Tachyon II Space VNX Card

(Hardware team)

Executive Project Summary

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Project Overview:

The purpose of the Tachyon II is to develop a next gen space VNX development platform based on the PolarFire SoC FPGA, the first SoC FPGA that utilizes a RISC-V processor system. Compared to other recent top-of-the-line processors, RISC-V processing runs at faster speeds and consumes far less power. The Tachyon II PCB will serve to be useful as a starting point for future projects involving autonomous vehicles, cache coherent multiprocessing across multiple boards, sensor fusion, machine learning, and other related projects. It is our intention that the Tachyon II is able to be utilized in many different industries and be applied in new and creative ways.

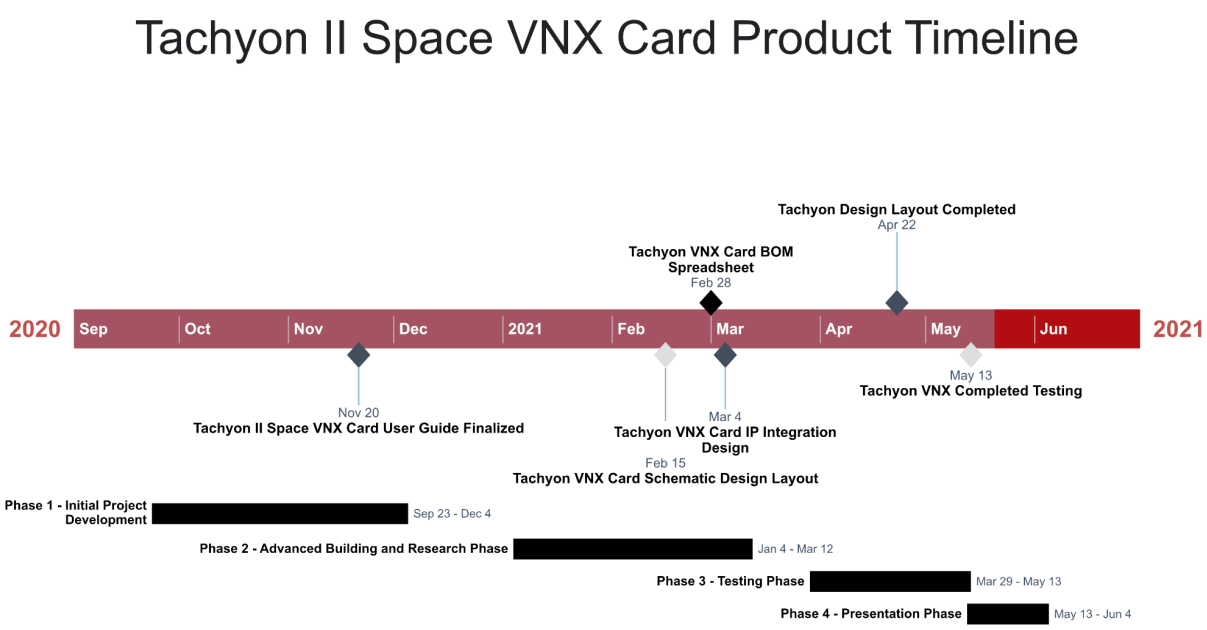
Design:

In 2019, Praesum Communications started work on a PCB that could fit in a small space and control a rocket. They worked with a Senior Design team during the 2019 to 2020 academic year to create a prototype. However, due to the COVID-19 pandemic, it never was finished. When we took on this project, we sought to create an upgraded version of this board using a new template PCB called the Icicle Kit.

A large part of this project was writing a peer reviewed user guide of the Tachyon II. To do this, we used the specs from the Icicle Kit that the Tachyon II is derived from. This took up fall term. During winter term, Hassan worked on the tech demo for the board while Brad and Raymond worked on the schematic capture using OrCAD. Finally, we tidied up loose ends

including documentation during spring term. Right now, the board is being simulated by having its functions run on the Icicle Kit. The board still needs to be physically printed and tested to make sure it can run these functions alone.

Timeline:



What we learned:

The Tachyon II was designed and developed by two teams, a hardware and software team in addition to third party experts. As a result the key lessons we learned from working on this project are time management and effective communication. Time management was an essential part of our project because each team's progress depends on the other team's work , which meant that managing time and delivering project pieces on time is important to avoid slowing the other team and project progress. Additionally, having effective communication between teams and third party experts was essential for maintaining the project progress as well.