

IR.8.	
Inventors	Matin Hayati
Invention	Automated Analysis and Visualization of EEG Signals for Seizure Prediction Using Frequency Band Decomposition
Institution	Iranian Youth Science and Technology Center (IYSTC)
Abstract	This project presents an automated method for processing and visualizing EEG signals to support seizure prediction. Using Python and Butterworth bandpass filters, EEG recordings from healthy individuals and epilepsy patients were extracted, filtered, and visualized across the five standard frequency bands (Delta, Theta, Alpha, Beta, Gamma). For each recording, a composite image was generated to represent the frequency profile and labeled based on the subject's condition. The results revealed clear differences in EEG patterns between healthy and epileptic individuals, especially in Beta and Gamma bands. This system provides an efficient way to generate well-organized, labeled datasets that are ready for machine learning applications. It offers a scalable and reproducible tool for researchers aiming to improve automated seizure detection.
IR.9.	
Inventors	Arshia Chehrezad, Taha Tajik
Invention	Fabrication of a Hydrogel Containing Captopril and Investigation of Its Effects on Oral Ulcers in Type 2 Diabetic rats
Institution	Iranian Youth Science and Technology Center (IYSTC)
Abstract	Oral wounds are a common yet understudied complication in patients with type 2 diabetes due to impaired tissue regeneration and prolonged inflammation. In this research, we developed and tested a novel topical hydrogel incorporating the antihypertensive drug Captopril, aimed at accelerating oral wound healing. The hydrogel was engineered with favorable physicochemical properties suitable for mucosal application. Using a diabetic rat model, we assessed its effects on wound closure, inflammation levels, and epithelial regeneration. Compared to the control group, the Captopril-based hydrogel significantly reduced inflammation, enhanced re-epithelialization, and promoted overall healing. These results highlight the hydrogel's potential as an innovative, effective treatment option for managing diabetic oral ulcers and improving clinical outcomes in patients with chronic wounds.
IR.10.	
Inventors	Raman Nafarieh
Invention	Evaluation of a novel herbal nanogel formulation on skin cancer cells utilizing the MTT assay.
Institution	Iranian Youth Science and Technology Center (IYSTC)
Abstract	Nowadays, there is a growing interest in biodegradable polymer-based materials due to their diverse applications in the biomedical field. Nanogels are hydrophilic polymeric networks at the nanometer scale, structured in a three-dimensional form with cross-linking bonds, capable of absorbing and retaining substantial amounts of water or aqueous solutions. Due to their nanoscale dimensions, these structures exhibit unique properties such as a high surface-to-volume ratio, suitable colloidal stability, and responsiveness to environmental stimuli, making them particularly well-suited for biomedical applications—especially in targeted drug delivery systems. In this study, a nanogel formulation was developed using plant-derived compounds, including extracts from <i>Viola odorata</i>, Curcumin (from Turmeric), and <i>Spirulina platensis</i>, based on a chitosan–hyaluronic acid polymer matrix. After evaluating its physicochemical properties, the effect of the nanogel on skin cancer cells was assessed using the MTT assay. The results demonstrated that a concentration of 100 mg/mL exhibited a significant pro-apoptotic effect on skin cancer cells.
IR.11.	
Inventors	Moeid Rajabi , Helena Rajabi
Invention	Protecting Curious Little Minds: A Smart Child Safety Solution with IoT and Image Processing