Needs assessments

Nanotechnology and IA Lab (1 000 000 $)

Objectives of the laboratory:

The Artificial Intelligence research laboratory will be primarily focused on the application of AI in the field of industrial engineering, while fostering collaboration with the electronics and energy options for interdisciplinary projects. Additionally, the laboratory is committed to conducting projects for the faculty and, if possible, welcoming international and national projects from other faculties or companies.

Equipment and infrastructure:

The cost of setting up a server to accommodate researchers in an artificial intelligence research laboratory can vary based on hardware specifications, brands, and suppliers. Here's an example configuration with indicative prices, (please note that actual prices may fluctuate depending on the market and specific offers):

Article Nb	Designation	Characteristics		Unit price (DT)
	Pynq-z1: python productivity for Zynq-7000 ARM/FPGA SoC (couleur rose)	zynq XC7Z020-1CLG400C SoC	30	929,140
		pripheral controller SPI, UART, CAN, I2C		
		650MHZ dual core Cortex-A9 processor		
		Artix 7 family programmable logic		
		XADC		
		programmable from JTAG		
	Kria KV260 Vision AI Starter Kit	FPGA SoC pour des applications en IA	30	769,1
	Kria KV260 Power Supply and Adapter	Cable d'alimentation de la carte Kria KV260	30	75

	Zynq UltraScale+ MPSoC ZCU106 Evaluation Kit	quad-core Arm® Cortex®-A53 applications processor, dual-core Cortex-R5 real-time processor	30	10007,55

Example server configuration:

- Processor: 2 x Intel Xeon Gold 6248R (approximately $3,500 each)
- RAM: 512 GB of RAM (approximately $8,000 for the complete configuration)
- Graphics cards: 4 x NVIDIA A100 Tensor Core (approximately $10,000 each)
- Storage: 4 TB of SSD NVMe storage (approximately $800 for a 4 TB SSD)
- Operating system: Windows Server or Linux License (cost depends on the version and required licenses)

Network and connectivity:

10 Gbps Ethernet network cards (approximately $300 for a 10 Gbps network card)

Secure VPN connections (cost depends on the chosen VPN solutions)

Software and frameworks:

Machine learning frameworks (TensorFlow, PyTorch, Scikit-learn): free, open-source

Development environments (Python, Jupyter Notebook): free, open-source

Cooling and power supply:

Cost depends on the chosen cooling solution and redundant power supply.

Backup and security:

Cost depends on the chosen backup solution and security software.

Total estimated configuration cost: approximately $50,000 to $60,000.

Computers:

The features of a laptop can vary depending on the intended use and specific needs of the user. Here are the key features to consider when choosing a laptop:

- Processor (CPU): The processor determines the speed and computing power of the computer. Intel Core i5 or i7 processors and AMD Ryzen processors offer good

performance for general use, while high-end processors like Intel Core i9 or AMD Ryzen 9 are suitable for resource-intensive tasks such as artificial intelligence or 3D rendering.

· RAM (Random Access Memory): RAM affects the speed of program execution. For general use, 8GB of RAM is usually sufficient, but for more demanding tasks, 16GB or more is recommended

· Storage: Laptops are typically equipped with Hard Disk Drives (HDD) or Solid-State Drives (SSD). SSDs offer faster performance and better responsiveness compared to HDDs. A 256GB or larger SSD is recommended for daily use.

· Graphics Card (GPU): If you need to do gaming, graphic rendering, or machine learning tasks, a dedicated graphics card (NVIDIA GeForce or AMD Radeon) is essential. Otherwise, integrated graphics processors are sufficient for general use.

· Screen Size: The screen size can vary from 11 to 17 inches. Choose the size that best suits your needs in terms of portability and visual comfort.

· Screen Resolution: A Full HD resolution (1920 x 1080 pixels) offers sufficient sharpness for most tasks. For superior image quality, opt for a higher resolution such as 4K (3840 x 2160 pixels).

· Connectivity: Ensure that the laptop has the necessary ports and connectors for your needs, such as USB ports, HDMI, Ethernet, etc.

· Battery Life: For portable use, look for a laptop with good battery life to avoid frequent recharging.

· Weight: If you plan to carry your laptop often, opt for a lightweight and portable model.

· Operating System: Choose between Windows, macOS, or Linux based on your preferences and software needs.

These features are a starting point for choosing a laptop that meets your specific needs. Consider your budget, personal preferences, and intended use to find the ideal laptop.

Laptops with AI-friendly specifications: $800 - $2000 (or higher for high-end configurations).

---> Laptops for researchers: 20 x $1500 (average estimation) = $30,000

The cost of sensors can vary depending on the type and intended application. For example, IoT sensors may cost $10 to $100 each, while specialized sensors could be more expensive, but an average budget estimate could be $5,000 - $10,000.