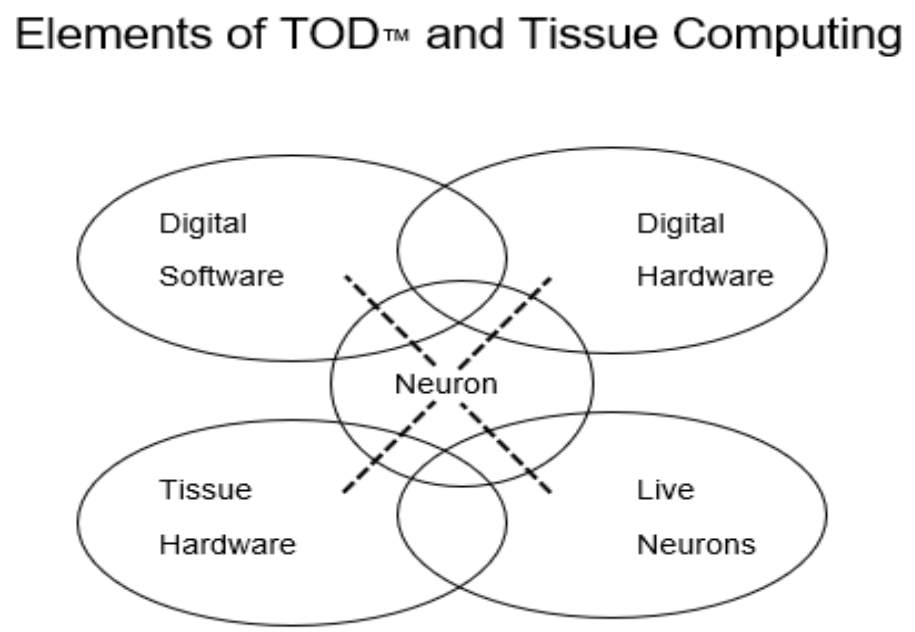
Elements of TOD™ and Tissue Computing

"The Age of Tissue Computing has Arrived™"

Brought to you by BCM Industries

The forthcoming family of Tissue Operating Devices (TOD™) with Tissue Computing (TC) utilizing millions of live neurons includes five unique elements. Illustrated in the Figure these elements include Digital Software, Digital Hardware, Tissue Hardware, Neuroware, and Live Neurons.

The unification of these five elements into a user-controllable, high-performance neural processing system is a significant leap forward in the application of live neurons to address thousands of commercial and consumer market applications. The following introduces each element and its basic function within a TOD™ system. This is an overview, for additional information visit the BCM Industries (BCM) website.



Code: ---- Neuron Digital Interface (NDI) links all TOD™ elements together into a fully functional live neuron operational system.

Digital Software – This subsystem includes all types of digital computer software required to operate the digital hardware used in the development, testing, and operation of TOD™ models. This software is also used in support of development, system integration, acceptance testing, and operational support. It includes digital computer operating systems, tools, utilities, and application programs used by TOD™ and the BCM operation of research, development, and manufacturing facilities.

Most of this digital software is commercially available from many sources, including open-source libraries, with limited or no modification required. In addition to conventional software, many open-source libraries are available providing digital-to-neural control and management software. Many of these open-sourced neural programs were developed in support of the development and operations of IBM's and Intel's computers employing artificial neuron chips.

Digital Hardware – This subsystem consists of digital hardware. Specifically, the TOD™ control Laptop, the integrated Management Computer residing within each TOD™ model, and all digital hardware employed for TOD™ system development, integration, testing, manufacturing, and quality assurance.

All of this digital hardware is standard digital motherboards, processors, servers, and laptops. All required components and hardware for this subsystem are commercially available from many sources.

Tissue Hardware – This subsystem, the Tissue Computer (TC) is the proceeding core of TOD™. It consists of all the customized live neurons and other components required to support TC operation, including environmental support systems to maintain the health of the neuron population. Within the TC are individual, sealed TC Boxes, which are plug-and-play replaceable live neural processing units. Upon failure, an individual TC Box is replaced by authorized TOD™ support service personnel at a customer's site.

The BCM Team has extensive skills and experience in cell design, growth, and tissue engineering. These skills are supported by special equipment, tools, clean rooms, labs, procedures, and facilities to assure quality fulfillment of the process of designing, growing, building, and sustaining TC subsystems and the millions of neurons populating all TC Boxes and supporting systems.

Neuroware – This subsystem (TC Neuroware) is a new form of processing "ware". Neuroware is not software, but rather the process of training, guiding, and monitoring the physical and operational state of living neurons and neural networks. Neuroware uses bi-directional input and output activities, guidance procedures, and both planned and reactive processes and tasks to accomplish these functions. TC Neuroware is implemented through a Neuron to Digital Interface (NDI) unit that transforms digital data into information recognized by neurons and vice versa. Neuron recognizable input data can also arrive in the form of analog sensory signals and the guidance and monitoring of these analog activities is also a part of Neuroware.

Neuroware activities and programming became an accepted operating element in research laboratories beginning in 2000. With the forthcoming arrival of TOD™ and the associated expansion of accessible neural processing capacity, the need for, and the resources focused upon and the acceptance of Neuroware has expanded. This expansion will be enhanced with the many forthcoming, TOD™ sponsored and supported TC Neuroware open-source programming development groups, and communities, plus many Neuroware tools, utilities, and application program libraries.

Live Neurons - This subsystem (TC Neurons) is a new and unique form of neurons that are constructed from natural live neurons (nerve cells), but not humans. They are modified by BCM to provide enhanced TOD™ configuration-specific, high-performance processing, data storage, data transfers, and customized sensor input signal processing functions within the confines of a TOD™ Tissue Computer.

Although TOD™ configuration-specific enhancements of live neurons to address thousands of processing applications are new, the reconfiguring, customizing, and adaptation of live neurons to enhance functional capabilities and performance has been an ongoing activity in research laboratories for decades. In support of these activities, recent efforts have affirmed the ability of Neuroware to write, store and read data files within the DNA of a neuron. This is one of many neuron modification procedures and enhancement efforts that allow TOD™ to offer near blinding processing speed and throughput, massive data storage capacity, and lighting fast data transfers.

For additional information on TOD™, Tissue Computer, these subsystems, and related subjects visit the BCM Industries (BCM) website.

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