

DragonFly^{IV}

Enables Key University Research

Client

The University of Sherbrooke (UdS), located in Canada's Quebec province, is a renowned, diverse, French-speaking institution that has earned a reputation for its hard-hitting research, which has led to major discoveries and innovations in a variety of disciplines.

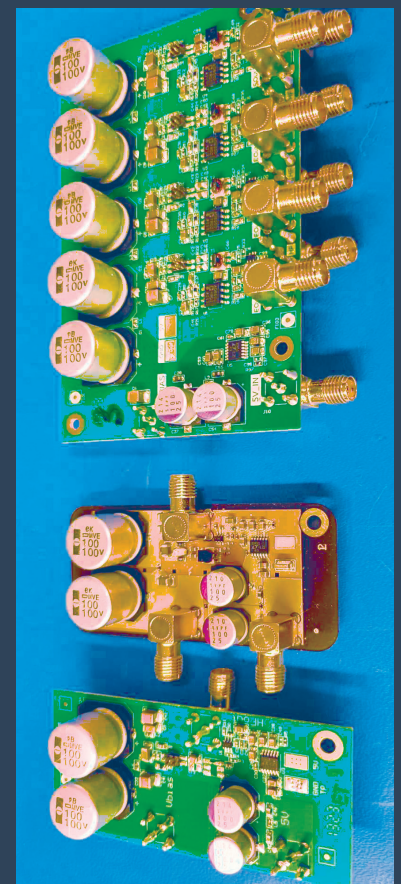
At the Interdisciplinary Institute for Technological Innovation (3iT), the 3iT.micro, is an internal group of professionals whose mission is to stimulate technological development by providing an interdisciplinary ecosystem of scientific research, and innovation. They help post-graduates and research groups inside the university with their design and assembly of printed circuit boards (PCBs), wire bonding, packaging, and programming needs. They also do work for entities outside the UdS needing these expertise

Challenge

3iT.micro is working with the research group Time-of-Flight Computed Tomography (ToF-CT) on a project to make the world's first fully functional time-of-flight computed tomography scanner (x-ray) capable of calculating the time-of-flights of photons. Having the time of flight of each photons helps identify and remove deviated photons from the image and improves the image quality significantly. This would reduce the amount of time that a patient is exposed to x-ray, making patients less prone to side effects, and allowing for more frequent scanning.

A preliminary functional circuit has been made and has the highest time precision of photons ever recorded, but ToF-CT and 3iT.micro plan to make a fully complete scanner for its new generation. This new scanner will require to have a highly dense detector matrix. Therefore, 3iT.micro was looking for a way to make redistribution layers to densify its electronics. They were also looking for a device capable of printing conductive material on silicon and exploring the limits of exotic PCBs.

HIGHLIGHTS



Printed prototype of
X-Ray detector and amplifier

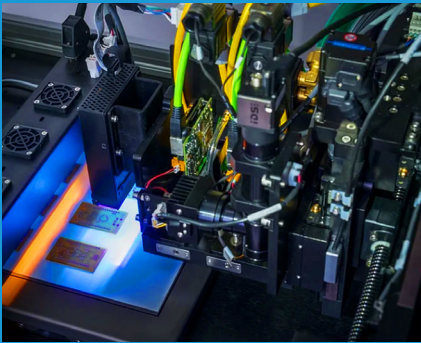
"3iT.micro continues to benefit greatly from the DragonFly, and we are determined to fully understand its design parameters and how we can fully leverage the system for this project and also for other initiatives and clients."

- Philippe Marcoux,
3iT.micro Recherche

— Solution

They researched various machines and determined that the DragonFly IV[®] a Additively Manufactured Electronics (AME) system, due to its simultaneous printing of dielectric and conductive material capability, was the versatile equipment that had the most potential of assisting them in accomplishing their goals. They purchased a DragonFly in the summer of 2022 and a close collaboration between 3iT.micro and Nano Dimension commenced.

HIGHLIGHTS



DragonFly IV Inside View

— Results

The DragonFly allows 3iT.micro to prototype designs before sending expensive boards out to be fabricated, this greatly reduces the cost of exotic PCBs designs with very small features. The DragonFly also enables them to engage in research more freely for 3d integrated devices opening new dimensions to their electronics designs.

The Dragonfly also allows them to do rapid prototyping to validate the functionality of their client's designs.

They intend to use AME to research encapsulation, wire bonding, and the densification of electronics (3D structure, embedded component). They will use the system for very high-density boards requiring lots of layers (e.g., for front-end electronics for photon detectors). They also plan to explore and characterize their capabilities for non-periodical high frequency signals.

For those reasons, the group continues working on the high-density front-end detectors for the x-ray scanners – defining the density of the electronic that will be required to have a fully working scanner with a useful detection area by taking advantage of the capabilities of the DragonFly.



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