

Biosensor laboratory services in telemedicine solutions for rural areas



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Biography

Hala Elsadek is the Professor at Electronics Research Institute. Her research interests are in RF wireless communications, electromagnetic engineering and micro strip antenna systems. She has five books and six patents. She is an author and co-author in more than 150 papers. She participates in more than 35 research and development projects at the national and international levels. She is included in several biographical indexes and acts as reviewer in many international societies.

Abstract

Rural areas are usually deprived from well-established services. Health services are mandatory and in some case are urgent. One of the important tools to be included in the telemedicine units is Mobile laboratory to detect infections in biological samples. The proposed system is a biosensor consists of microwave cavity resonator that is used for rapid detection of different viruses and bacteria in biological samples. Biosensors, as a diagnostic device, are attractive solutions for rapid and effective disease diagnosis due to their simplicity and ability for real-time analysis. The biosensor device is portable, self-standing and user friendly, so it can be used for early detection of pathogens in the field and rural areas with high sensitivity and specificity based on antigen antibody reaction at the surface of gold plated antenna batches. The change of electrical properties due to antigen-antibody reaction at the modified gold plated self-assembled monolayer surface with right orientation of immobilized antibodies are measured. The system 3D housing is reliable design to increase the measurement accuracy and the device portability. Pocket Vector Network Analyzer (VNA) is used for real time measurements. Biostatistics analysis were done by using ROC (receiver operator characteristics) method to determine the threshold levels for infections. An automated software with machine learning is used to create the patient record as well as the database. The accuracy depends on sensitivity, specificity, positive prediction values and negative prediction values of each microorganism under test. System control software is developed for automation with security over the manipulated data. The whole system is portable and standalone. The results can be stored and sent through internet to MDs. This solution is suitable for telemedicine solutions in rural areas, military applications, medical convoys and quarantine locations. Two patents are registered and several papers are published for this solution.

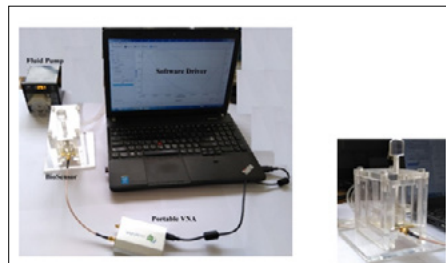


Fig.1 Complete Biosensor Proposed System

Publications

1. Electronics Research Institute, Inventors HalaElsadek, Esmat Abdallah, Dalia Nassaat and Mohamed Ismail, "Portable Movable device for detecting viruses and bacteria in biological Samples", Patent Application Number:245995, July 2019.
2. Electronics Research Institute, Inventors & Holding Company for Vaccines, Inventors: Hala Elsadek, Esmat Abdallah and Dalia Nassaat "Microstrip Cavity Resonator Bio-Sensor for Detection of Different Enteroviruses", Patent Application No.:1852 at Dec. 2013.

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