Fall 2024 UGA SSRL Flight Software Take Home Project

Congratulations again on completing your 2nd round technical interview! The last step of the interview process for the Flight Software team is this take-home project. You will have 7 days to complete this project, and it will be due at 11:59 PM EDT, on Sunday, September 22nd.

Please make your submissions via email to sl94656@uga.edu and include all your project files in a ZIP archive.

This project will involve encoding an ASCII message in a PNG image without (noticeably) visually altering the image. You may choose the method by which you encrypt your data, but make a conscious effort to develop an efficient encoding method (how much text data can you pack in a single image?) and you may not utilize the metadata of the PNG to store information. The message may be one of your choosing, and the PNG image with which you will be working is attached alongside this document to the email you received.

The project will be written in the C language, and your project should consist of two separate programs, one to encode the data in the image, and another to decode the data from the image. You will need to include a makefile such that a user can run "make clean" and "make" in the target directory and successfully compile your code. You will also include a README.md file in which you will describe how your projects work, as well as why you made certain design decisions (such as choice of encoding method, choice of data redundancy, etc.). You may use a PNG library of your choosing but be sure to justify your choice in your README. It is alright if your program is not cross-platform, but please include any necessary libraries for compilation and include which platform your program was tested on (Windows, Linux, MacOS).

Your program must include some way for the decoder to detect any errors during transmission in the encoded data. (Bonus points if you implement an error correction method, but this is not required). Below is a more succinct list of engineering requirements for you to refer to:

Engineering Requirements:

- Must be written in C language.
- Must include an encoder and decoder program.
- Programs must be able to be compiled by running "make clean" and "make" in the target directory.
- You may use any PNG library of your choice but justify why you chose what you did.
- The program MAY NOT utilize image metadata to encode the message.
- The message may be of your choosing but must be ASCII (plain text) data. You must utilize the provided PNG image for testing, but theoretically your method should work for any PNG file.
- Your program must include a way for the decoder to detect errors, bonus points if the decoder can correct errors.

- Program needn't be cross-platform but include the target platform of your program in the README.
- Submit via email to sl94656@uga.edu as a ZIP archive including all your project files (including any libraries used).
- Due at 11:59 PM EDT on Sunday, September 22nd.