Capacitors can be connected in series or parallel, depending on the desired behavior of the circuit. In some cases, capacitors are present in most electronic devices to filter out unwanted frequencies and smooth out voltage transients.

By measuring the current-voltage characteristics of a capacitor, you can determine its capacitance, which is a key parameter in many electronic circuits. Capacitors are used in a variety of applications, from filtering to energy storage and in the construction of filters and oscillators.

Did you know that a capacitor's capacitance is directly proportional to the area of its plates and inversely proportional to the distance between them? This relationship is expressed in the formula $C = \frac{Q}{V}$, where $C$ is capacitance, $Q$ is electric charge, and $V$ is voltage.

The Music Mixer uses a summing op-amp to add the two input audio signals. The potentiometer provides control over the balance, allowing you to mix the signals to your liking. By measuring the current-voltage characteristics of the components in the circuit, you can understand how the circuit responds to different input signals.

Monitor their discharge rate through diodes and resistors, and enable applications using different LEDs you can design your own circuit. The power supply voltage $V_{cc}$ is typically 5V, ensuring a stable operating environment for the electronic components.
• The Music Mixer uses a summing op-amp to add the two input audio signals. The potential dividers change the voltage, and hence volume, of each.

• The op-amp can also be used to amplify and measure the human heartbeat. Did you know that they can also be configured to subtract signals, or even perform numerical integration and differentiation?

Capacitor Discharge

• Capacitors can be connected in serial and parallel. Monitor their discharge rate through different resistors.

• Capacitors are present in most electronic devices, and enable applications including cardiac pacemakers and camera flashes.

Planck’s Constant

• By measuring the current-voltage characteristics of different LEDs you can estimate Planck’s constant.

• This section of the board contains four LEDs. Did you know that a 4K OLED TV contains as many as 33 Million LEDs?!
Electronic Engineers apply Maths and Science to use components like these to design and build complex systems such as smart phones. Exciting developments in Electronics mean we can develop innovative products and help transform the way we live; from healthcare and energy to entertainment.

**UKESF**

In the UK, the Electronics sector is big, valuable and growing; however, the demand for capable, employable graduates is currently outstripping supply. The UKESF is an educational charity that operates collaboratively with major companies, leading universities and other organisations to tackle the skills shortage.

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**Find out more**

For more resources, including tutorials on how to use the board, videos related to the concepts and technologies used, visit: www.ecs.soton.ac.uk/kits