Module Design

In this step of our design process, we outlined the main functions of our system in pseudo code and added tests of expected outputs.

1 - Calculating river water level

INITIALISE initialWaterDepthInput variable

INITIALISE sensorToRiverBedDistance variable to sensorToRiverTopDistance function OUTPUT plus initialWaterDepthInput variable

1.1 - Calculate distance from sensor to river top

sensorToRiverTopDistance function
    INITIALISE timePassed variable to receivePulse variable (milliseconds)
    RETURN **microsecondsToCentimetres** function OUTPUT with timePassed variable as parameter

INPUT	INPUT TYPE	OUTPUT	OUTPUT TYPE
N/A	N/A	function output	float

1.2 - Converting microseconds to centimetres

microsecondsToCentimetres function
// The speed of sound is 340 m/s or 29 microseconds per centimetre.
// The ping travels out and back, so to find the distance of the
// Object we take half of the distance travelled.

RETURN INPUT / 29 / 2

INPUT	INPUT TYPE	OUTPUT	OUTPUT TYPE
Microseconds value	long	Centimetres value	float

1.3 - Return river level in centimetres

riverLevelCM function
RETURN sensorToRiverBedDistance variable minus **sensorToRiverTopDistance** function OUTPUT

INPUT	INPUT TYPE	OUTPUT	OUTPUT TYPE
N/A	N/A	River level in centimetres	float

2 - Connecting to the network

2.1 - LoRaWan set up function

Setup Lorawan function
    If no saved config
        Send Auth keys for things network commands
        Save keys and lorawan config.
    Send Command to connect
    Check if connected, if connected continue else try to connect again after a second's wait. If after three times haven't connected then give up and log failed attempt.
    If setup went well without errors return successful.

INPUT	INPUT TYPE	OUTPUT	OUTPUT TYPE
N/A	N/A	Variable - true or false depending on whether the connection was made	boolean

2.2 - LoRaWan data transmission function

Data Transmission function
    If data is in an incorrect format
        Log an error
    Attempt to send data
    If data wasn't sent ok
        Check for the error
            If connection was disconnected
                Attempt to re-setup and connect
            If data denied sleep
                // Handle
            If there was no free channel
                Wait and attempt to send again
    RETURN boolean - true if data has been sent, otherwise false

INPUT	INPUT TYPE	OUTPUT	OUTPUT TYPE
N/A	N/A	Variable - true or false depending on whether the data was sent	boolean

3 - Storing data in SD Card

3.1 - Writing sensor values and/or errors to SD Card

Write function
    Check initialisation of card
        IF initialisation fails
            Print error message
        Open text file
        IF text file opened ok
            Write INPUT
        Else
            Print error message

INPUT	INPUT TYPE	OUTPUT	OUTPUT TYPE
“Error 101”	String	Create new line in text file with string	
690	int	Create new line in text file with int	