2. Requirements, Constraints, And Standards

2.1 REQUIREMENTS & CONSTRAINTS

Functional Requirements

- Radar must be able to detect objects that are up to 1 meter away (**constraint**)
- Radar must display sweep/radar image for detected objects
- Use a phase array with phase delay to determine object directions
- Use pulse time delay to determine object distance (the delay between sending and receiving a pulse)
- Use pulses with an ultrasonic frequency of 40 KHZ (**constraint**)

Physical Requirements

- Use 10 ultrasonic transducer transmitters in linear layout (**constraint**)
- Use 1 ultrasonic transducer receiver (**constraint**)
- Transducers must be approximately 10 mm in diameter (**constraint**)

Experimental Requirements

- Provide an Error Log
- Clear component and software testing documentation.

Environmental Requirements

- The sound produced by the radar system must be 40 KHZ, ensuring that it is outside the range of human hearing. It should only be heard by a small number of animals (e.g. a bat)

Resource Requirements

- Raspberry Pi 3 used as server for wireless data transmission
- External supply is needed to power the ultrasonic radar system
- The system with use MA40S4S/R (10S, 1R

Aesthetical Requirements

- Display must be clear, readable, and interactive (allowing for zooming and panning)
- Object data points and groupings must be clear and readable
- The radar must precise down to the at least 1 cm, with 1 mm of precision being optimal (Constraint)

2.2 ENGINEERING STANDARDS

Engineering standards help ensure products have a quality status to strive for, ensuring safety, convenience, reliability, and other various factors. Most products around us adhere to these standards, significantly improving their usability.

IEEE 1471-2000

- This standard deals with creating, analyzing, and maintaining software architecture.
- This standard applies since we will have to deal with the maintenance and display of software with the ever changing device specifications.
- This standard will have to be addressed through thorough documentation.

IEEE 754-2008

- This standard deals with storing floating point numbers in computer systems.
- Indirectly applies since we are using floating point operations which the computer should store, but it may apply directly to how the hardware depicts its data.

IEEE 802.11

- This standard covers transmitting data to a computer wirelessly.
- This standard applies because our project will be using a raspberry pi to transmit data wirelessly.

IPC 2221

- This standard establishes design requirements for PCBs.
- This standard applies to the construction of the radar hardware, since it will be using a PCB board as its foundation.