## Objective – Long Range Wide Area Network

**The Norfolk and Suffolk Innovation Network**

**What is it?**

A project that will be implementing a Norfolk and Suffolk county wide network for the Internet of Things (IOT) which will be free to use for Schools, business, the public sector and the public. The technology it uses is LoRaWAN which stands for Long Range Wide Area Network which is similar to mobile phone technology for sending small pieces of information from a sensor to a gateway which then delivers it to the internet. You can't use the technology for making calls, sending pictures, texts or access internet but because of this it can send information a very long way.

## Functionality – Long Range Wide Area Network

The Internet of Things (IOT) is the concept of connecting a device (any device) with a sensor to the Internet to collect data to monitor, manage, control or report. This includes everything from kettles, light bulbs, pollution monitors and flood warning sensors to almost anything else you can think of.

Sensors can be designed, developed and tested by anyone using low cost computing devices such as Raspberry Pis or Arduinos (technology used in many schools), which enables rapid creation of prototypes as they use simple connectivity of electronic components and can be programmed with some intelligence.

Examples include:

- Detection if a kettle is turned on before 10am; if it is not, a member of a person's family is alerted to check on them.
- Highway sensors that dim or brighten lights, depending on detection of movement.
- Automatic opening of the correct compartment of a pill box to administer medications and detect if it has been taken.
- Tracking of herds of cattle, via a sensor that is swallowed, to reduce theft or detect illness.
- Detection if a bin is full and needs to be emptied, which notifies the bin collection service.
- Detection if parking spaces are all full and notifying traffic control systems to redirect traffic

## Collaboration with Norfolk Fire and Rescue Services

- Detection when batteries need replacing in smoke alarms*
- Detection when a defibrillator case has been opened or tampered with
- Monitoring life buoys/rings on the broads and Norfolk Waterways

* Norfolk Fire & Rescue Service (Jonathan Wilby) are working with IoT Solutions (Emma Mahy) and Comms365 (Richard Bridge) to prototype a sensor-based solution, using LoRaWAN coverage, to monitor smoke alarms in the houses of vulnerable individuals such as the elderly. These are being called "Smart Smoke Alarms" and are being sponsored by the local Rotary group (John Beer). Local councillors from WNKLBC and Downham Market Town Council are also supporting this initiative. The idea is to monitor battery levels in smoke alarms, so that replacements can be put in as and when required, rather than needing to visit all properties. And to monitor for when the alarm goes off so a trusted friend can be notified and can call in rapidly to check if it is an emergency or something less sinister such as burning the toast.

## Use in Schools / Education

School children of all ages have been using IoT to help with and create projects. NCC and IMT Solutions are working in collaboration to encourage the usage of IoT throughout schools in Norfolk. Using Arduino boards, it's possible for children to create sensors for a multitude of things including:

- Air Temperature
- Air Pressure
- Humidity
- Gate Sensors
- Rain Fall
- Operational status (is something working or not)
- Carbon Monoxide Footprint
- Footfall

ICT Solutions can work with schools to hold ICT events such as workshops or techathons creating sensors for project use

**Outcomes**

The innovation network will encourage digital skills, the start-up of new business, and prototyping technology, which could have a significant positive impact on the way we deliver our services as a local authority.

## Assets – Long Range Wide Area Network (LoRaWAN)

NCC has started already rolling out a LoRaWAN network, and coverage (as at Jan 2020) is as below:

## Use Cases

Using the growing network, NCC has already instigated a pilot to monitor road temperature in the Great Yarmouth area, which is providing data. This will be further investigated as a means of enabling more efficient and cost-effective winter gritting of roads.
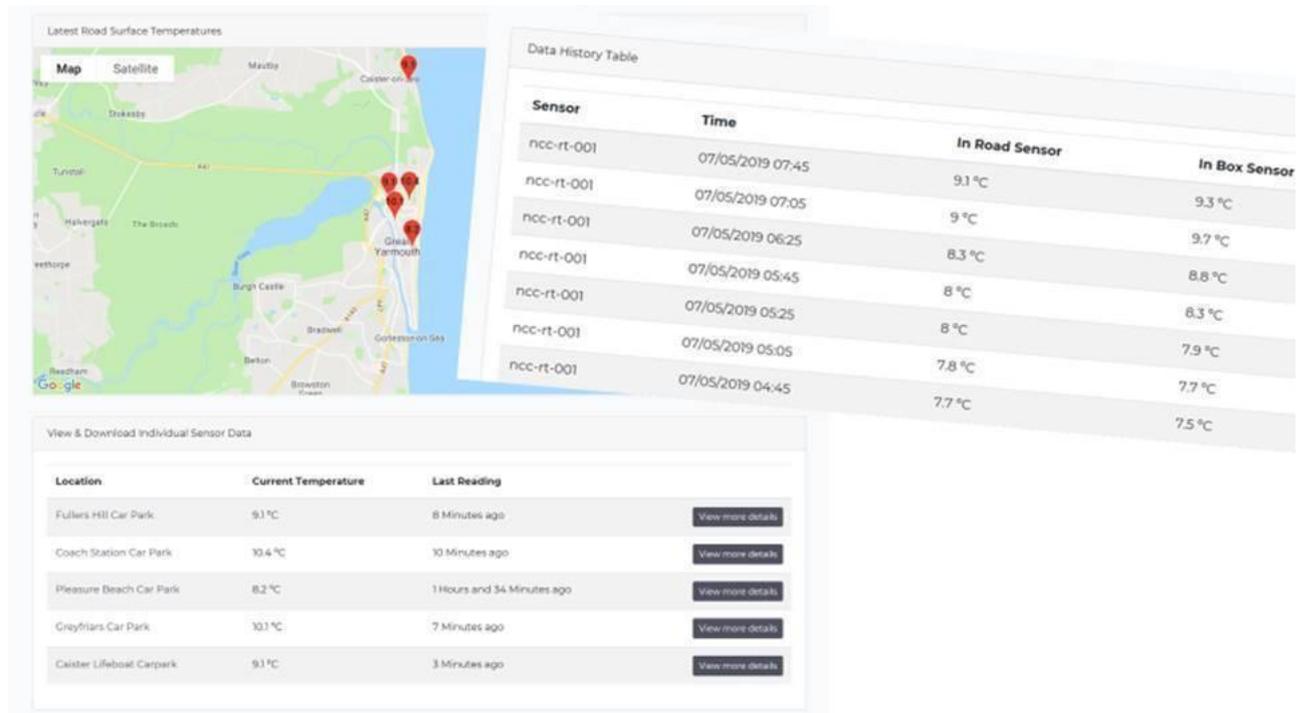
## Health & Safety

NCC take health and safety very seriously and can confirm that all installs are carried out by a contractor who have all the relevant experience and certificates to work at height and use high rise equipment such as Boom Lifts/Cherry Pickers.  All work is carried out behind barriers and each install is covered in install specific RAMS (risk assessment & method statement).

The devices themselves are very safe.  They act as receivers not transmitters and operate at 868 MHz which is a similar if not lower frequency than mobile phones, Wi-Fi, laptop computers, walkie-talkies, baby monitors and microwave ovens all which operate between 900 MHz band and 2.4 GHz band.

Further information regarding Electromagnetic fields (EMF) can be found on the World Health Organisation webpage by clicking on the following link – WHO info