

**ELECTRONIC INVENTION INFO**  
**7<sup>TH</sup> INT'L INVENTORS'S DAY (IID) VIRTUAL CELEBRATION**  
**2014 JUNE 13, HUNGARY**

**1. I.R.IRAN: First Institute Researchers and Inventors (FIRI)**



**2. FIRST EVER PATENTED INVENTION IN I.R.IRAN**

**TITLE: A Gas Laser**

**PATENT INFO:** Iranian Patent Office – 1960, December

**INVENTOR:** Professor Ali JAVN (Persian: علی جوان)



**DESCRIPTION:** The gas laser was the first continuous-light laser and the first laser to operate "on the principle of converting electrical energy to a laser light output." By definition, "a gas laser is a laser in which an electric current is discharged through a gas to produce light.

**IMPORTANCE OF THE GAS LASER:** The gas laser laid the foundation for fiber optic communication. Laser telecommunication via fiber optics is known to be the key technology used in today's Internet. Helium-Neon gas lasers were the first lasers to be mass-produced. They were used in everything from UPC checkout scanners, video disc players to medical and monitoring technologies and laser printers. Although they have been largely replaced by diode-pumped solid state lasers and laser diodes, they are now used principally for specialized applications such as interferometry and holography due to their long coherence length and Gaussian irradiance profile.

**Award:** Notable award, Albert Einstein World Award of Science (1993)  
<http://www.consejoculturalmundial.org/winners-science-alijavan.php>



### 3. TOP THREE IRANIAN PATENTED INVENTIONS IN THE 20<sup>th</sup> CENTURY

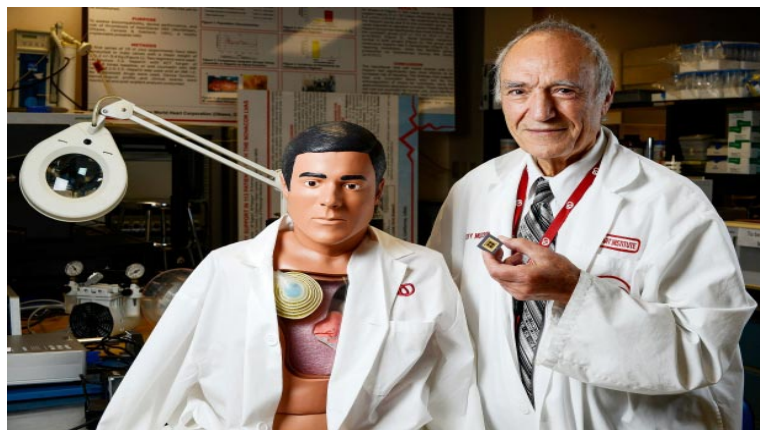
#### 3.1 – TITLE: **Electrohydraulic Ventricular Assist Device**

**PATENT INFO:** Iranian Patent Office – 1994, September

**INVENTOR:** Professor Tofy MUSSIVAND (Persian: توفیق موسیوند)



**DESCRIPTION:** The invention is directed to a unified system for an electrohydraulic ventricular assist device adapted for implantation in the thorax and for cannulation to the blood circulatory system comprising an internal electronic controller for generating an actuating signal actuating means for converting the actuating signal into a back and forth rhythmic displacement of a fluid, a blood pumping chamber having an inflow blood port and an outflow blood port for converting the back and forth displacement of the fluid into a rhythmic unidirectional displacement of blood through the inflow and outflow port, hermetic coupling means for supplying the internal electronic controller with a supply voltage, detecting means for generating the actuating signal in response to the status of the blood pumping chamber, a volume displacement chamber (VDC) acting as a reservoir for the back and forth rhythmic displacement of a fluid, and a support with a surface curvature compatible with the internal human sagittal and transverse chest wall curvatures for supporting the internal electronic controller, the actuating means, the blood pumping chamber, the hermetic coupling means and the detecting means in a compact structure with the blood pumping chamber arranged with the inflow and outflow ports oriented away from the support and the structure with an overall size that when the unified system is placed within the human thorax with the support surface adjacent the chest wall, the structure does not adversely compress adjacent organs.



### 3.2 – TITLE: **Microscopic Surgical Training**

**PATENT INFO:** Iranian Patent Office - 1950, December

**INVENTOR:** Professor Majid SAMII (Persian: **مجید سمیعی**)



**DESCRIPTION:** Professor Majid SAMII began for Microscopic surgical training in 1950 during the first term began in 1956 with the help of Germany's first microscopic surgery practice lab [Volkswagen Foundation] established.

Microsurgery is a general term for surgery requiring an operating microscope. The most obvious developments have been procedures developed to allow anastomosis of successively smaller blood vessels and nerves (typically 1 mm in diameter) which have allowed transfer of tissue from one part of the body to another and re-attachment of severed parts. Microsurgical techniques are utilized by several specialties today, such as: general surgery, ophthalmology, orthopedic surgery, gynecological surgery, otolaryngology, neurosurgery, oral and maxillofacial surgery, plastic surgery, and pediatric surgery.



### 3.3 – TITLE: **Human power amplifier for vertical maneuvers**

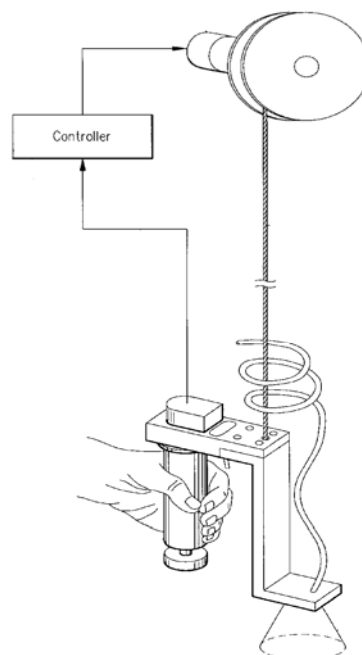
**PATENT INFO:** Iranian Patent Office - 1999, May

**INVENTOR:** Professor Homayoon Kazerooni (Persian: همایون کازرونی)



**DESCRIPTION:** A human power amplifier includes an end-effector which is grasped by a human operator and applied to a load. The end-effector is suspended, via a rope, from a take-up pulley, winch or drum which is driven by an actuator to lift or lower the load. The end-effector includes a force sensor which measures the vertical force imposed on the end-effector by the operator and delivers a signal to a controller. The controller and actuator are structured in such a way that a predetermined percentage of the force necessary to lift or lower the load is applied by the actuator, with the remaining force being supplied by the operator. The load thus feels lighter to the operator, but the operator does not lose the sense of lifting against both the gravitation and inertial forces originating in the load. The operator has direct contact with the load (through the end-effector) there need be no switches, valves, keyboards, teach pendants, or pushbuttons in the human power amplifier to control the lifting speed of the load.

All of the foregoing deficiencies are overcome in a human power amplifier according to this invention. The human power amplifier includes an end-effector to be held by a human operator; an actuator such as an electric or air-powered or hydraulic motor; a computer or other type of controller for controlling the actuator; and a rope, cable, wire or other type of line for transmitting a tensile lifting force between the actuator and the end-effector. The end-effector provides an interface between the human operator and an object which is to be lifted. A force transfer mechanism such as a pulley, drum or winch is used to apply the force generated by the actuator to the rope or other line which transmits the lifting force to the end-effector. (Note that the word "lifting" herein refers to both lifting and lowering motions.)



## 4. TOP THREE IRANIAN PATENTED INVENTIONS IN THE 21<sup>st</sup> CENTURY

### 4.1 – TITLE: **Spintronics microwave nano-oscillator with anisotropic materials**

**PATENT INFO:** Iranian Patent Office – 2010, February

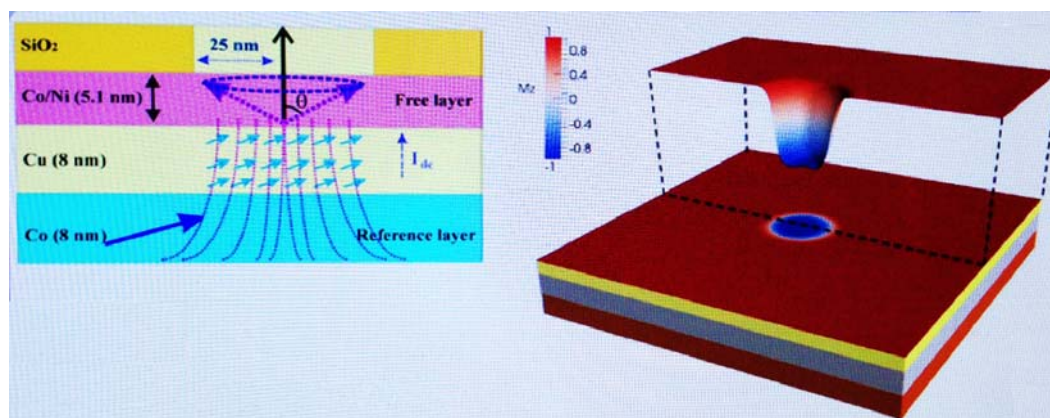
**INVENTOR:** Mr. Seyed Majid Mohseni Armaki (Ph.D.)

(Persian: سید مجید محسنی ارمکی)

**Collaborators:** Sohrab R. Sani, & Johan Akerman



**DESCRIPTION:** Spin-transfer-torque (STT) is established in a three layers spin valve (left figure) made of two magnetic layers separated via a metallic/insulator spacer. While a high current crosses over the structure, a spin polarized current from one magnetic layer (reference layer) passes through the spacer and impinges on another magnetic layer (free layer) and then changes the resistance of the whole structure, causes an unstable equilibrium between damping and STT resulting in precession of the free layer and finally revealing a time variable voltage with nanosecond rate. Finally, this device is able to transfer dc current to ac voltage, with sub-micron size, is able to be integrated in microelectronics beside other semiconductors, has a wide band frequency operation tunable with current and magnetic field. In this application, results of spin-torque oscillator (STO) fabricated with high perpendicular magnetic anisotropy from ultrathin Co and Ni multilayers (as free layer) are presented. We first achieved an STO with high frequency output (12 GHz at 0 T and 40 GHz at 1 T), tunable with current and magnetic field. As featured scientific achievement, dynamical magnetic droplet as a spintronics soliton object (right figure) is observed. Such droplet soliton was already predicted in 1977 with Russian scientists, and however, with high amount of scientific reports after the first prediction, it has yet remained demanding for experimental evidence. Our observations and measurements reflect nonlinear dynamical droplet including, periodical droplet un-centering and droplet deformation and droplet spinning. Such droplet can produce field and current frequency shifter; and is able to increase the output power of STOs, shows step resistant changes, all new in nonlinear physics, spintronics, and also opened new horizon in observable mathematical object for future studies.





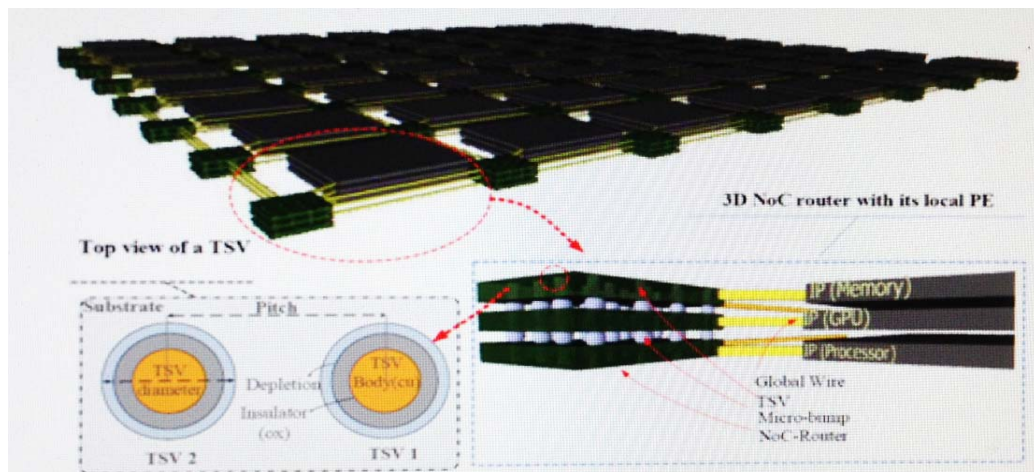
**4.2 – TITLE: Design and analysis of high performance and low power computer architecture based on the notion of Network-on- Chip (NoC)**

**PATENT INFO:** Iranian Patent Office – 2012, October

**INVENTOR:** Professor. Nader Bagherzadeh (Persian: **نادر باقرزاده**)



**DESCRIPTION:** As the number of cores for a System-on-Chip (SoC) increase to hundreds of units, it will be much harder to use the same old techniques based on the bus central architecture to develop the next generation SoCs. Long wires due to bus central designs result in wire delays that require multiple clock cycles to traverse across the chip. These designs tend to be slow and require power consumption levels that are not acceptable for embedded systems as well as high performance machines. In this work we are investigating the notion of Network-on-Chip (NoC) for the design of future generation SoCs. We have developed efficient new routers for managing packets, devised new mapping and scheduling algorithms for executing tasks on multiple cores, and introduced new modeling approaches for evaluating the behavior of NoC architectures under realistic work load conditions. We also plan to extend our work to 3D NoCs



#### 4.3 – TITLE: Development of new technologies in propagation and growing walnut trees in Iran

**PATENT INFO:** Iranian Patent Office – 2011, March

**INVENTOR:** Mr. Kourosh Vahdati (Ph.D.) (Persian: کوروش وحدتی)



**DESCRIPTION:** Iran is the second producer and the most important source of walnut genetic in the world. Besides high nutritional value of walnut, it also has a high potential for export. This project is the results of “20 years research on walnut in Iran” which were carried out aiming “to improve growing and export of walnut using new technologies” in this county. Some of the most important achievements of this project include: commercial propagation of walnut grafting under greenhouse and moist bed conditions, commercial propagation of walnut topworking for changing inferior walnut genotypes; refining walnut micropropagation methods and commercialization of this method by private companies; identification and evaluation of walnut genotypes in Iran; selection of dwarf rootstocks of walnut; introducing a protocol for propagation of walnut by stool layering; improving seed germination methods of walnut; selection of drought tolerant rootstocks of walnut; genetic engineering of walnut for tolerance to drought and salt stresses; production of haploid plants in walnut; measuring of chilling requirement and cold tolerance in walnut cultivars; finding reasons of walnut kernel browning; collaboration in design and construction of post-harvest machineries such as walnut dryer, sorter, huller and sheller.

