ECG Circuit

*Final Project - Bioelectronics (SBE3130)*

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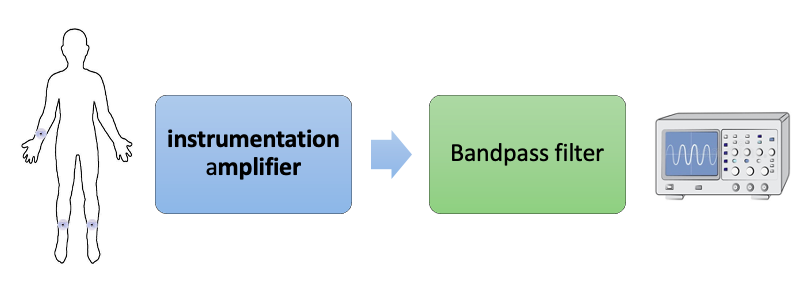
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We designed a prototype circuit for an ECG in order to assess how the heart is functioning and can be used to diagnose a variety of cardiac diseases. It turns out that an ECG is very easily obtained with a few common circuit components, we use the following components to build our circuit:

1. **Hardware components**

|  |  |  |
| --- | --- | --- |
| Component | Value | Quantity |
| Op Amplifier | “TL084CN” | 1 |
| Capacitors |  | 1  2 |
| Resistor |  | 3  2  2  1  1  1  1 |
| Electrodes |  | 3 |
| Crocodile probes |  | 3 |
| Jumpers |  | 1 |

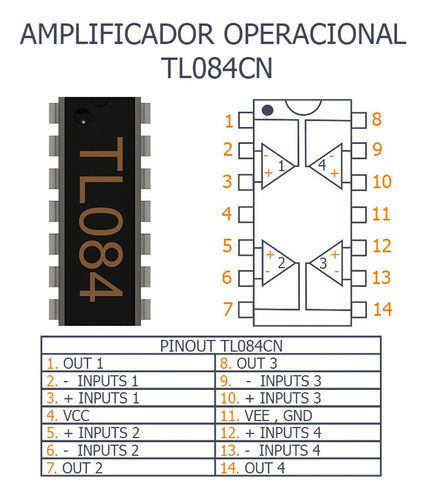
1. **ECG main circuit:**



**(HPF + LPF)**

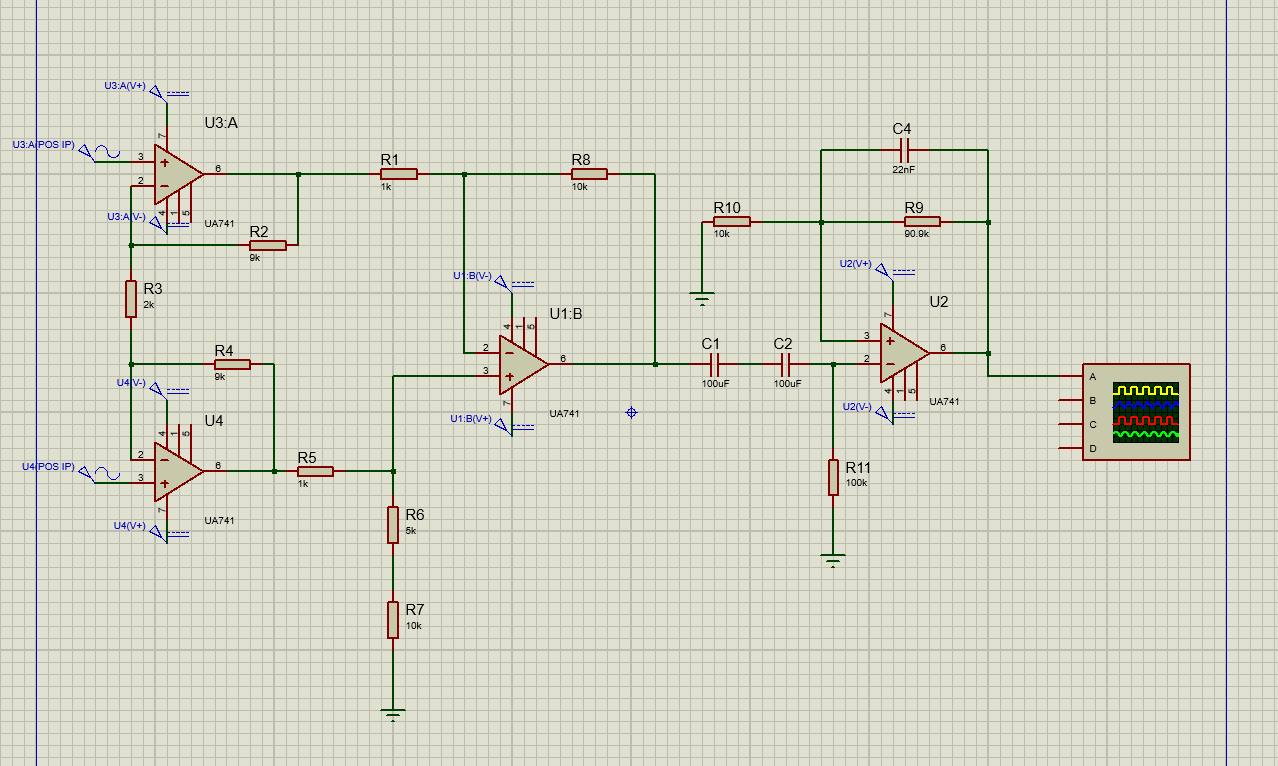
1. **Circuit description:**

Our circuit mainly depends on “TL084CN” op amp. as it can replace the 4 amplifiers that we need in our circuit:

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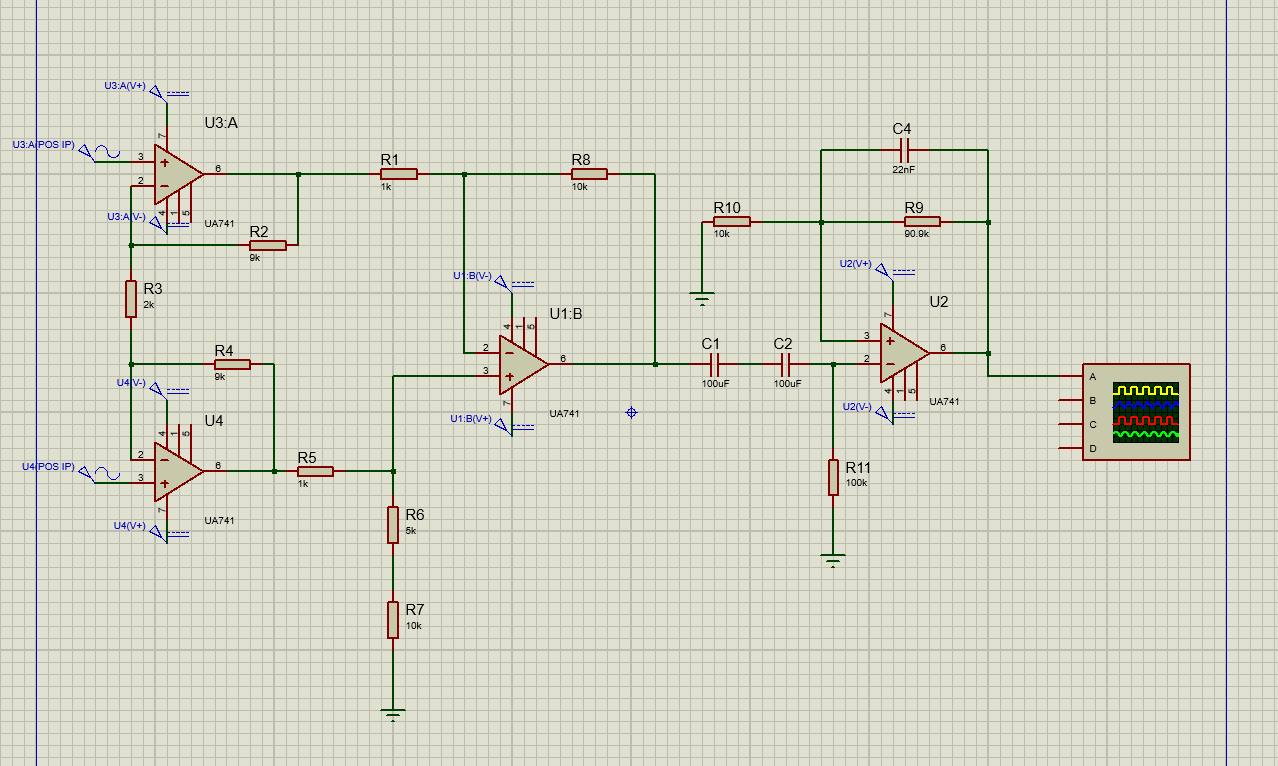
* 1. **instrumentation amplifier:**

The fundamental component of an ECG is the instrumentation amplifier which probably the hallmark amplifier for bioelectrical measurements for a number of reasons, most notably: (1) high input impedance and (2) very good common mode rejection. then it is responsible for taking the voltage difference between leads and amplifying the signal.

It’s basically built from 3 amplifiers and resistors, then first 3 amp in TL084CN amp are used to build the instrumentation amp.

* 1. **Band-pass filter**

A bandpass filter which combines from high and low pass filters only allows those frequencies within a certain band around (0.03~80 Hz) to pass through(Our ECG signal). It’s built from an amplifier, resistors and capacitors.

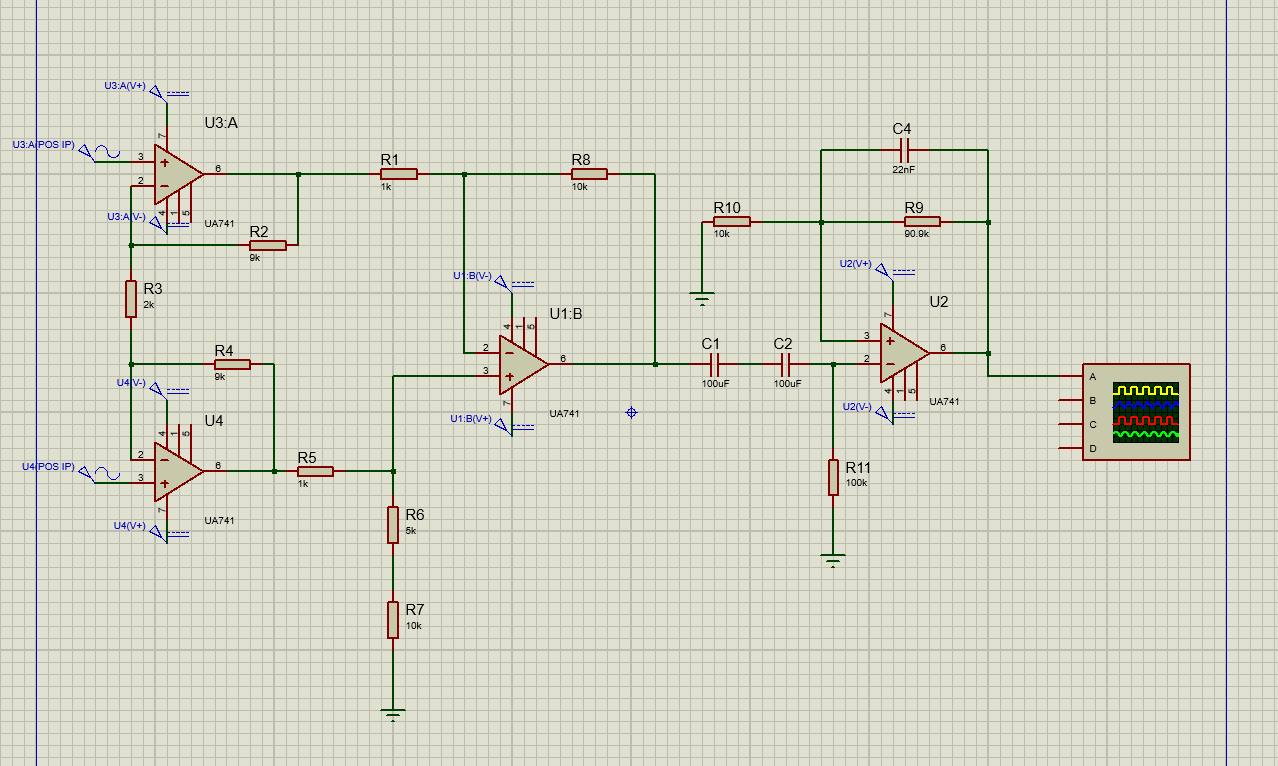
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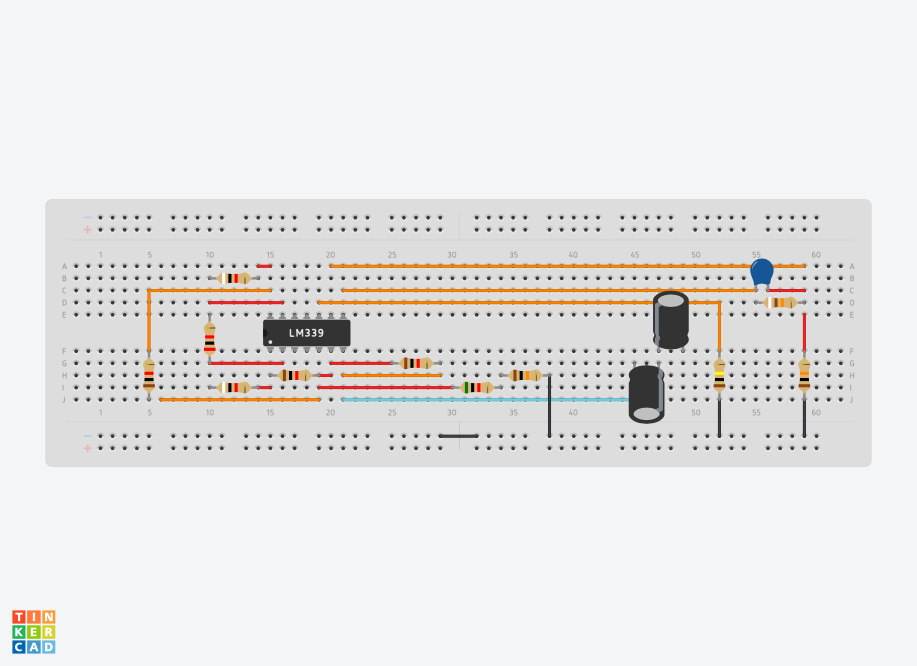
1. **Limitations:**

We used just one lead (lead II) and 3 electrodes. Also we used a band-pass filter not high-pass filter, so normal ECGs only will be displayed on this circuit.

Lead II: one of limb leads. ﻿Lead II is the voltage difference between the left leg (LL) electrode and the right arm (RA) electrode.

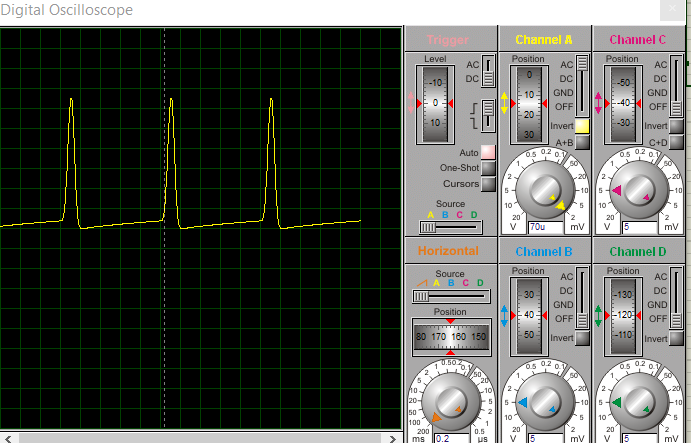
**Finally, we got our ECG circuit:**

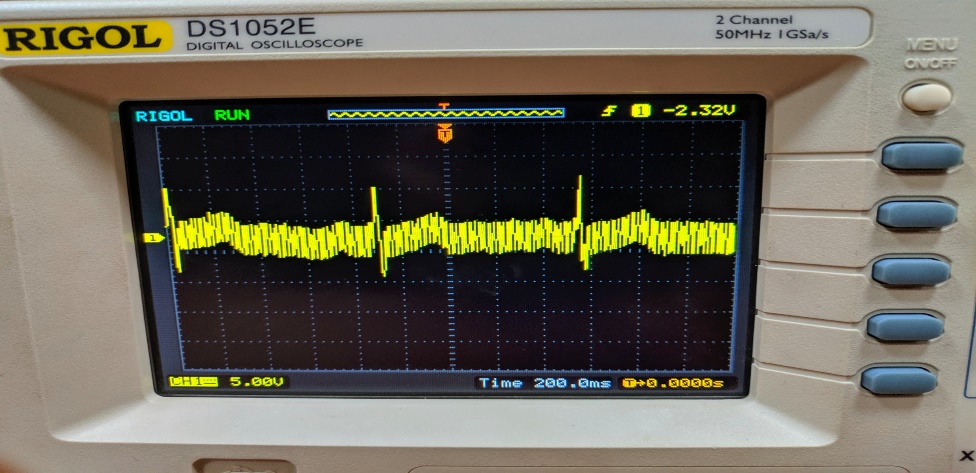
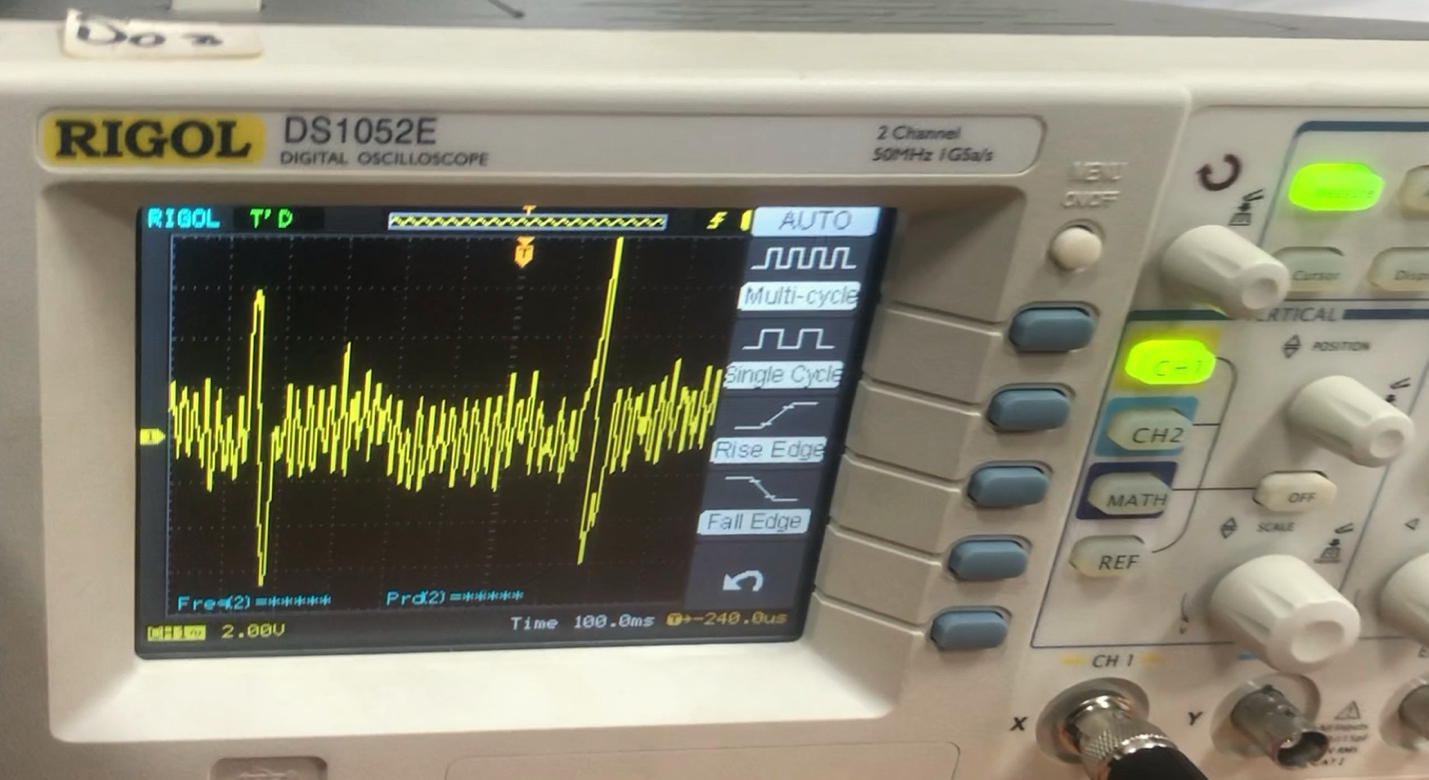
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**TL084**

**The output:**

1. **Using Proteus**
2. **In lab**



**Another Scale:**