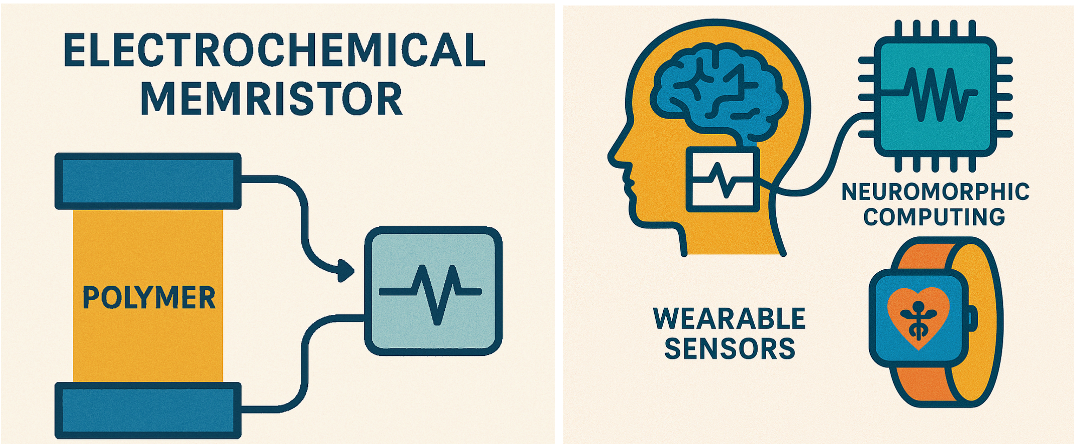
In a world increasingly shaped by Artificial Intelligence (AI) and the Internet of Things (IoT), the need for smarter, faster, and more energy-efficient memory technologies is greater than ever. Traditional computer systems face growing limitations in speed and energy consumption due to the physical separation of memory (RAM) and processing units (CPU). **Memristor** is a new type of electronic component that can "remember" electrical signals even when its power is turned off. Instead of traditional silicon-based computations, memristors do brain-like computing with reduced energy consumption. To make computers based on memristors, we need cheap, scalable, eco-friendly materials for their fabrication.



This project explores a promising direction in this field: **electrochemical memristors**. Unlike conventional devices made from rare, toxic, or energy-intensive materials, electrochemical memristors can be built from **soft, biodegradable, and water-compatible materials**, such as natural polymers and hydrogels. These devices operate at low voltages (which is beneficial from an energy standpoint), can be flexible, and even work in water environments, making them ideal for **wearable electronics** and **implantable sensors**.

At its core, **this research will uncover how the nanoscale interactions at the interface between electrodes and polymers lead to the memory effect.** By better understanding these mechanisms, we aim to develop next-generation memristive materials for artificial neurons that are not only smarter and more adaptable—but also cleaner, safer, and more aligned with the needs of a sustainable technological future.