Currently, our drone uses LiDAR Sensors for obstacle detection and collision avoidance. However, the system is still not very effective even though it has a range of around 5 meters for detection. The main problem behind not using efficient image processing and the neural network algorithms is the fact that using an on-board efficient processor like NVIDIA Jetson-TX2 is very expensive and using IoT based devices for sending the data to a cloud involves time lag.

We tackle this problem by designing our own chip for efficient processing. It'll be a multicore chip like a GPU, lower clock speed clusters will be used for all flight sensing tasks whereas a high clock speed single core will be used for flight control and communication.

The chip is composed of two ARM processors(CPU) and several vision computing engines(VCE). ARM will be used for all the on-board communication and also for all the computation about the algorithms.

VCE's used will be:

1. Classifier Engine
2. Preprocessing Engine
3. Lane Detection Engine
4. Tracker Engine
5. Neural Compute Engine

Since ARM CPU will be used, they will have to be mounted on multiple FPGAs(Field Programming Gate Array) to support them. The first step will be to create some general-purpose I/O pins, serial ports, frequency clock generators, registers. This will be followed by defining the data and control interfaces and constructing SIMD(Accumulate Architecture) Machines for basic image processing and pattern classification. In the end, proper architecture must be set for parallel computing of each task frame so that overall clock rate can be kept low.

The team is currently exploring ways to ensure advanced algorithms can also be run on the chip.

Making our own indigenous chip for faster processing will not only help in reducing the overall project cost that'll be spent in purchasing the processor but also help in reducing the time lag that may be caused due to data transfer from the onboard processor to the Ground Control System.