NovaWurks, Inc. of Los Alamitos, California was founded in December 2011 by U. C. Irvine graduate and space veteran Talbot Jaeger with the vision of developing and delivering an entirely new approach to building spacecraft and space structures. The ‘Hyper-Integrated Satlet’ or HISat™ is a 20 by 20 by 10-centimeter, mass-produced, Lego-like building block that contains all the functional capabilities of an autonomous satellite, and the flexibility to conform to the shape or capability requirements of any payload, a cellular architecture that is flexible for a variety of mission purposes.

Each HISat’s role in the satellite is configured by software to optimize the entire spacecraft. All HISats share power, thermal, and are in constant communication with one another. The software can move functions around within the architecture to minimize thermal impacts, or maximize data storage or throughput, as needed to support the payload. As the HISats are designed to be mass produced, the cost of building a HISat-based spacecraft is greatly reduced compared to traditional approaches, and the consistency of building with mass produced standard building blocks improves quality and reduces risk in the integration and test phase. HISat “Packages of Aggregated Cells” or PACs from 75 kg to more than 3,000 kg have been designed to support various payloads and missions. The HISat building block was designed and qualified for GEO and is therefore radiation tolerant for most orbits.

A HISat solution is payload centric, meaning that the payload can be designed in virtually any size or shape that is best for the payload, and the HISats are used to build the spacecraft bus around the payload. Payload NRE, schedule, and therefore time to orbit, is minimized. Resiliency is another key benefit to a HISat-based solution. With multiple HISats configured by software, many management options become available to the user. All spacecraft functions are aggregated to provide greater power, throughput, memory, orbit knowledge, thermal capacity, and control authority. In the case of failure, multiple cells have the hardware needed to replace the failed unit by simply re-configuring the satellite function based on the remaining HISats. Instead of switching from primary to redundant on the satellite and hoping no other failures occur, a HISat PAC has multiple ways of recovering from errors that a traditional satellite just can’t implement.

On October 27, 2017, NovaWurks’ HISat-based “Satlet Initial-Mission Proofs and Lessons” (SIMPL) experiment became the first propulsion-capable satellite to be successfully assembled by NASA astronauts aboard the International Space Station (ISS), and then deployed into Low Earth Orbit (LEO) using a NanoRacks Kaber microsatellite deployer. The SIMPL experiment consisted of eight fundamental pieces, six HISats, and two solar arrays.

In November of 2018, NovaWurks will be part of the largest rideshare mission from a US-based launch vehicle, as one of more than 70 spacecraft from approximately 35 different organizations. NovaWurks’ “eXperiment for Cellular Integration Technology” (eXCiTé) spacecraft will be part of the Spaceflight SSO-A: SmallSat Express scheduled to be launched from Vandenberg Air Force Base aboard a SpaceX Falcon 9 rocket. eXCiTé is the next test in the Defense Advanced Research Projects Agency (DARPA) “Phoenix” project with a goal to develop new satellite architectures to validate the concept of an aggregated satlet system cluster in low Earth orbit (LEO).

NovaWurks believes that everyone should have access to the latest tools for the exploration and understanding of our planet, and the surrounding universe. Our platform enables colleges and universities, commercial ventures and agencies to envision and deploy affordable spacecraft built around their own payloads. For the first time, space is for Everyone!