Summer School on Embedded Systems and Robotics

Aptitude Test, 16 April 2024

Instructions:

- Answer the questions in a single Microsoft Word document and upload this file.
- If you are unsure about any details of the questions, make assumptions. Clearly note these assumptions in your answers.
- Submit your responses by or before April 25, 2024.

Questions:

1. Write a Python code to generate a square wave with user-defined amplitude, frequency, and samples per second. The code should plot the generated waveform and save it to a CSV file with two columns: time and amplitude.
2. Write a Python code that mimics the ADC (Analog-to-Digital Converter) calculator available at https://circuitdigest.com/calculators/adc-analog-to-digital-converter-calculator
3. Create a Python package that facilitates basic mathematical operations: addition, subtraction, and multiplication of two numbers. Upload this package to PyPI (Python Package Index). Provide the package name and its URL. Explain how to install and use the package.
4. Describe how the current through a resistor, denoted as I(R), depends on the resistor value, R, when the resistor is connected across a voltage source, V, in a practical setting.
5. In communication systems, explain the need to modulate a signal with a carrier. Write a python code to demonstrate OOK (On-Off keying) modulation and demodulation.

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