MOBILE DETECTOR

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The following circuit was the circuit that was built in order to detect smartphone signals. This is the simulation for the RF circuit. The voltage source acts as the RF signal that would come from a smartphone or other electronic device. It has a really high frequency in order to simulate the frequency of any RF signal that would come out of a cell phone. The two op-amps have really high gain as the signal coming from the smartphone was likely to not be very strong. It can take an input signal of 1uV and output something in the range of 8V. The LT1192 was the op amp of choice for this circuit because its properties allowed for this circuit to be functional. It runs on a voltage source that can be replaced by a 9 V battery.

Specification	Description
9 V Power Supply	Runs from +9V to Ground, can easily be powered by a battery
~1.5 mV Signal	The circuit can pick up values of ~1.5 mV
LED	The circuit contains one LED that lights up when it receives a voltage of about ~0.7 V
~1Ghz	The circuit operates on frequencies of about 1 Ghz
LT1192	LT1192 was the op-amp used for this project because it can handle high speeds and has high gain

Calculations:

$Gain$ = − Rf / Rin
$Gain$ = − 2. 2 * 10 6 / 100k
$Gain$ = − 22 V / V
-22 volts / volt is the gain for both of the non inverting amplifiers This provides a total gain of the system of about 484 volts / volt non-inverted.
$Vled$ = ~. 7 V
$Vinput$ = . 7 / 484 = 1. 4463 mV
This means that the circuit is so sensitive that it can pick up on signals with voltages as low as ~1.5 mV.
There is both an input capacitor and a capacitor connected between the two different op-amps to help filter the circuit as we are dealing with quite high frequencies.

Simulation:

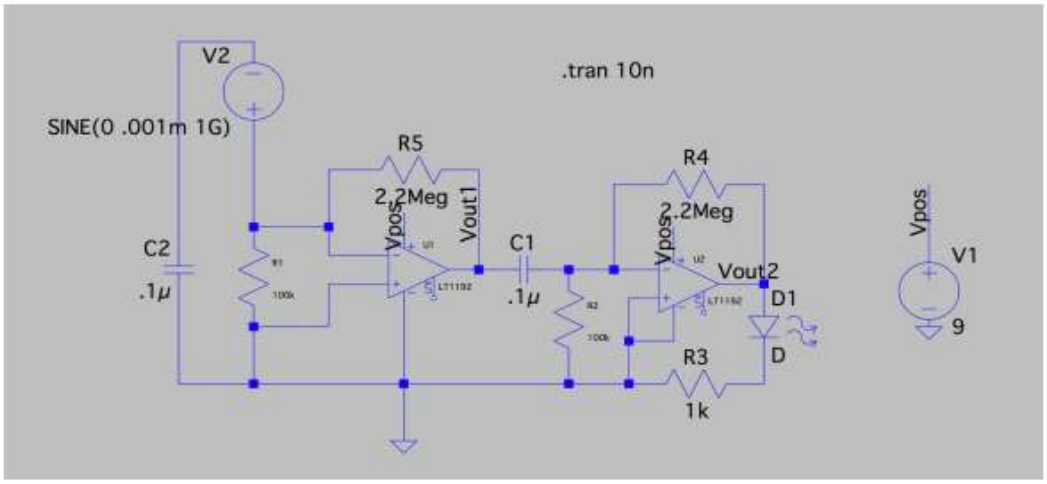

Figure 1: LTSpice Simulated Circuit

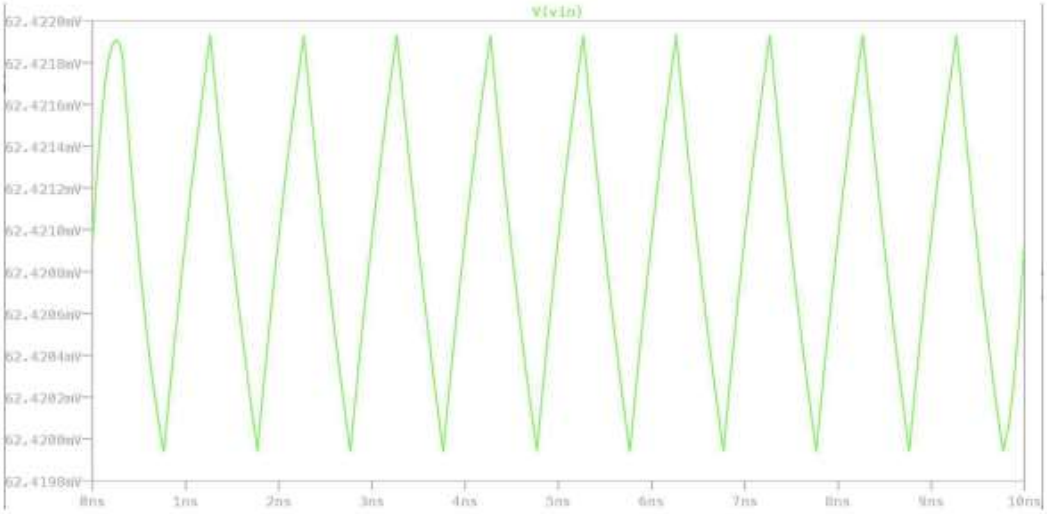

Figure 2: LTSpice Simualted input to represent Cellphone signal

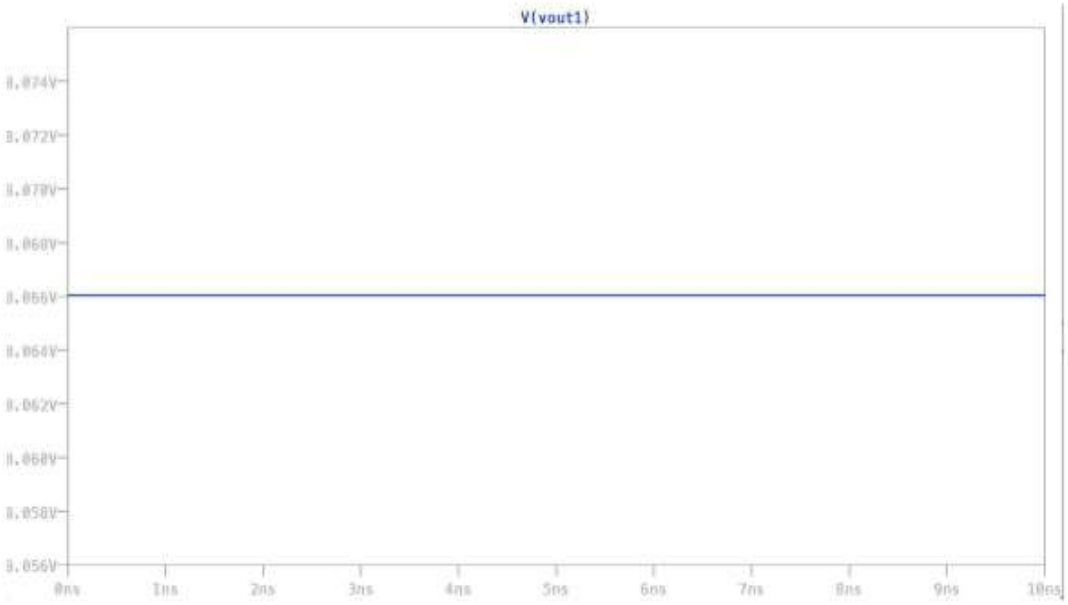

Figure 3: LTSpice Simulated Output after 1st gaining stage

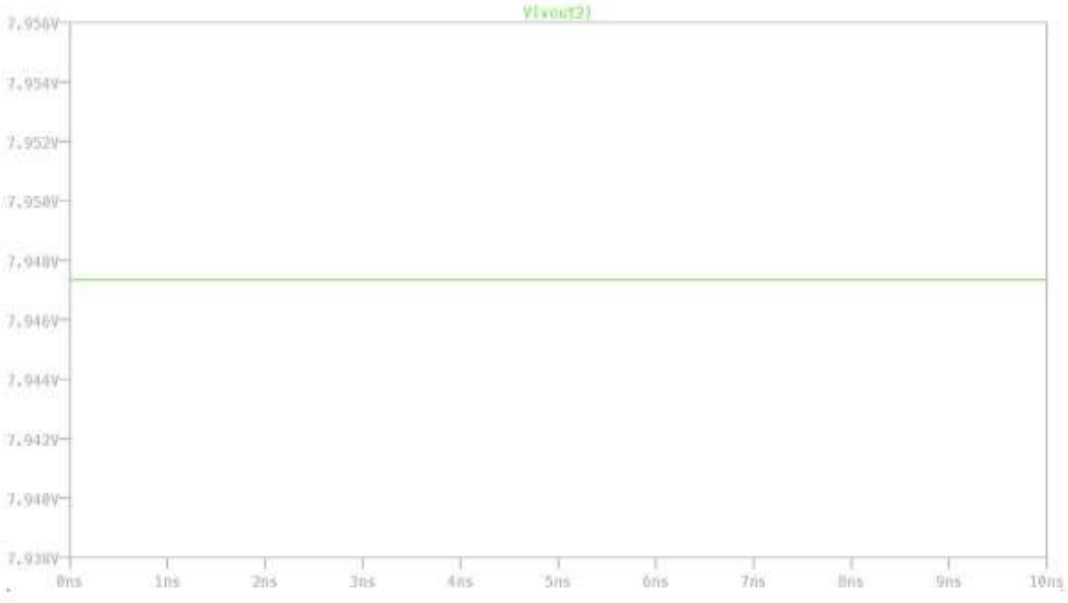

Figure 4: LTSpice Simulated Final output

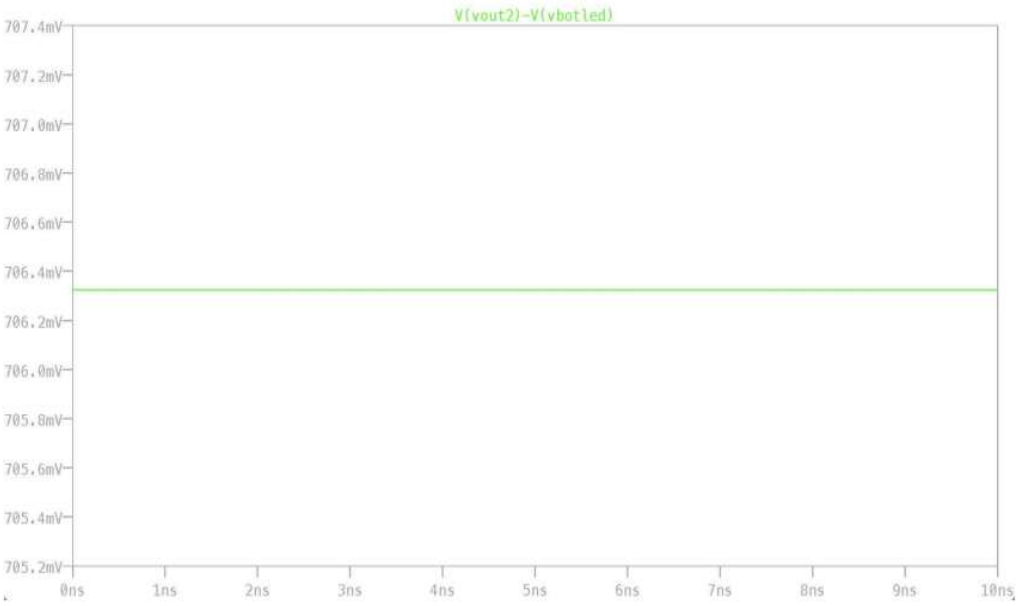

Figure 5: Voltage across LED when there is an input signal