Signal generator

Countries:	Czech Republic 🇨🇿	Slovakia 🇸🇰
Suitable for grade:	3 - 4	3 - 4
Specialization:	IT	Electrotechnics
Responsible teacher:	Ladislav Opiol	Peter Psota

Project description:
Goal of the project is to make signal generator for frequencies up to 5MHz with different shape of signal (sine wave, triangle, saw, …). Generator should have buttons/switch to change signal shape, keyboard to type frequency of signal, potentiometer to regulate signal amplitude and display to check selected values. Project will consist of two modules. First module will be circuit generating signal and second will be control and display.

Project tasks:
Student #1 (CZ):
- Design circuit for signal generator based on DDS chip from Analog Devices company
- Design and make PCB based on prepared circuit
- Prepare connectors for connecting outputs from microcontroller used for display values and read data from keyboard
- Solder parts on PCB and test circuit
- Compare precision of created signal generator to laboratory generators

Student #2 (SK):
- Prepare circuit for controlling generator by keyboard and displaying values on LCD display
- Design and make PCB for controlling module
- Prepare program for microcontroller to read data from keyboard and buttons/switches, send it to DDS chip and display current signal characteristics
- Connect controlling module to generator module

Success criteria:
Project will be successful after construction of working signal generator for max. 5GHz frequencies with various signal shape controlled by microcontroller. Generator should have its values set by keyboard and displayed on LCD display. Project should also follow safety rules according to working with voltage. All project parts should be cost efficient, software code should be well designed (time and memory efficient, without bugs). Project documentation has to be prepared based on given template in the range of 15-25 in English and native language.

Developed hard skills:
Making connectors and connections, electronic measurement, working with electronic parts, working with datasheets, programming in C, working with microcontroller, CAD systems, design of PCB, mounting, soldering, testing of circuits

Developed soft skills:
Cooperation, working with computer, planning, teamwork, tracking progress, communication in foreign language, responsibility, compliance with agreements, respect deadlines, problem solving, finding and processing information, design thinking, following safety and ergonomic rules