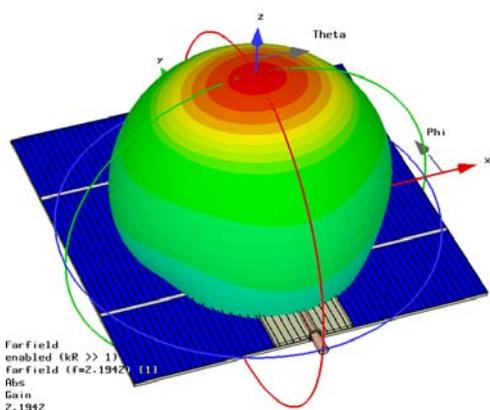
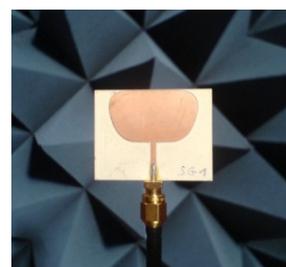


## Antenna Design for Medical Applications

- Hyperthermia applicator antennas
- UWB imaging antennas for breast cancer screening
- Wireless medical sensor network antennas

## Antennas for Personal Communications

- LTE antennas
- WiMAX antennas
- WLAN / WiFi antennas
- GPS / Galileo antennas
- Ultra Wide Band antennas
- Flex circuit PCB antennas
- Reconfigurable antennas

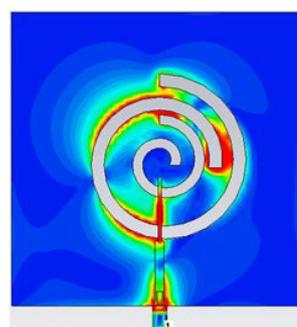


## Combined Photovoltaic Panels and Antennas

- Wireless devices in remote areas
- Independence of grid-power source
- Optimal utilisation of surface space on satellites
- Transparent conductive film antennas on solar cells

## High Performance Circularly Polarized Antennas

- Satellite positioning systems GPS / Galileo
- Satellite communication
- Radio frequency identification (RFID)



### **Compact and High-Performance Circularly Polarized Antennas for the Integration of Wireless Positioning, Communications and Asset Tracking Systems**

Circularly polarized (CP) radio propagation links in satellite communications, positioning and radio frequency identification (RFID) systems are preferred to linear schemes which are subject to losses when arbitrary polarization misalignment occurs between the transmitter and receiver. With CP antennas at both radios, the enhanced gain and cross-polar discrimination improve the systems' resilience to multipath propagating effects. While antenna miniaturization is desirable for small and portable devices, radio links are dependent on a balance of antenna bandwidth, efficiency and polarisation quality which are inherently compromised by size reduction. The project involves antenna design which can support circular polarisation across unprecedentedly broad bandwidths which can lead to viable design solutions for integration with miniaturised radio systems of the future.

### **Antenna Time-Domain Optimization Technique for a Miniaturised Antenna Design**

This project centres on antenna optimisation for signals that exploit time-domain characteristics in communications and ranging systems. Multi-jurisdictional ultra wideband standards (IEEE 802.15.4a) have been allocated frequency spectra for short range, low-powered applications that are sensitive to impulse distortion. Impulse Radio - Ultra Wideband (IR-UWB) use signals in the pico- to nano-second range. To preserve signal quality, it is essential that the antenna does (1) not add significant distortion to the transmitted or received signal and (2) the radiated energy pattern does not introduce significant variation to the signal time of arrival at different angles. In general, the miniaturisation of antennas compromises several of the radiating performances that reduce the communications range or data throughput performances. Fidelity metrics to quantify these effects used to optimise the miniaturisation of single-ended and balanced-feed antenna geometries for time-domain-based applications.

### **Enhanced Ultra Wideband Antennas for Ground Penetrating Radar and Biomedical Imaging Applications**

The goal of this project is to enhance UWB antennas for Ground Penetrating Radar and Biomedical Imaging Applications. Antenna geometries are optimised with focus on minimising their pulse-distortion, size and weight. This work is carried out in collaboration with the Second University of Naples, Italy, where a prototype biomedical imaging system will be used to qualify system performance due to the various antenna designs created. Numerical models of the human body are used to analyse the antenna interaction with multi-layered human tissues. Optimised antennas will be a critical enabler for the realisation of cost effective sub-centimetre image resolution using a UWB impulse method.

### **Combined Photovoltaic and Cellular Antenna Panel for Building Façade Integration**

The integration of Photovoltaic (PV) cells with cellular antenna panels provides for autonomous solar powered communications networks. This research is focused on establishing a practically-oriented rigorous understanding of implications for antenna design theory, photovoltaic characteristics and non-imaging optics when combined for building façade locations. This project is funded by Science Foundation Ireland (SFI-RFP).

### **Design Principles of Antennas for Multiband Reconfigurable Wireless Systems**

This work aims to realise the next generation of fully reconfigurable radio transceivers and associated intelligent antenna systems. With funding from Science Foundation Ireland (SFI), the Telecommunications Research Centre CTVR has based the antenna research in the DIT AHFR Centre.