# LOrawan gateway requirements

## Primary Requirements

### These requirements are the bare minimum needed to ensure a functioning system

1. The board (ST Nucleo F411RE) must boot and be able to run programs

1.1. The board must turn on

1.2. The board must be battery-powered

1.3. The board must run the program from on-board memory

2. The board must be able to communicate with the LoRaWAN module (ic880A concentrator board)

2.1. The board must be able to communicate over an SPI bus

2.2. The ic880A Hardware Abstraction Layer must work on bare-metal

2.3. The ic880A module must function correctly

3. The LoRaWAN gateway must be able to receive signals from at least one LoRa node

3.1. The LoRa nodes must transmit data to the gateway when some button press is detected

3.2. The LoRaWAN gateway must receive signals transmitted from at least 5km away

3.2. Data must be either stored into long term memory or streamed to a PC as it is received

4. The LoRaWAN module/board setup must function offline

4.1. Data collected from LoRa nodes must be stored locally

5. The LoRa nodes must be able to gather global positioning data from some GPS module

5.1. GPS data must be accurate to within 10 metres

6. The LoRa nodes must be able to send the GPS data to the gateway board

6.1. Information from each LoRa node must be easily identifiable as coming from that LoRa node

## Secondary Requirements

### These requirements represent useful functionality that if present, would expand the use-case of the project in a meaningful way

7. LoRa nodes must autonomously send GPS data to the gateway every 30 minutes

8. The gateway board must be able to store data received from nodes onto an SD card

9. The board must be able to reliably receive signals from a large number of nodes (20+)

9.1. The board must not lose LoRaWAN packets if two are received simultaneously

## Tertiary Requirements

### These requirements represent functionality that, although unnecessary for the proper operation of the device, would nonetheless be useful

10. The gateway board must be able to stream incoming LoRa data to a connected computer in real time

10.1. An application on the connected computer must represent the data in some meaningful way (map/radar/etc)