

Title: Mobile Phone Detector

I. Summary

A mobile phone detector can detect the activation of a mobile phone such as; incoming and ongoing phone calls, messages, and things in that nature. Mobile phone detectors can be used for spying on someone and for unauthorized video transmission. Whenever when the phone is on silent mode, a mobile phone detector can detect various things from a mobile device. Overall, mobile phone detectors can prevent the use of mobile phones in prisons, movie theaters, classrooms, and in any facility that individuals do not allow cellphone usage.

II. Objective

Individuals will create a mobile phone detector to see exactly how mobile phone detectors operate. During this project, individuals will be introduced to a circuit that contains transistors, capacitors, resistors, light-emitting diodes, as well as, a CA3130 IC.

Individuals will receive hands-on experiences of creating a mobile phone detector. Also, individuals will gain knowledge on various equipment and how each component operates.

III. Industry

Mobile phone detector is important to industry due to its ability to add safety to many businesses, offices, classrooms, etc. For prison for example, individuals smuggle phones into prisons on a day-to-day basis, due to inmates using the mobile device to orchestrate an escape plan, orchestrating ways to smuggle more

contraband into the prison, and much more that is not good for the prison system. On top of that, individuals use mobile devices in classrooms to cheat on example and to send the answer around, so many schools implemented mobile devices to restrict cheating from occurring. Also, within classrooms mobile devices can be a huge distraction from a student receiving his or her education. Lastly, for offices it can restrict distraction so that employees can focus the importance of each meeting he/she attends.

There are various places on Earth where mobile devices are restricted. A company's like Bastille created mobile phone detectors because even though they believe that "cellphones are a great business productivity tool," they also believe that "they are also the most ubiquitous security and compliance threat faced by financial services organizations." (1) On top of that, "Financial services firms want to track both the authorized and unauthorized phones that enter and move around their environments to alert on potential security threats and compliance issues in real time." (1) Also, a company named "CellBusters" has a device name "Zone Protector™" which detects cellular activity such as short text messages and phone registrations pulses which are common for correctional facilities. (2) CellBusters also created Zone Manager™ which keeps logs, as well as, display alerts activity on a map of a facility which helps make finding devices in a correctional facility easier to find. (2)

IV. Methodology

a. Parts

- i.** CA3130 IC
- ii.** $1\text{k}\Omega$ resistor
- iii.** $100\text{k}\Omega$ resistor
- iv.** Two $2.2\text{M}\Omega$ resistors
- v.** 47pF capacitor
- vi.** $0.22\mu\text{F}$ capacitor
- vii.** $100\mu\text{F}$ capacitor
- viii.** BC548 Transistor
- ix.** Light-emitting Diodes
- x.** Power Supply 9V
- xi.** Wires
- xii.** Breadboard
- xiii.** Digital Multimeter

b. The Purpose of Each Part

- i.** The CA3130 IC is an op-amplifier that combines the advantages of bipolar and CMOS.
- ii.** Each resistor is used to control the current throughout the circuit
- iii.** Each capacitor is used to store energy and provide the circuit with energy when it is necessary.
- iv.** Transistors are used to switch electronic signals and electrical power.
- v.** Light-emitting diode is used to provide light for the final output.

- vi. Power Supply is used to provide the circuit with a proper amount of voltage.
- vii. The digital multimeter is used to set the power supply to the required voltage amount.
- viii. Wires are used to connect each component within the circuit together.
- ix. Breadboard is needed to construct the circuit.
- x. Anode is the positive end of the capacitor and transistor
- xi. Cathode is the negative end of the capacitor and transistor.
- xii. The base of the transistor is the second terminal of the transistor.
- xiii. Anode, as well as, the collector is the first terminal of the transistor.
- xiv. Cathode, as well as, the emitter is the third terminal of the transistor.

c. Procedure

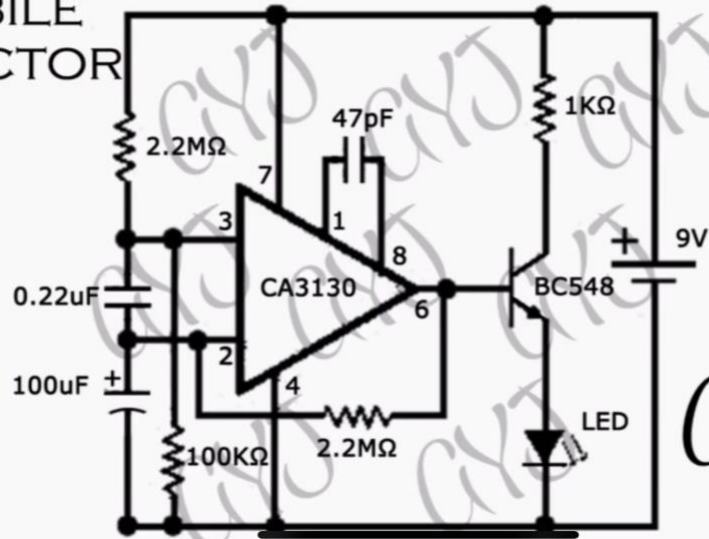
- i. Connect the digital multimeter and power supply together.
- ii. Set the power supply to 9 volts.
- iii. Place a wire into the breadboard for voltage, as well as, a wire for the ground.
- iv. Place CA3130 IC onto the breadboard.
- v. Connect pin 7 of the CA3130 IC to the voltage source.
- vi. Connect pin 4 of the CA3130 IC to the ground.
- vii. Place the BC548 transistor into the breadboard.
- viii. Connect Pin 6 of the CA3130 IC to the base of the BC548 transistor.
- ix. Connect the collector of the BC548 transistor to the voltage source using the $1k\Omega$ resistor.

- x. Connect the anode of the light-emitting diode to the emitter of the BC548 transistor and the cathode of the light-emitting diode is connected to the ground.
- xi. Connect pin 2 of the CA3130 IC to the base of the BC548 transistor using a $2.2\text{M}\Omega$ resistor.
- xii. Connect pin 3 of the CA3130 IC to the ground using a $100\text{k}\Omega$ resistor.
- xiii. Place the $100\mu\text{F}$ capacitor to the breadboard.
- xiv. Connect the anode of the $100\mu\text{F}$ capacitor to pin 3 of the CA3130 IC, as well as, the cathode of the $100\mu\text{F}$ capacitor to the ground.
- xv. Connect pin 3 of the CA3130 IC to the voltage using a $2.2\text{M}\Omega$ resistor.
- xvi. Connect pin 2 to pin 3 of the CA3130 IC using a $0.22\mu\text{F}$ capacitor.
- xvii. Connect pin 1 to pin 8 of the CA3130 IC using a 47pF capacitor.

d. Video Link & Photos

- i. <https://www.bastille.net/cell-phone-detection>
- ii. <http://www.cellbusters.com/contraband-cell-phones-in-prisons-and-other-correctional-facilities/>
- iii. <https://youtu.be/xW-hXU7MWnM>

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AYJ

To Inspire The Curious...

