Dirty finger switch

There have been numerous circuits published for finger-tip control of devices like lights or radios. Most of these rely on conductivity, which can be poor if the finger is dry (old?), oily or dirty. Because this circuit works from finger capacitance as well as conductivity, it is more reliable.

Feedback around IC1a via R1 and C1 causes it to oscillate at about 2MHz. This signal is fed to IC1b via R2, so that under normal operation IC1b inverts and buffers the output of IC1a.

However, the input to IC1b can be attenuated or biased off by applying a finger across the sensing electrodes. A clean finger is usually conductive and biases the input of IC1b to cutoff. Otherwise, any finger is conductive internally and so will increase the capacitance presented by the electrodes and thus shunt the signal to the point where it is below the hysteresis voltages of the input. In either event, IC1b output becomes 'stuck' instead of switching at 2MHz. The change is detected at the input of buffer IC1c as a drop in the DC output of the voltage doubler formed by C2, D1, D2 and C3. From there, network R4, D3 and C4 respond quickly to a finger signal, by taking the input of IC1d high, but holding over for any small break due to hesitant movement. IC1d gives further buffering and IC1e gives inversion of the logic level.

Otherwise, the action depends on the setting of SW1. As drawn, IC2a will toggle (alternatively high and low) each time the output of IC1e goes high due to finger application. If SW1 is moved to its other position, then each finger-on pulse from IC1e clocks IC2a to a high, after a small delay caused by C5 and R5 to ensure reset has ended. Finger-off allows IC1d to reset IC2a. Consequently, SW1 allows the unit to act in either bistable (toggle) or monostable (pushbutton) mode. The output of IC2a is connected to an emitter follower (Q1) which in turn drives a suitable relay. Note that a quenching diode is not needed. If toggle mode is not needed, IC2 can be dispensed with by wiring the base of Q1 to the output of IC1e.

The circuit can be powered from a 9V or a 12V battery. If used in 'button' mode, battery drain is not a problem. For toggle mode, a plug-pack or rechargeable batteries might be needed.

The sensing electronics can be a pair of pads (say 20 x 20mm) etched on a PCB, perhaps at one end of the board containing the circuit. I found it better to mount a small pair of stainless steel handles, like parallel bars, on the face of a plastic box containing the electronics. Just be sure to keep their capacitance down — separate their wires rather than twist them together.

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