



## Stroke Diagnosis using Microstrip Patch Antennas Based on Microwave Tomography Systems

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### ABSTRACT

Microwave tomography (MT) based on stroke diagnosis is one of the alternative methods for determinations of the haemorrhagic, ischemic and stroke in brain nervous systems. It is focusing on the brain imaging, continuous monitoring, and preclinical applications. It provides cost effective system and able to use the rural and urban medical clinics that lack the necessary resources in effective stroke diagnosis during emerging applications in road accident and pre-ambulance clinical treatment. In the early works, the design of microstrip patch antennas (MPAs) involved the implementation of MT system. Consequently, the MT system presented a few limitations since it required an efficient MPA design with appropriate parameters. Moreover, there were no specific diagnosis modules and body centric features in it. The present research proposes the MPA designs in the forms of diagnosis modules and implements it on the MT system.

**K** Microstrip patch antenna designs, microwave imaging systems, Debye test bed model, monostatic radar approach and UWB types of MPAs

### INTRODUCTION

The brain stroke is the third major death rate in the human society. It also causes serious long-term disabilities which lead significant economic impact. The current stroke diagnosis methods include computed tomography (CT), positron emission tomography (PET) and magnetic resonance imaging (MRI). The new non-invasive, mobile, real-time and easy to apply technique is microwave tomography (MWT). It is under development for diagnosis of breast cancer, lung cancer, brain imaging and cardiac imaging. Medfield diagnostics AB is an incubator company at Sahlgrenska hospital in Gothenburg, Sweden.

This goal of this project work is to design compact product for ambulances, so the proper stroke diagnosis can be made in earliest stage. The real-time diagnosis is important because of different treatment; the ischemic stroke patients are given thrombolytic treatment which could be fatal for haemorrhagic patients. Currently, two stroke diagnosis techniques are in development, statistical classification, and image reconstruction of human brain. The microwave based techniques need antennas which work in single or multi-frequency ranges. The multi-band operating systems are preferred due to higher resolution and deeper penetration than narrow band counterparts. This project focuses on design of ultra wide-band antenna (UWB) which is ideal for multi-frequency techniques.

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Karanasiou, et al. [1] proposed on microwave radiometry system, determining the tissue temperature, conductivity distribution inside the human body. It offers the non-invasive microwave imaging system operating at 3.5 GHz for feasible brain intracranial applications. Romeu, et al. [2] investigated on 3D UWB magnitude combined tomographic algorithm which improved the robustness and image quality in multi-frequency operation. Ireland, et al. [3] proposed