
In this project, we build an amplifier, which increases the input signal as many times as we design it to. An amplifier can be made from a transistor or an op amp. In this project, we show how to build an amplifier from an op amp chip, to create the gain that we want. This will teach you about op amp connections for amplification.

Project – Light-dependent Amplifier



Continuing with the last project, in this one, we now add to the previous amplifier. We now construct an amplifier that amplifies a signal based on the intensity of light that strikes the circuit. If the light intensity is strong, the amplifier amplifies the input signal to up to 25 times. If the light is low, the amplifier attenuates the signal and there is barely any output. In this circuit, you try this out.

Project – Zener Diode Voltage Regulator



In this project, we will show how to connect a zener diode in a circuit to act as a voltage-regulating device, which is a device that outputs a constant DC voltage across its terminals. You will learn what zener diodes are, their characteristics, and how they can be connected in a circuit to provide a constant, stable voltage to any device we want to feed.

Project – Simple Voltmeter



In this project, you will learn how to build a simple voltmeter, which is a device that detects and measures the level of voltage in a circuit. Voltmeters are very useful and are present in all multimeters, an essential tool for any engineer or technician. In this project, we'll exploit the properties, specifically, of zener diodes to build a device that can measure the voltage entering a circuit.

Project – AC-DC Voltage Converter



In this project, we will build a device that takes an input AC signal and converts it into DC to power an electrical device. This is very common in practically all electrical devices which are plugged into AC outlets. The device takes the AC current from the wall outlet and converts it into DC, and then is powered by the DC current. You will learn in this project how to build your own AC-DC converter, so that if you want to design your own plug-in product one day, you'll know how the circuit construction is.

Project – Speaker Crossover Network



In this project, we build a speaker crossover network, which is a network of speakers. Woofers are speakers which are designed to play out low-frequency (bass) sounds well. Tweeters are speakers which are designed to play high-frequency (treble) sounds well. By building a filter to send bass to the woofer and treble to the tweeter, we can build a speaker system with the best possible sound, which is how the best speaker systems are built.

Project – Mode Light Status Indicator



We've all seen electronic devices that have LEDs which represent what mode or status they are in. For example, printers are devices that have these LEDs often on them. When the green LED is lit, that most likely means it's ready to print. When the red LED is lit, it means it is in a paused status, either waiting on a queue or there is a jam or some error. Cameras are the same, where a green LED means it is ready to take a picture, while a red LED means there is some pause. In this project, we will use a SPDT throw to enact a similar system to show how these mode light status indicators operate. Doing so, you can build a device that enacts the same type of operation.

Project – Latching Switch



Latching switches have widespread use in electrical circuits. A latching switch is a switch that once activated, remains on, until the whole system is disabled. Think of alarm circuits and how once they are triggered, remain on, until a special code has to disable it. In this project, we will build a latching switch that turns on an LED and only turns it off when the main power going to the LED is shut off. This project serves to teach how latching switches operate and how they are connected in a circuit to provide such operation.

Project - MOSFET Light Dimmer



Using a MOSFET circuit connected to a lamp, we will build a circuit in which the MOSFET allows for the changing of the intensity of the light by controlling the current output. In this project, you will learn how to connect MOSFETs for adjustable current output.

Project – Solar Cell Battery Recharger



In this project, we will build a battery recharger from solar cells. Solar cells, which harvest energy from light, convert the light energy into electrical current, which then charges a battery or batteries. In this project, you'll learn how solar cells can be connected to give enough power output to recharge a rechargeable battery.

Project – Tone Generator



In this project we will build a device that can play out varying tones, which we can change by varying the potentiometer of the RC module in the circuit. Thus, the speaker that is connected to our circuit will output different frequency tones according to the value we adjust the potentiometer to. This serves to teach you about RC circuits and how frequencies can be changed by changing either resistor or capacitor values in an RC circuit.

Project – Automatic Night Light



This is a circuit that turns on automatically when night time approaches. Say if you're a late night person and you love to stay up to watch TV or read during the night. This circuit can automatically turn on when it becomes dark, so you won't even have to move to turn on your lamp. This circuit will serve to teach you how photoresistors can be hooked up in a circuit to allow for such output.