

# Development of a low-cost radio and phase detector

**Company:** TechApp Consultants Ltd (<https://www.techappconsultants.com>)

**Project open to:** 3rd/4th year undergraduate, Final year undergraduate and Masters students

**Application closing date:** 20th January 2023

**Expected duration of project:** 4-6 months

**Latest start date:** April 2023

**Application link:** <https://forms.gle/sSfkEXM69TcVKhN68>

## Organisation description

TechApp Consultants (TAC) is a technology-led business, focusing on radio frequency (RF) technology and product developments in the space telecom market. Leveraging its knowledge and expertise gained in the space telecom industry, TAC is developing an revolutionary, market-disruptive electronic sensor (trade-marked as Elesen) for smart-farming.

## Project description

### The Elesen project

Smart-farming relies on accurate information from sensors to monitor the key growth parameters (KGPs) of crops, plants, fruits and vegetables (otherwise known as item under monitoring, or IUM). The sensors need to be not only accurate, but also easy to install, easy to operate, durable, highly integrated with the digital world, highly automated, as well as being cost-effective - hence they can be deployed in the mass (quantity) needed for the farm

Today's sensors for the farming industry fail to meet most of these requirements. They are one of the areas impairing the development, growth and adoption of smart-farming technology. Taking the fruit-dendrometer as an example: they are largely based on a tape-measure or calliper type of mechanical design, which is bulky, heavy, intrusive to IUM, inaccurate, expensive and complex to install and operate. They are 'analogue' era products, incompatible with digital Datacom and smart-farming technologies. Thus, they are rarely used by farmers.

TechApp Consultants takes a novel and highly innovative approach in Elesen sensor designs where we use the technology developed for satellite telecommunication and sensing, and explore the electromagnetic waves' properties in radio frequency (RF) signals to measure and monitor IUM's KGPs.

### What will you do?

At the heart of Elesen technology is the use of RF signals to interact, detect and monitor IUM's KGPs. A main building block or sub-system of Elesen sensor is the radio source generator and the radio signal phase detector (known as radio sub-system). This project focuses on the development of the radio sub-system.

The student will be involved directly into radio sub-system development, from concept on drawing board to the realisation of technology and product.

- a) Understanding Elesen technology, product feature, market and customer requirements
- b) Understanding technical requirements and design constraints, especially on radio sub-system
- c) Literature research
- d) Defining design architecture and approach
- e) Technical performance analysis, predication, trade-off and review
- f) Design and development of radio sub-system
- g) Parts procurement and prototype construction
- h) Testing
- i) Design and development report

### The expected outcomes

- a) Working prototype of radio subsystem
- b) Literature research report
- c) Design drawing and report
- d) Test report

### Scope

The project can be descoped if the student's project module does not allow time for the full scope to be completed. Please indicate this in your application if you think this would be the case for you.

### We will provide

- a) Overview of Elesen technology
- b) Design spec, target and constraints
- c) Design tools including laptop and software
- d) Expenses for required hardware, travel, meetings and internet access etc
- e) Mentoring on business, technology and project work



### **Person Specification**

The candidate is expected to be studying or have strong knowledge in physics and/or electronics engineering, with passion and desire in novel technology and product developments.

The candidate is expected to be highly self-motivated, effective in all levels of communications and a good team player.