

# Computer Integrated Analogue Electronics Laboratory for Undergraduate Teaching

MARKO DIMITRIJEVIĆ, VANČO LITOVSKI

Faculty of Electronic Engineering Niš



## Overview

- Introduction
- Component characteristic tracer
- Scalar network analyzer
- Specific linear electronics circuit analysis
- Conclusion

## Introduction

A new laboratory for teaching basic  
Electronics was established as a part of  
TEMPUS CD-JEP 17028 project

## Introduction – main goals

- Emphasize the learning of electronic component and circuit behavior vs. measurement technique
- Simplify manipulation of instruments
- Faster measurements
- Testing, supervising, documentation
- Distance learning

## Introduction – system architecture

- Computer based acquisition card NIDAQ  
PCI-6014
- Test circuits
- Virtual instruments – implemented in  
LABVIEW

## Introduction – NIDAQ PCI-6014

- 16 analog inputs with 200kS/s sampling rate
- 2 analogue outputs with 10kS/s sampling rate
- 8 digital I/O channels
- Two 24-bit, 20MHz counters

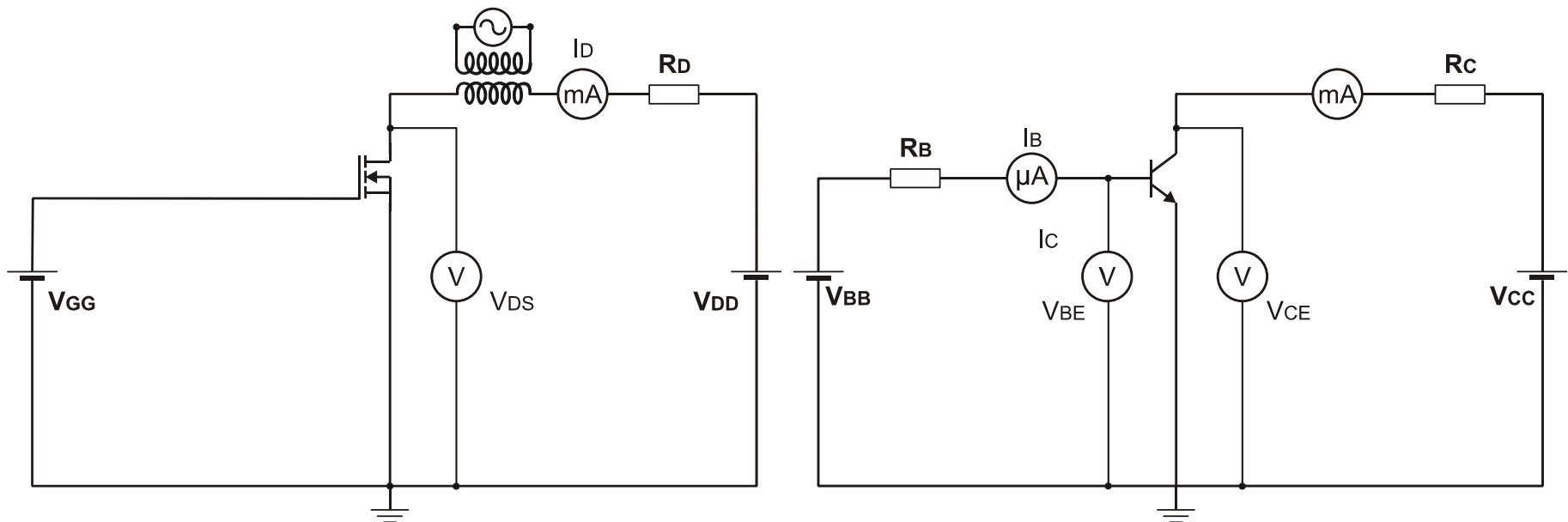


---

# Analysis of electronic component behavior:

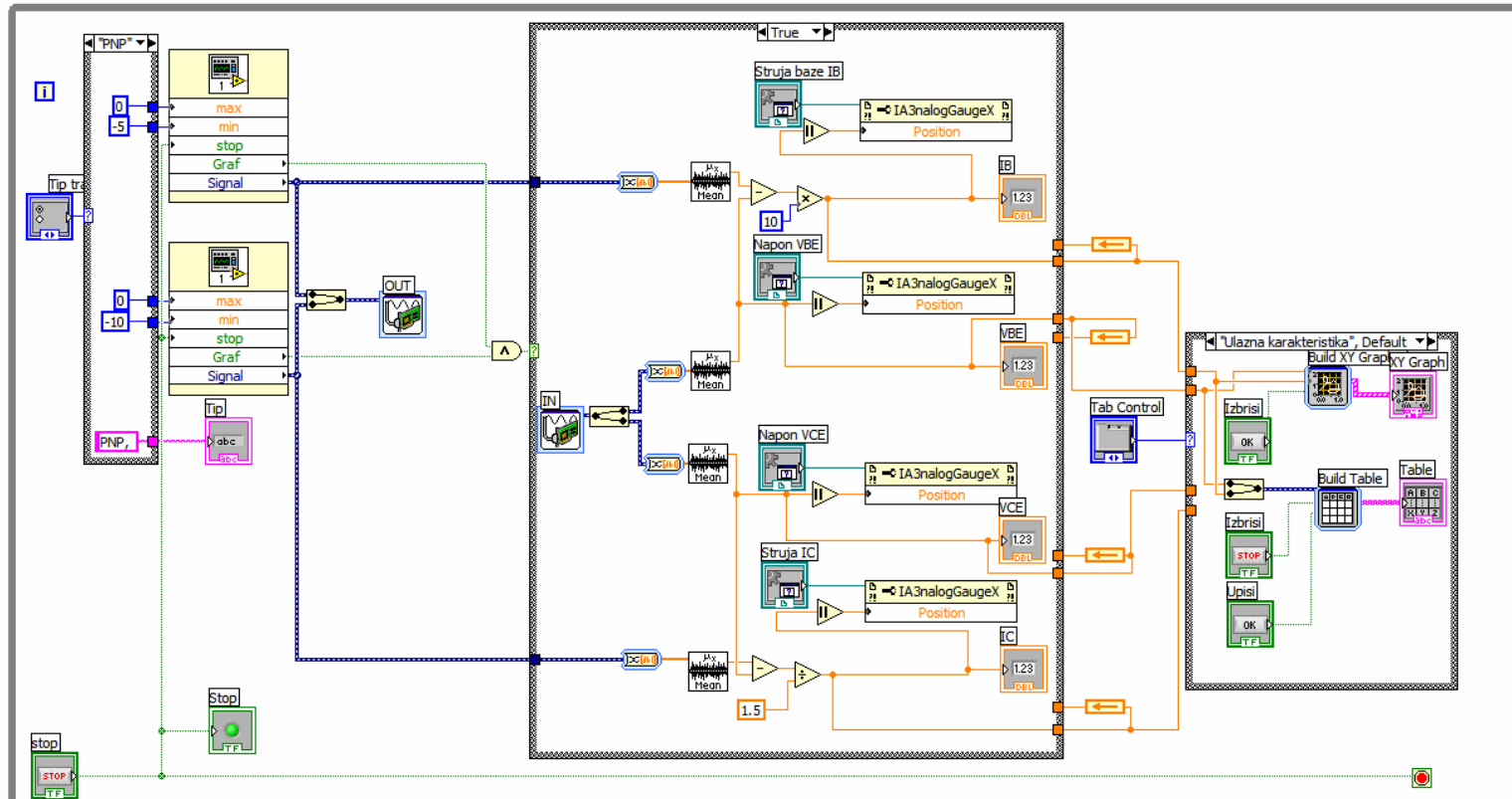
- Diode
- BJT
- JFET
- MOSFET

# Test circuit for MOSFET and BJT characteristic

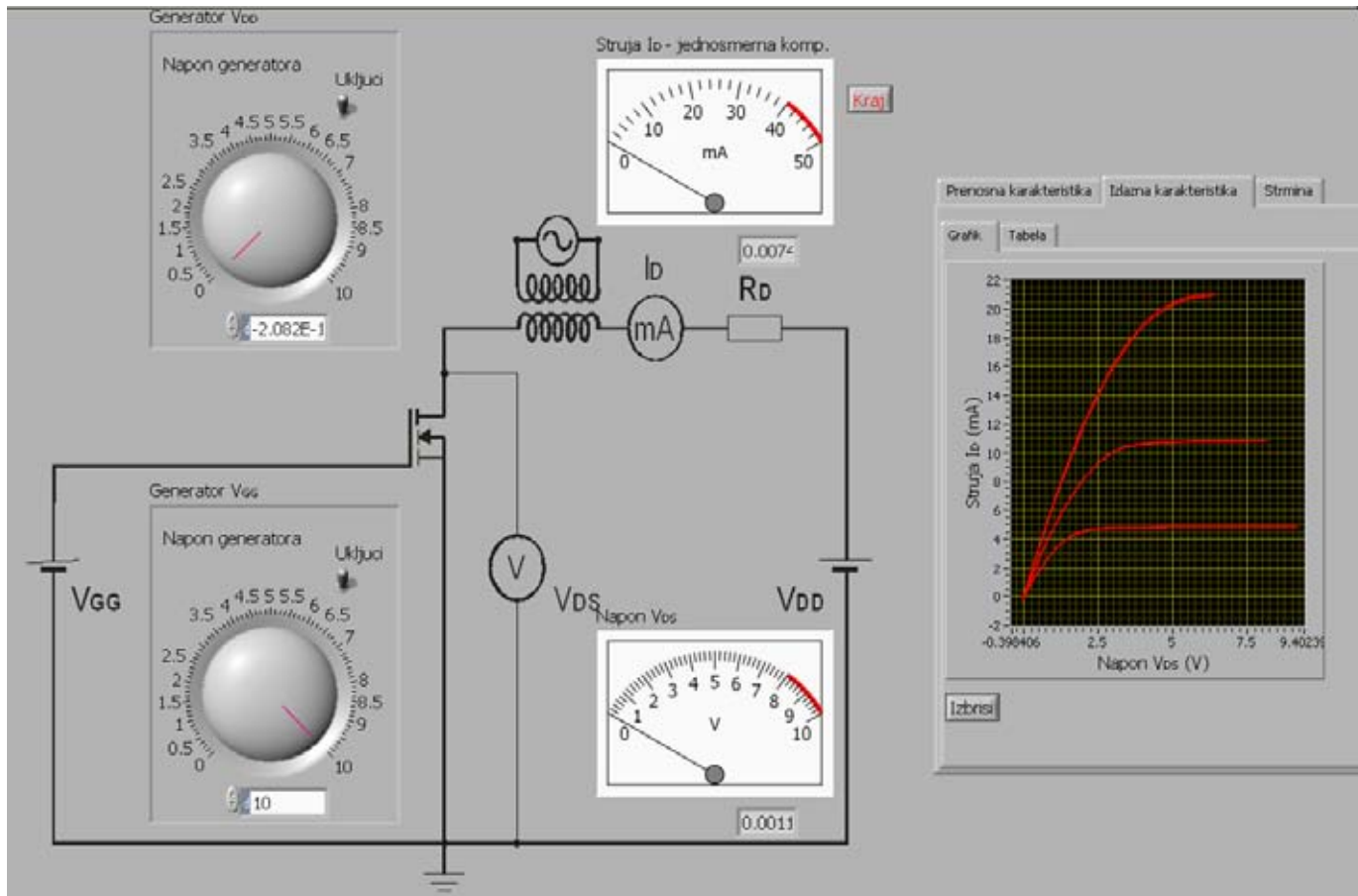




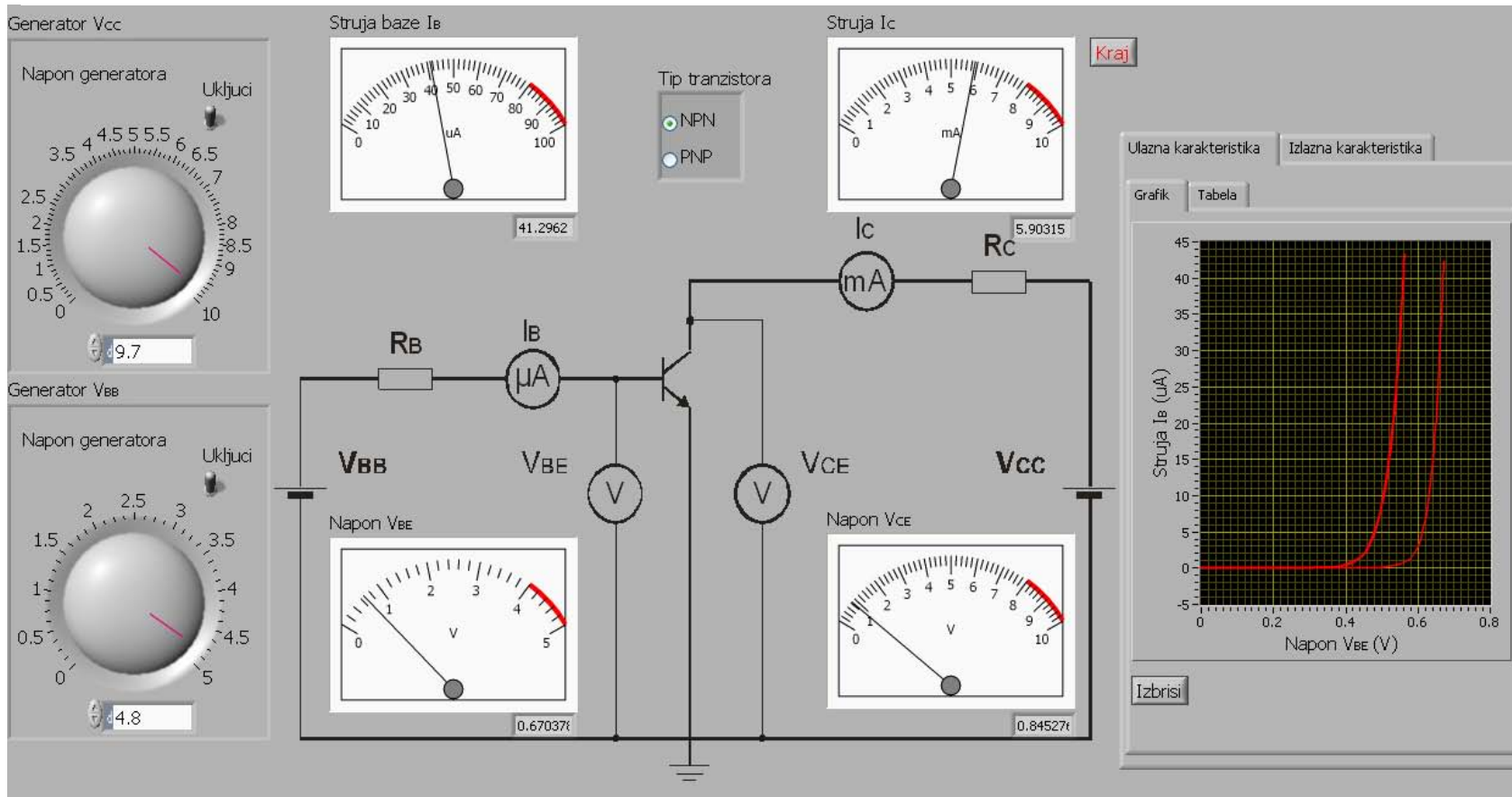
# Implementation in LABVIEW



# Component characteristic tracer - MOSFET



# Component characteristic tracer - MOSFET



---

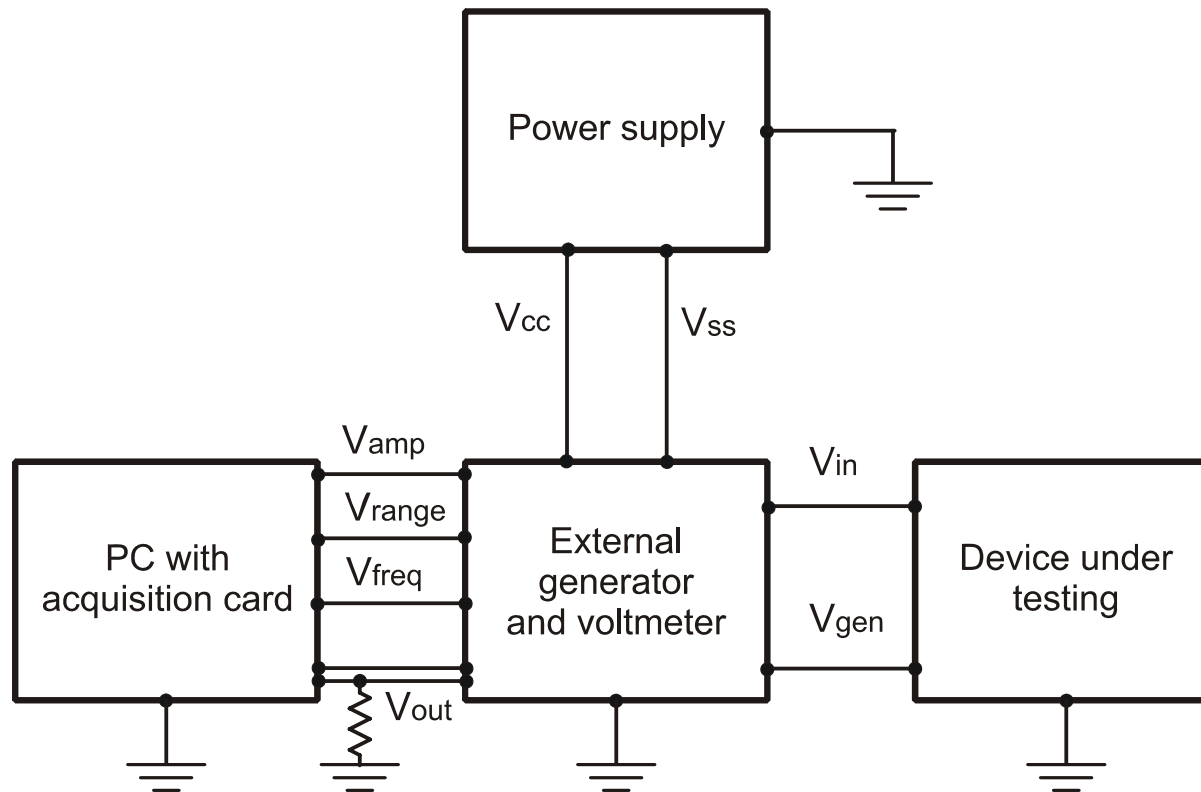
# Analysis of electronic circuit behavior

- Passive filter
- BJT amplifier
- JFET amplifier
- MOSFET amplifier

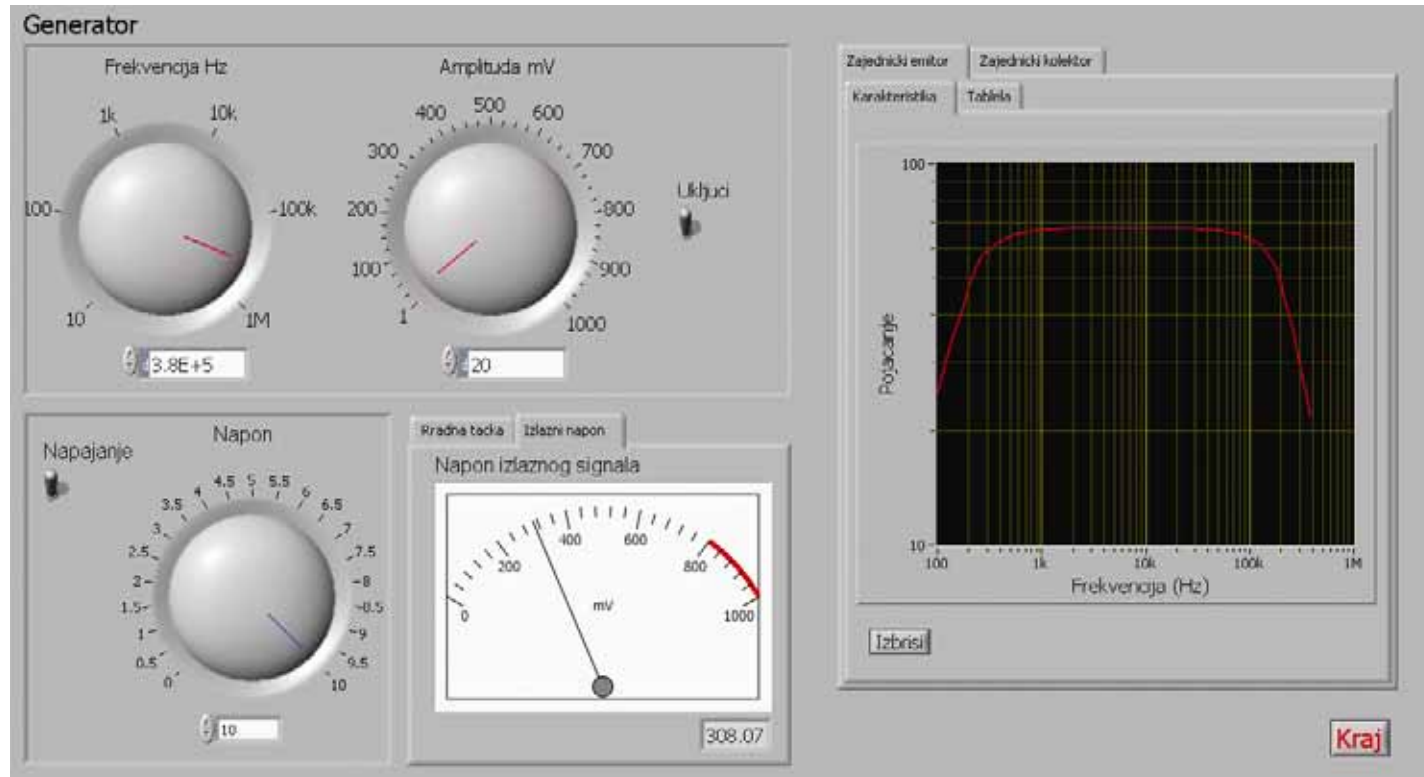
## Scalar network analyzer

The sampling rate of NIDAQ PCI-6014 cards limits the frequency range of measurement. The frequency measurement range can be extended using external generator and AC voltmeter.

# Scalar network analyzer – complete system



## Scalar network analyzer – BJT amplifier



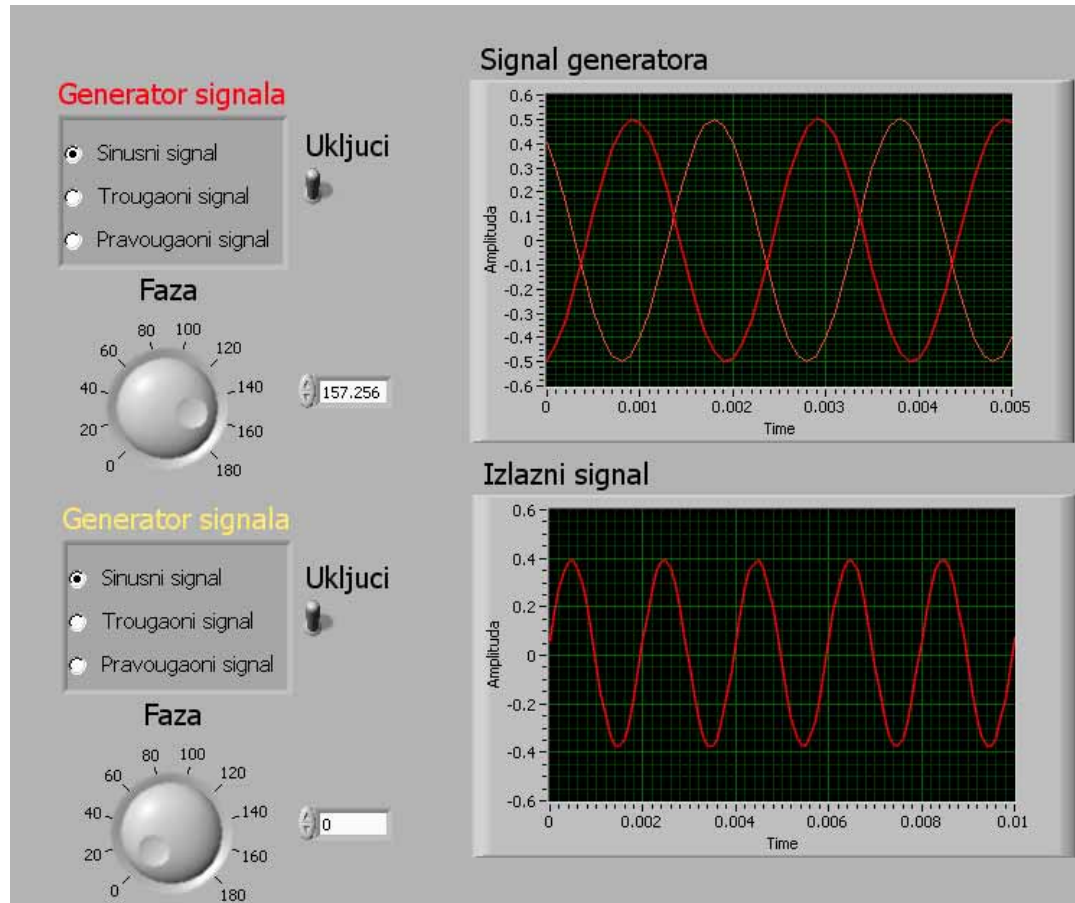
---

# Specific linear electronics circuit analysis

- Differential amplifiers
- Operational amplifiers
- Power amplifiers
- Oscillators
- Rectifiers



# Operational amplifier analysis





## Conclusion

- Faster measurements providing students to concentrate on measurement essence
- Better supervision and documentation of exercises
- Possibility of distance learning

