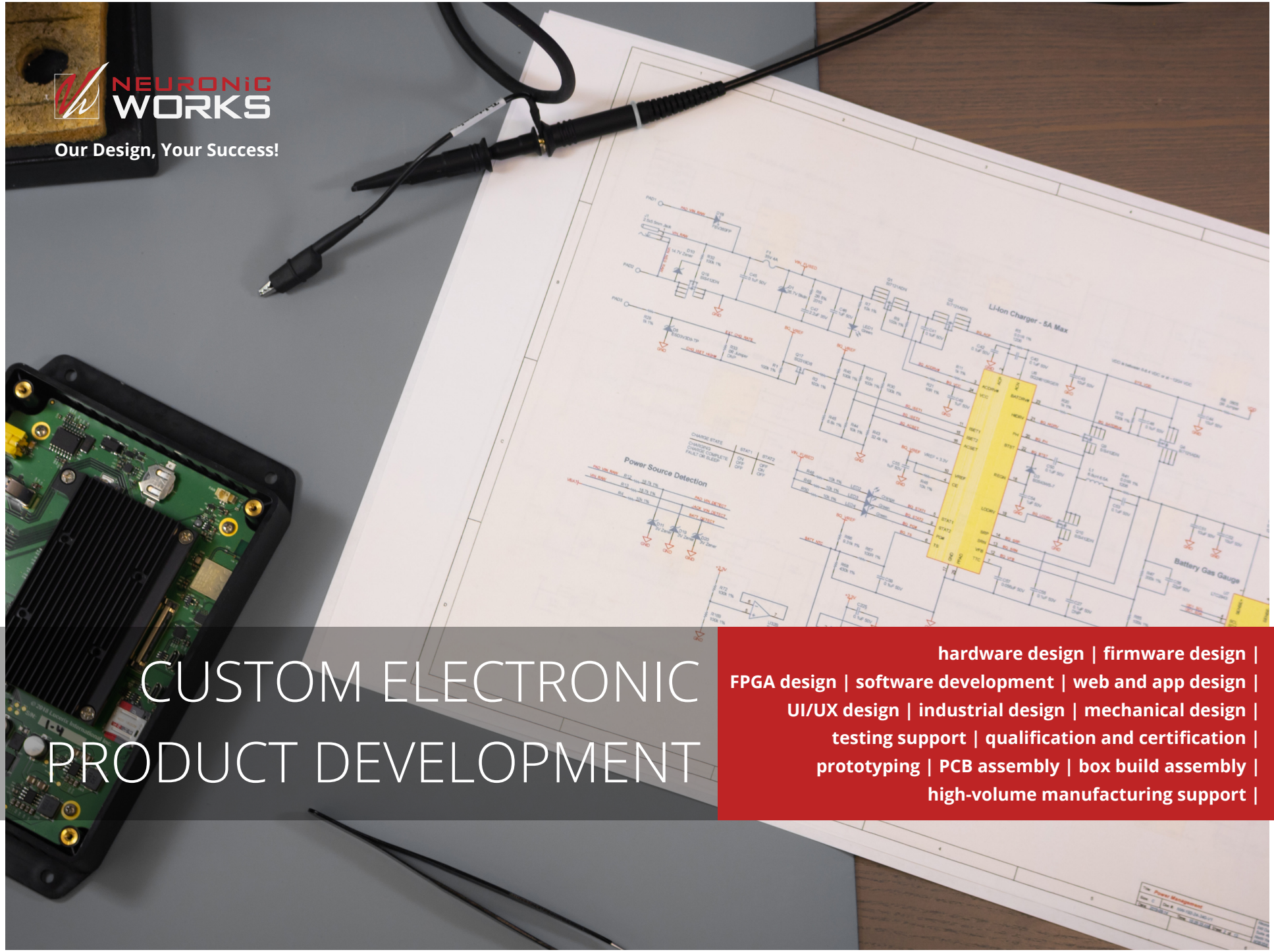


CUSTOM ELECTRONIC PRODUCT DEVELOPMENT

hardware design | firmware design | FPGA design | software development | web and app design | UI/UX design | industrial design | mechanical design | testing support | qualification and certification | prototyping | PCB assembly | box build assembly | high-volume manufacturing support |

NEURONiC WORKS

Our Design, Your Success!

Who we are

Established in 2009 in Toronto by a couple of visionary engineers, Simona and Titu Botos, NeuronicWorks Inc. initially focused on custom electronics and software development. Over the years the company grew into a powerful design house with a diverse team of over 60 designers and engineers, with a wide range of expertise in innovative technologies, design and product development. We work-on all phases of product development, from initial concept design to manufacturing and certification.

Our team of engineers are specialists in an array of areas required to create a quality product: hardware design, circuit design, PCB design, embedded firmware, software development, industrial design, web development, mobile applications, and complete system integration.

Professional Engineers Ontario

NSF NSF-ISR Registered to ISO 9001

IPC

RoHS COMPLIANT

ONTARIO MADE FABRIQUÉ EN ONTARIO

Our Design, Your Success!

Vision

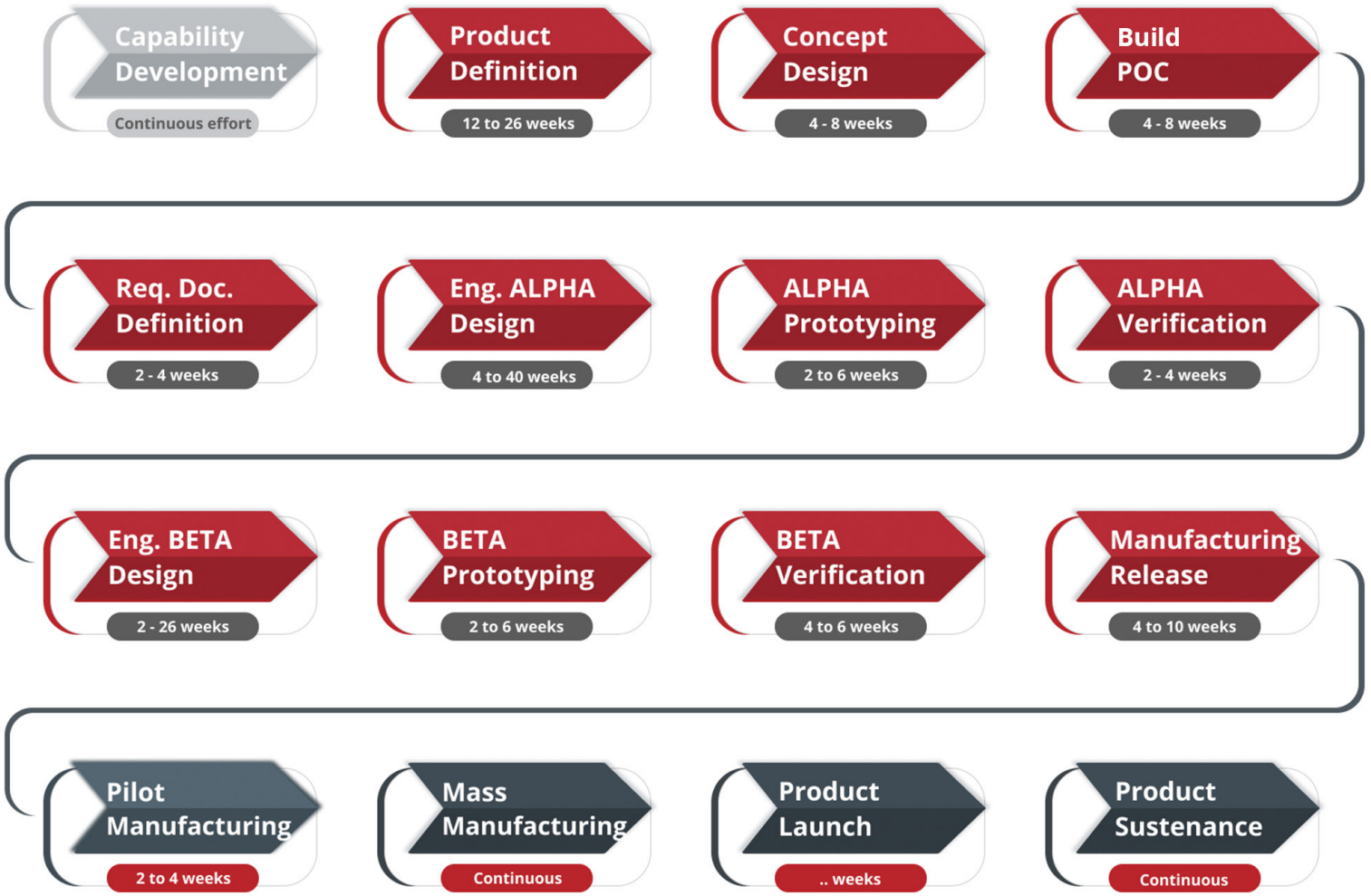
To design a sustainable, clean, and safe future!

Mission

To create great products that are human centric, functional, reliable, sustainable, energy efficient, and recyclable, while using minimal carbon footprint to produce and distribute.

Our Process

ISO 9001 : 2015 Certified



Industries Served

Our breadth of expertise has strengthened our presence in key industries, which today represent 85% of our portfolio.

- Scientific & Medical
- Payment Processing
- Agriculture
- Transportation
- Wearables
- CleanTech
- Industrial Control
- Gaming
- Sporting Tech
- Tele-communication & IOT
- Consumer Electronics
- Edge Computing

Our Services

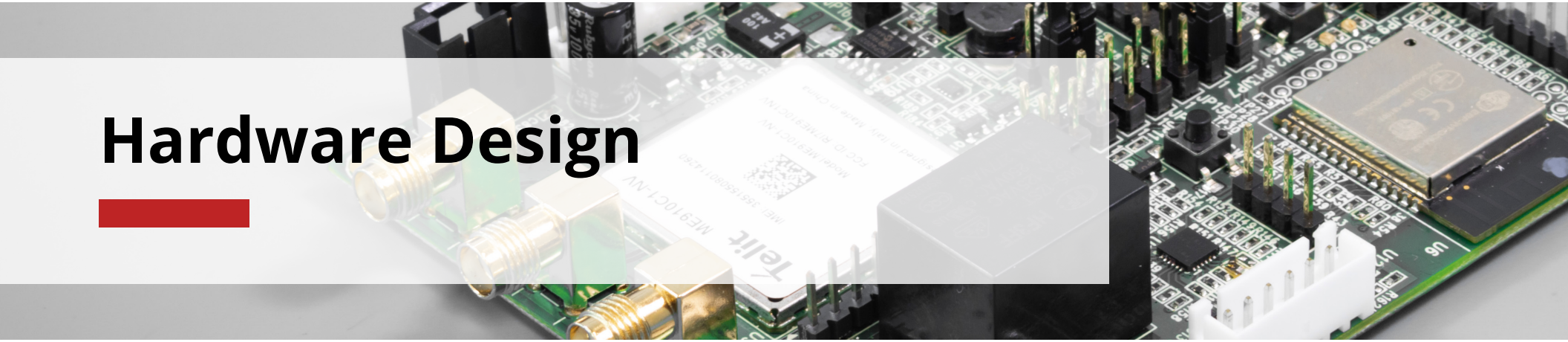
Engineering design and manufacturing services for electronic product development.

Design Services

- Electronics Hardware Design
- Firmware Design
- FPGA Design
- Software Development
- App Development
- Industrial design
- Mechanical Design
- UX/UI Design
- Prototyping
- Testing Support
- Qualification and Certification

Manufacturing Services

- PCB Assembly
- Box Build Assembly
- High-volume Manufacturing Support



Hardware Design

We will engineer the best solution for your requirements and objectives. Whether it is a compact wearable or large industrial automation board, every project receives the same standard of care and skillful workmanship.

Mock-up

Proof of concept at an early stage is an essential step forward on the path to success.

Schematic diagrams

Design of the necessary blueprints that become the skeleton of your project.

PCB Layout design

Component placement that optimizes given metrics.

Prototyping assembly

Putting together the pieces of the puzzle to see and hold the physical creation for the first time.

Bring up

Through the bring-up process, your product begins to take shape and draws its first breaths.

Integration and testing

We ensure that integration with firmware, software and the mechanics is seamless.

Some tools we use include:

- Altium Designer
- Cadence OrCAD Capture
- Cadence OrCAD PCB Designer
- Cadence Allegro PCB Designer
- Mentor Graphics PADS
- Autodesk EAGLE
- KiCad EDA

Apple’s MFI Development Licensee

We know hardware design like no one else!

Firmware Design

Some tools and standards we use include:

- TrueSTUDIO
- CCS
- Simplicity Studio
- Atmel Studio
- MPLab X
- MCUXPresso
- Embedded Studio (Segger)
- uVision IDE (Keil)
- IAR
- CUDA
- GCC
- Doxygen
- IEC 62304
- Git

Apple’s MFI Development Licensee

Our firmware engineers specialize in embedded software development and have created many on-board solutions with embedded systems. We have experience with numerous embedded microprocessors and microcontrollers, including those from Silicon-Labs, STMicroelectronics, Murata, TI, Microchip (& Atmel), NXP, NVidia, among others.

Requirements synthesis

Documentation of requirements to acknowledge what is necessary of the firmware.

Fault prevention

The structure of the code plays a huge role in the reduction and prevention of bugs.

Compatibility

The necessary drivers to ensure your device functions correctly, efficiently and smoothly.

In-house experts

Our team of engineers have experience with various sensors, peripheral protocols, control algorithms and connectivity, which makes us confident in our ability to create functional solutions.

Our firmware is second only to our hardware!

FPGA Design

Our FPGA design engineers specialize in a wide range of applications including high speed data acquisition and processing, video processing, high speed memory and network interfaces, advanced algorithm development, ASIC prototyping and feasibility study, among others.

Requirements Analysis

We start by analyzing the requirements and generate a structured workflow which is guaranteed to save time and deliver accountable results.

Hardware-Software Codesign

Our FPGA engineers work closely with our Hardware and Software teams to ensure that the design is efficiently split between software and hardware in the FPGA ensuring a cost and time-effective solution.

Development and Synthesis

We use a wide range of tools including building behavioral models using Matlab and Simulink, IP cores integration tools or by our own IP core libraries.

Testing and Verification

We use a variety of tools to perform timing analysis, bandwidth measurements and give a detailed characterization of the design.

Some tools and standards we use include:

- Xilinx ISE/Vivado (System Generator, ChipScope Pro)
- Intel Quartus II and Quartus Prime (SignalTap, Qsys)
- Synplify
- Lattice ispLEVER and Lattice Diamond
- ModelSim
- Aldec
- Matlab/Simulink
- VCS(Synopsys)

Programming Languages:

- VHDL
- Verilog, SystemVerilog
- System C

Software Development

Our software engineers have hands-on expertise in developing applications for data collection, data visualization and analytics, as well as image processing and recognitions.

Requirements & Analysis

Gathering the necessary specifications and posing applicable questions to fully grasp what is required.

Design

Requirements are organized, and diagrams are drawn to model the flow of the system software.

Implementation

We are comfortable working with many different development environments (Visual Studio, Android Studio, Xcode), databases (MySQL, PostgreSQL, SQL Server) and programming languages (C/C++/C#, Java, JavaScript, PHP, Python).

Testing

Through rigorous verification, we will ensure that every process is functioning effectively and as intended. We won't settle for anything less than the best result.

Maintenance

We continue to support the system as requirements evolve or issues arise. We are always here to help!

Platforms:

- Linux
- Windows
- iOS
- Android
- AWS (Amazon Web Services)

Programming Languages:

- C, C++
- C#
- Java
- JavaScript
- Swift
- Python
- PHP
- QML (Qt)

Web and Mobile App Design

Platforms:

- Linux
- Windows
- iOS
- Android
- AWS (Amazon Web Services)

Apple’s MFI Development Licensee

NeuronicWorks offers custom web app design and mobile app development services. We specialize in web and mobile apps that are part of IoT systems or provide e-commerce solution for your business.

Requirements

We gather all the information we need by asking our customers as many questions as we can to complete their vision and cover as many details as possible.

Platform Selection and Solution Architecture

At this stage we create an overall plan about how everything will work together. We will deliver a Solution Cost Analysis and service usage breakdowns and solution diagrams with a few solution configuration options.

Implementation

We start to do proof of concept work to demonstrate the application is working. As well, small demos take place to validate the required functionality and look and feel of assets.

Integration and Testing

At this stage we connect all the elements together and link and test the features end to end. We create all the accounts and integrate the services in preparation for release.

Product Deployment & Maintenance

We support you with the official public release and with any future updates, new features, or improvements you want to make along the way.

Industrial Design

Our industrial design team will help you to develop a desirable product. We will research the market of existing products to understand where your idea stands at and will come up with creative concept designs for your future product.

Sketching

We'll create an abundance of sketches to breathe life into the idea you have in your imagination. It's tricky to perfectly match what one has in mind, so we'll continue to improve the look and feel of the design until you're satisfied.

3D Modeling

Using Computer-Aided Design (SOLIDWORKS) software, a digital visualization of the product is conceived. From here, textures, colours, form factor and the general aesthetics can be adjusted to further progress the product's development.

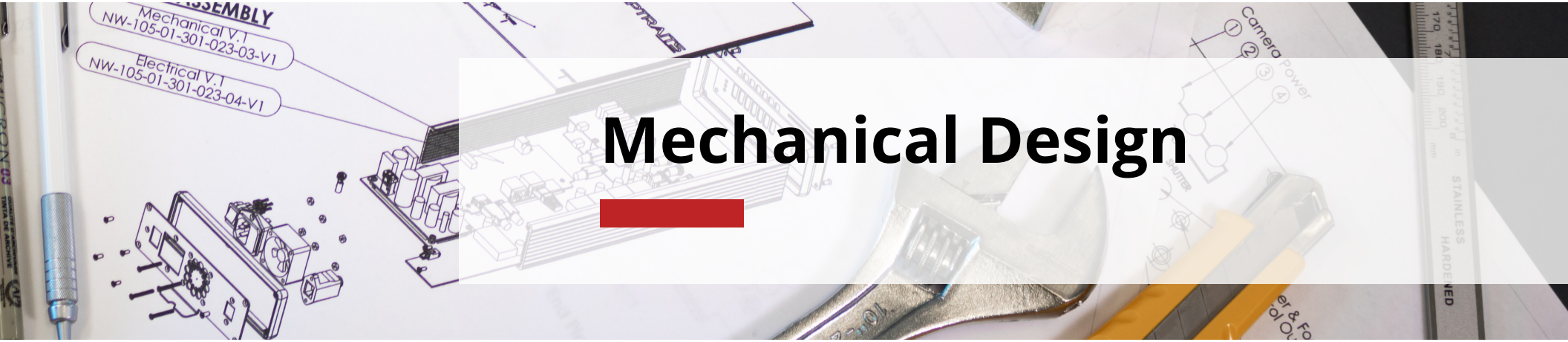
Consulting

Through years of experience and research we have developed an eye for aesthetically pleasing products so we can provide recommendations in regards to optimizing the look, form-factor and functionality. We will work continuously with you to create the best possible product.

Some tools we use include:

- SolidWorks
- MODO
- Keyshot
- Fusion 360
- Adobe Suite

Stand out with a user-centric solution designed for you!



Mechanical Design

From initial napkin sketch to full-blown production, our mechanical engineering team is able to insert themselves anywhere along your timeline to help bring your product to market faster.

Some tools we use include:

- SolidWorks
- MODO
- Keyshot
- Fusion 360

Where ergonomics and functionality meet.

Problem-solving

We separate the facts from opinions and use data and evaluations to specifically identify the problem. Our years of experience in different fields give us the ability to tackle your mechanical problems from various angles. We separate the facts from opinions and use data and eval-ua-tions to specifically state the problem.

Functionality

Ultimately, your product has to work. Through our design process, we will help you implement systems and processes to ensure your product functions as intended considering certifications, sealing, sustainability, among others. Our mechanical engineers always design for manufac-tur-ability, assembly, and repairability to help you get the most out of the product.

Simulation and CAD modeling

CAD modelling is engrained in our design process, with all of our team using the latest version of SOLIDWORKS. We are able to visualize the products and perform fit, molding, bending, and interference checks before going to manufacturing. In addition, we offer stress, frequency, fatigue, and thermal simulation options to help evaluate and optimize the design.

UX/UI Design

Our team of designers will help you understand your customer's needs and develop real solutions through rigorous research and prototyping, extensive user testing, and an iterative design process based on continuous feedback.

User Discovery

Define the problem and conduct user discovery research to understand your customer's true needs and motivations. Outline user personas and inform design decisions through user interviews and questionnaires.

Information Architecture

Organize the application or product's navigation in a logical and intuitive way for the user, enabling them to quickly find appropriate information for the required task.

Sketching, Paper Prototyping, and Wireframes

Combining paper sketching with digital prototyping tools, you will be able to test prototypes, validate the best ideas, and receive feedback early. We will create detailed wireframes for further validation and testing.

UI and Visual Design

Design the product's look and feel based on your requirements and expectations. We will create a style guide for your product, defining colours and graphics, and produce realistic renderings of your future product.

Clickable Prototype

Test, verify, and get feedback on your product's flow and organization with a clickable prototype before committing to the development process. Finalize essential details such as animations, transitions, and micro-interactions to enhance the user experience.

Some design tools we use include:

- Adobe XD
- Sketch
- Figma
- InvisionApp

Testing Support

Testing and the development of test systems are an integral part of our development process and we offer both the infrastructure and expertise to deliver rigorous inspection and testing as part of our design services.

We support our customers with testing and verification at all levels: **Design validation, Qualification and certification, Manufacturing Testing**

Comprehensive Testing Support

We conduct in-circuit testing, parametric testing with bed of nails, functional testing, integration testing, reliability testing and with the help of our partners support environmental testing and certification.

Global Testing & Qualification Support

At NeuronicWorks we have developed numerous automated test systems and test jigs to support high volume production. We have built test systems that range from simple manual functional testers through to fully automated test jig systems. For environmental testing, certi-fication, and qualification we work closely with reputed third-party labs.

We test our designs at every step.

Qualification and Certification

Certification-ready designs for success.

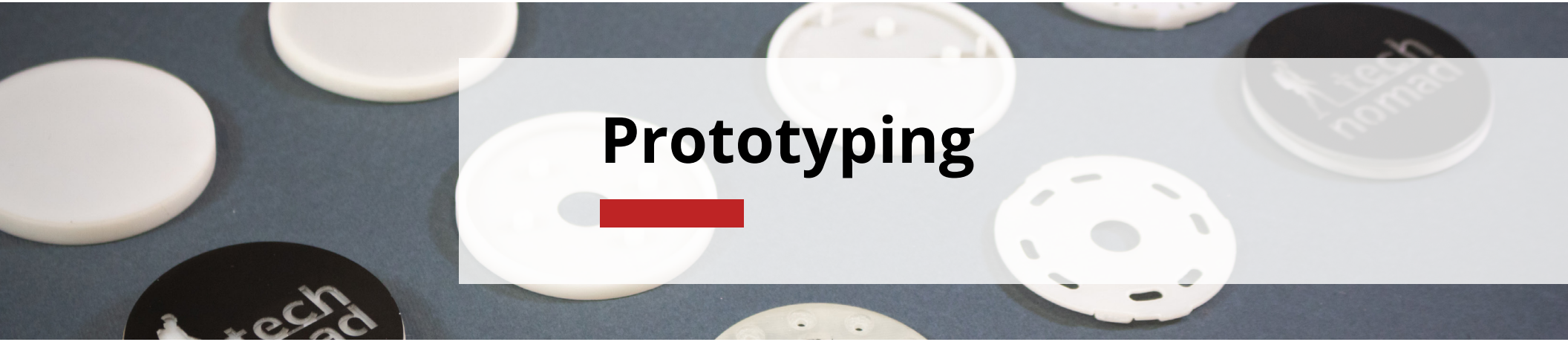
Certification of electronic devices requires incorporating specific design elements throughout the hardware, software, mechanics, RF and other systems. Incorporating these design features from the first iteration of the device can reduce setbacks and can allow for an early assessment of performance and a high level of confidence in the product before the certification process.

Getting it right from the start

Planning for safety and regulatory compliance should start from the concept stage of product development. The sooner it is considered, the lesser pain, additional expenses and delays the project will go through. We have years of experience supporting our clients with their qualifi-cation and certification requirements.

Designing for certification

We have the experience and expertise to determine the certification standards your product requires, and we design with that in mind. We ensure the design of the product meets certifi-cation standards and will guide you to prepare for, apply and obtain the necessary certifications and approvals. With years of experience and success, we can help you integrate certification into your product lifecycle no matter where you are in the process.



Prototyping

We will help you to turn your idea into a feasible mockup in the most time-and-cost-efficient way. You will be able to test and improve your product idea without spending thousands of dollars. From the mockup stage you can adjust your design and move on to a higher resolution prototype version that will closely resemble the final look and shape of your product.

Bring your idea to life

Nothing feels better than having the materialized idea in your hands. We offer affordable 3D modelling. The end result is a realistic model that could be used for 3D printing and further design evaluations.

Close network of partners

We understand that sometimes different levels of precision are required based on the application. 3D printing technology is quickly advancing. Thus, we have built a close network of local 3D printing houses here in Toronto. We work with the best and will never settle for anything less.

Our in-house resources save you time and money.

Project Management

PMP certified project managers

Customized processes to support our unique clients:

- Weekly Meetings
- Can Support Daily Stand-ups
- Track and manage development activities in Jira
- Integrate with your communication methods, source control, and file sharing tools
- Support for requirements elicitation, and traceability

Methodologies:

Agile
Waterfall
Hybrid

NWI Project Management Approach:

Initiation	Planning	Execution	Monitor & Control	Closure
• Identify project scope • Review project scope, project schedule,milestones, and interim deliverables	• Create workflow documents • Gather and coordinate resources	• Review & track milestones • Constantly communicate with client & team	• Bi-weekly Meetings • Scope Management • QA and QC	• Analyze project and team results • Document project closure

PCB Assembly and SMT Services

We offer turnkey PCB Assembly services for prototype and low to high volume manufacturing. We manage turnkey, end-to-end requirements, from procuring bare printed circuit boards and parts through to PCB assembly and testing as required. We also work on consignment orders and in both cases, work closely with our customers to offer high quality services and ensure the fastest possible lead-times.

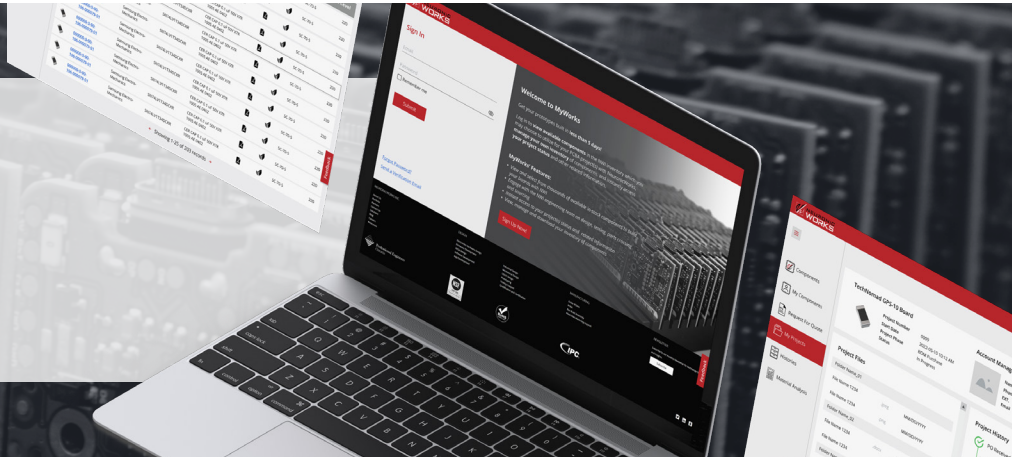
Capabilities

- PCB Assembly types: Rigid, Flexible, Rigid-Flex
- Mixed technology: Surface Mount Technology (SMT) and Through-hole (THT)
- No clean, RoHS 3 (Lead-free) Compliant Assembly Process
- Single or double-sided placement
- Format (length x width): 50 mm x 50 mm to 510 mm x 580 mm
- BGA, µBGA, QFN, QFP, POP, 3D cavities, Lead frame, Pre-mounted, Pin-in-Paste, Broadband, Flat chips
- Smallest size components 0201
- PCBA turnaround time:
  - Rush orders: 1-2 days
  - Prototype: 3-7-10 days
  - NPI: 10-15 days
  - Production: Depends on pre/post-processing tasks: 15+ days

    (TBD based on volume)

Vertically integrated services under one roof.

MyWorks



MyWorks is an online portal from NeuronicWorks for streamlined PCBA order and inventory management. With MyWorks, NeuronicWorks aims to modernize and accelerate prototyping services by seamlessly connecting design, manufacturing, order and inventory management via MyWorks portal to provide an easy, convenient and seamless user experience.

This industry-first platform offers designers, engineers and entrepreneurs with an enhanced ability to easily manage and build their custom electronic solutions. Some of the features include the ability to request instant PCBA quotes, place orders, view available NWI stock of components, manage own inventory of consigned components, access project status and related information.

MyWorks delivers value to users through actionable insights around an accurate components inventory and transparent project status visibility allowing for informed business decisions. Providing access to existing inventory of NWI components allows customers the flexibility and insight to build their design from a wide range of carefully curated inventory of components sourced from accredited sources, a critical benefit during this phase of global components shortage.

Key Features of MyWorks:

- View and select from thousands of available in-stock components to build your boards with NWI
- Engage with the NWI engineering team on design, testing, parts crossing and sourcing
- Instant access to your project(s) status and related information
- View, manage and download your inventory of components

Take charge of your PCB Assembly requirements, register for MyWorks today.

Box Build Assembly Services

We offer turnkey, end-to-end design, engineering, prototyping, certification support and manufacturing services all under one roof and see projects from the initial stages of design all the way to volume production.

Our team of experts offer full, cost-effective electrical and mechanical box build assembly services tailored to customer requirements with quick turnaround times.

We ensure the box builds are carefully constructed to perfectly house the printed circuit board assemblies, user interfaces, the interconnecting cable and wire harness assemblies while meeting design specifications and applicable safety standards requirements.

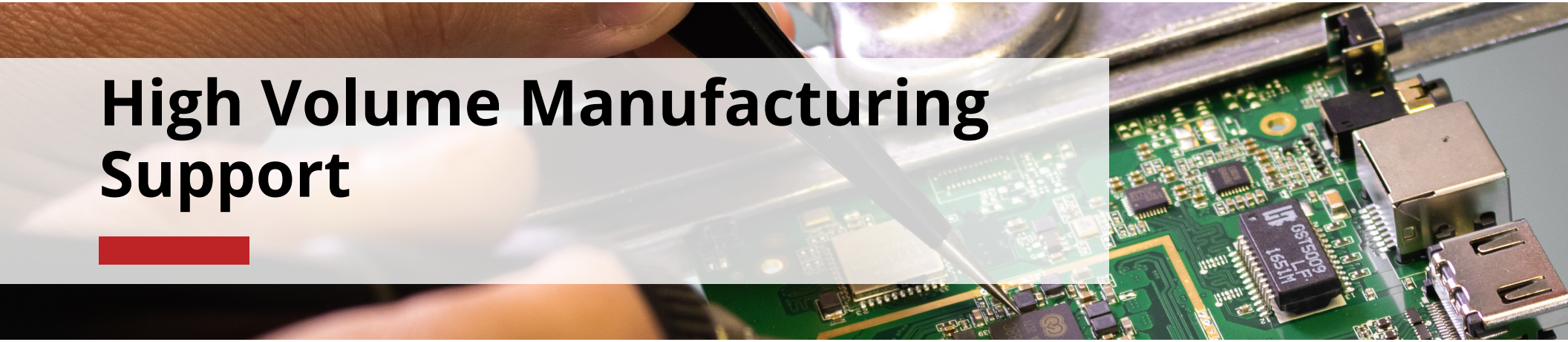
Services

- Sub-level Product Assembly
- System Level Assembly
- Complete Product Testing (in-circuit, and functional testing)
- Complete System Integration
- Quality Control and Assurance
- Inventory Management
- Logistics, Packaging and Shipping

Our Box Build Assembly capabilities include:

> Ultrasonic welding
> Programming and Functional Testing Jigs
> Manual Inspection

Get your products to market faster with our turnkey solutions.



High Volume Manufacturing Support

For high volume manufacturing requirements, we have the expertise and the right network of trusted channels that you can rely on. Our experts will help you to find the right manufacturing option, so you can make the most profit by leveraging production in mass quantities.

Save money

Make the most profit by leveraging production in bulk quantities. Transition from a functional prototype to low-volume production to high volume or mass manufacturing with ease.

Be production ready

For high volume manufacturing, we will prepare and share compatible manufacturing files (including the Bill Of Materials - BOM) for maximum production efficiency. Along with this, we will make sure that all industry standards are respected by supporting you through all the necessary testing and certification procedures prior to production.

We'll give you options

With our network of reliable manufacturing channels, we can channel you to both local and international alternatives, so that you can ultimately make the appropriate decision.

Transition smoothly to mass manufacturing.

Design for Excellence (DFX)

From the very initial design phase, our team implements a ‘Design for Excellence’ process in a systematic approach, identifying potential issues that can impact product cost, quality and delivery time. This allows our designers to incorporate manufacturing and supply chain management know-how from the very beginning and make recommendations for design optimization.

Our Design for Excellence (DFX) expertise includes:

- **Design for Supply Chain (DFSC):** Ensures material sourcing, supply, component compliance and lifecycle requirements are met during design stage.
- **Design for Manufacturability (DFM):** Ensures the manu-facturability of a component or complete assembly meets selected supplier’s capability.
- **Design for Test (DFT):** Preparation of schematic and PCB for optimum test coverage while also developing custom tools (automated test-jigs) to test boards while in production.
- **Design for Assembly (DFA):** Esures product assembly is easy, with fewer parts to assemble using minimum tools in the shortest time.
- **Design for Reliability (DFR):** Ensures the product is designed to withstand the specified field conditions for the intended lifespan.
- **Design for Cost (DFC):** Evaluates a product’s life cycle cost (LCC) and design to reduce the LCC from the onset of product development.
- **Design for Compliance:** Determine the certifications and standards the product has to comply with based on targeted markets and design accordingly.
- **Design for Service (DFS):** Ensures product parts and sub-as-semblies can be easily changed in the shortest time.

MCU, MPU, BT, Wi-Fi and RF modules we have experience with:

Single Board:

• BeagleBone Black
• i.MX 6 (Dual and Quad)
• i.MX 8M (Dual and Quad)
• LattePanda
• NVIDIA Jetson TX1
• Pine 64
• Qualcomm DragonBoard 410c
• Raspberry Pi 2/3/4
• Texas Instruments AM335x (Sitara)

WiFi:

• Atmel: ATWINC1510
• Digi: XBee S6B
• Espressif: ESP32, ESP8266, ESP8285
• GainSpan: GS210x
• Realtek: RTL8710
• Redpine Signals: RS9113
• Silicon Labs: WF200
• Telit: WE310
• Texas Instruments: CC3100, CC3200, CC3220
• u-blox: NINA-W15

Cellular:

•Digi: XBee 3 LTE, XBee 3 LTE-M/ NB-IoT
• microhard: pX2LTE-4GL
• Nordic: nRF9160
• Quectel: BG96, EC21, EC25, SC20, SC606T, RM502Q-AE
• SIMCom: SIM7500, SIM7600
• Telit: HE910, LE910C1, ME910C1
• u-blox: SARA-R4, SARA-U2, TOBY-L2, LARA-R6

Bluetooth / LE:

• Cypress: PSoC4 BLE
• Digi: XBee 3 LTE, XBee 3 LTE-M/ NB-IoT (w/BLE)
• Laird: RM191
• Nordic: nRF52832, nRF52840
• Qualcomm: CSR1010
• Redpine: RS9113
• Renesas: DA14535, DA14580
• Silicon Labs: BGM13P, BLE113
• STMicro: BlueNRG
• Taiyo Yuden: EYSHSNZWZ
• Telit: WE310
• Texas Instruments: CC254x, CC2564

LoRa:

• Laird: RM191
• Microchip: RN2903
• Murata: CMWX1ZZABZ (Type-ABZ)
• Seeed Studio: LoRa-E5 (STM32WLE5)
• Semtech: SX1276

GNSS:

• Maestro: A2235
• u-blox: CAM-M8Q, SAM-M8Q, NEO-6Q,NEO-M9

Z-Wave:

• Silicon Labs: ZGM130S

Microcontrollers (MCUs) and Microprocessors (MPUs):

• Analog Devices: BF609, BF707 (Blackfin DSPs)
• Cypress: PSoC 4 BLE
• Intel: x5-Z8350 (x86 Atom)
• Microchip: ATmega, ATSAMA5D27, ATSAM3X, ATSAM4L, ATSAM4S, ATSAMD51N, ATtiny, ATSAMD21, ATSAMC21, ATSAME51, PIC10, PIC16, PIC18
• NVIDIA: Jetson TX1
• NXP: i.MX 6 (Dual and Quad), i.MX 8M (Dual and Quad), i.MX RT series (crossover MCU/MPU), K22, K64, K81 (Kinetis secure MCU), MMA9553L, LPC2000, LPC54000
• Qualcomm: Snapdragon 410E
• Quectel: SC20, SC600T
• Renesas: RL78G14, RA6M3, RZ/A1H, R5F10, RL78G12
• Silicon Labs: EFM32, EFR32, EZR32
• STMicro: STM32 F0/F1/F4/F7/G0/H7/L0/L4/U5/WLE5
• Texas Instruments: AM335x (Sitara), CC3200 (SimpleLink), CC254x (RF), DM369 (Da Vinci), LM3S9B (Stellaris), MSP430, TM4C123 and TM4C129 (Tiva C), TMS320
• Xilinx: Zynq-7000

Proprietary RF:

• HackRF: HackRF One (software defined radio)
• STMicro: SPIRIT1 (sub-GHz)
• Texas Instruments: CC1101

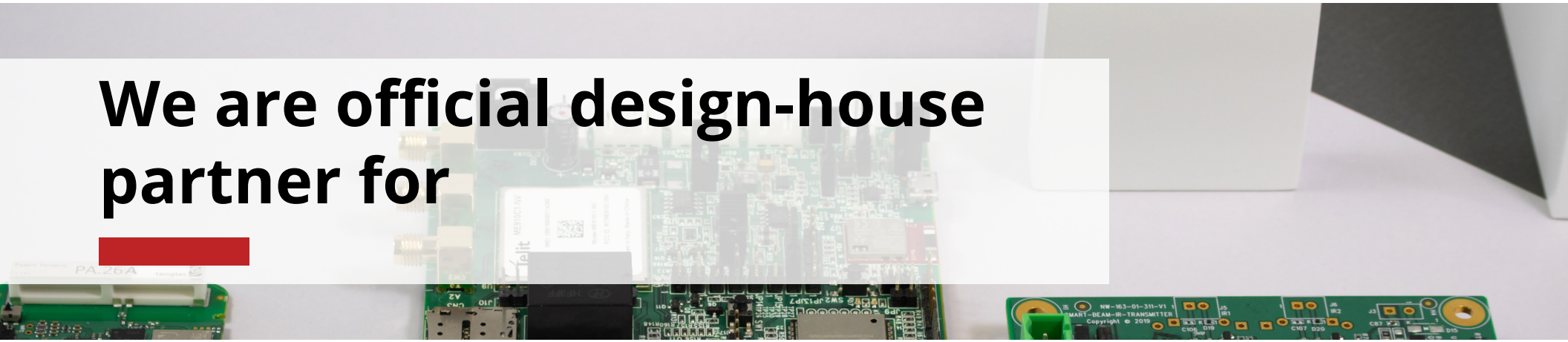
Zigbee:

• Digi: XBee S2C

Why should you trust us?

500+	250+	60+	16	6
years of combined experience	successfully completed projects	highly skilled engineers and designers	industries disrupted with innovative technology	months - average project completion

Customer owns the IP	Customer has full control of the design process	Total transparency of the work process	Total confidentiality is guaranteed	Support during all stages and post-delivery process



We are official design-house partner for

Selected industry partners

Ecosystem partners

NEURONIC WORKS

Our Design, Your Success!

Contact Us

If you are seeking to have a reliable production-ready product designed and built to your specifications in the timeliest and most cost-effective method possible, look no further!

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