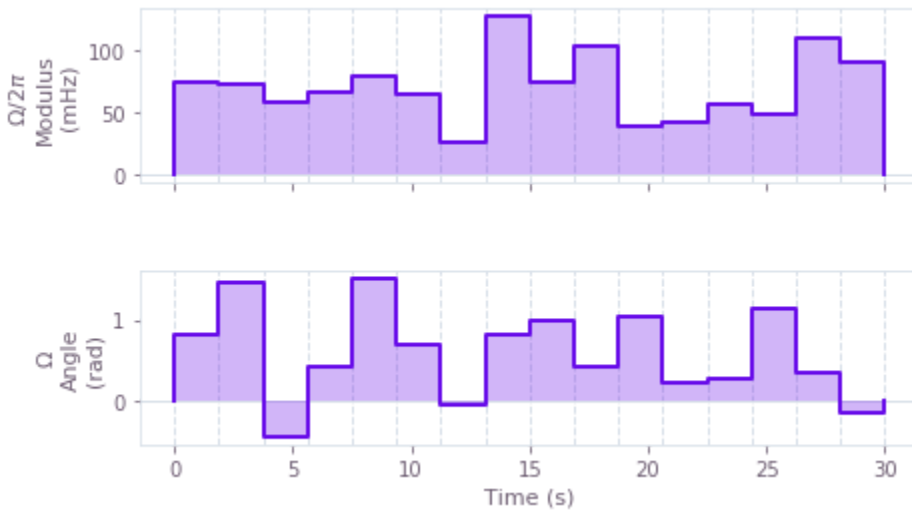


## QcHack – Q-ctrl challenge summary

We approached the problem using Learning control where we took help of the Automate closed-loop hardware optimization of quantum devices user guide and wrote our program in Boulder Opal. We have initially defined our cost functions for both the gates. In case of NOT-gate, the cost function we have tried to optimize was the probability of the getting  $|1\rangle$  as an output. And in case of H-gate, the cost function we optimized was the the ratio of  $|1\rangle$  and  $|0\rangle$  states and how close that is to 1. We have started with 5 control\_test\_points and the program selected the best pulse value from the 5 test\_points. Segment count is 16, duration count is 30, hot count is 32. Then we then set the bounds on the cost function. By taking the minimum cost out of 5 control\_test\_points, we run the optimization loop.

The pulse signal for NOT- gate is as follows:



The pulse signal for H-gate is as follows:

