We describe how to program gate based quantum computers using the QUIL (Quantum Instruction Language)[1] abstraction. More practically, we use pyQuil, an open source Python wrapper for QUIL to write quantum programs. This library/tool is particularly suited to implement classical/quantum hybrid algorithms, the class of algorithms which are themselves well suited for useful tasks on near-term NISQ[2] era quantum computers. We demonstrate an example of the implementations of such algorithms in the context of electronic structure calculations, using a variational eigensolver on a quantum processor, and discuss future directions.