

# Where did my wifi go? Measuring soil moisture using wifi signal strength

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## Idea

Make a WiFi based radar that detects soil moisture by recoring the RSSI value of.



SMAP measures soil moisture in the 1.20-1.41 GHz band

Which is very close to the WiFi band of 2.4 GHz

## Setup

A focussed beam of WiFi signal is aimed at a square meter sample of soil in the lab of Delft University of Technology. A second antenna, connected to a Spark Core is aimed at the same sample. The strength of the spectral reflection is related to the RSSI that the Spark Core registers on its antenna.



Sender, connected to a WiFi router.



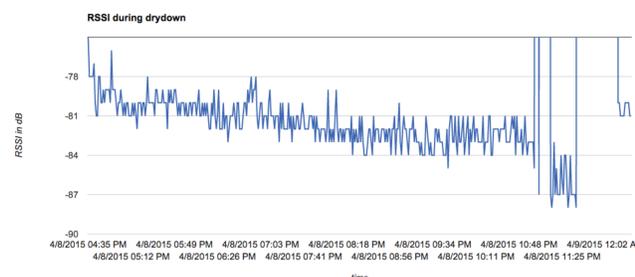
receiver connected to Spark Core



1 m2 soil, with drain. Moisturized using Marotte bottle

## Results

During drydown the RSSI values measured decreased. After 8 hours the RSSI values dropped below detectable levels. When the soil sample was re-moisterized the RSSI values returned to the values observed at the



## Sensors

The sender (WiFi router) and receiver (Spark Core) are both fitted with antennas made of Pringle Cans (antenna) which is itself term fitted to a tv-satellite-dish.

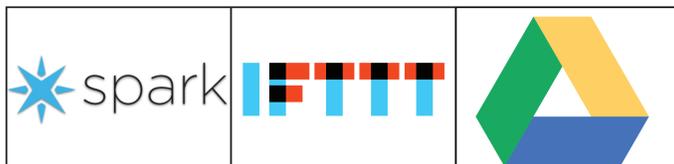


Sender, connected to a WiFi router.

receiver connected to Spark Core

## no-code real time online logging

The receiving antenna is connected to a Spark Core. Since the core is connected to the internet, measurements can easily be uploaded in near real time.



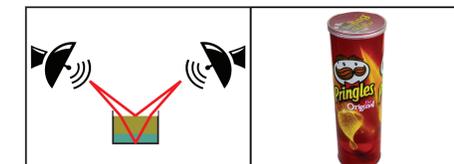
The Spark Core publishes the RSSI value to the Spark Cloud

A IFTTT (If This Than That) recipe triggers on the published measurement

IFTT recipe automatically adds measurement to a spreadsheet in Google Drive

## Problems...

Although a relation between RSSI and soil moisture was found, this relation was counter-intuitive. Further research will focus on finding the reason for this relation. We are looking for a MSc student! Contact us!



Soil sample on concrete floor may introduce unwanted reflections

Pringles cans are fun, but not ideal for WiFi. Fruit cans (larger diameter) are better.