

Background

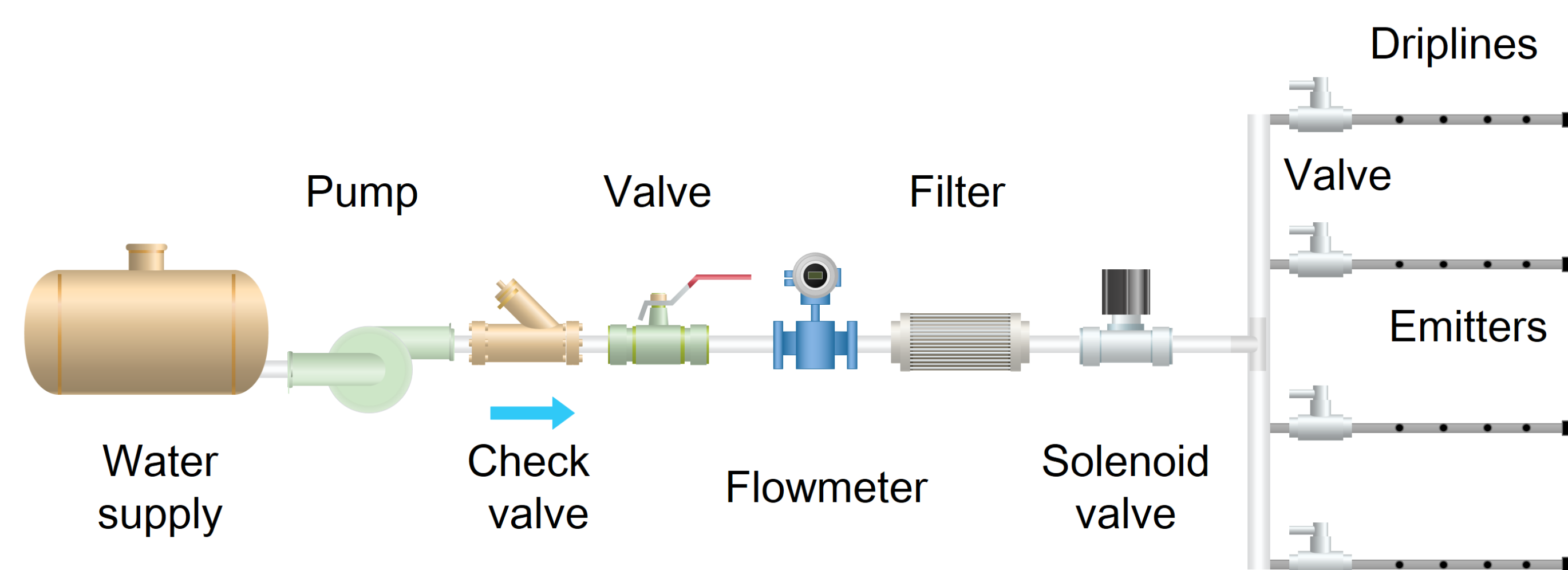
Soil moisture-based irrigation was proved to be effective in water saving and yield increasing due to being capable of maintaining optimal soil moisture condition. While, manual operation with soil moisture-based irrigation still requires an operator to turn on/off system on site at certain time points. This research aimed to develop an automatic soil moisture-based irrigation system using LoraWAN technology in a peach orchard.



Materials and Methods

Irrigation system

- A drip irrigation system was used in a peach orchard in the Penn State Fruit Research and Extension Center.
- The pressure gauge was regulated at 40 psi pressure for the irrigation system.
- A solenoid valve was installed in-line on a PVC pipe to turn on or Off water to the test block according to the soil moisture.



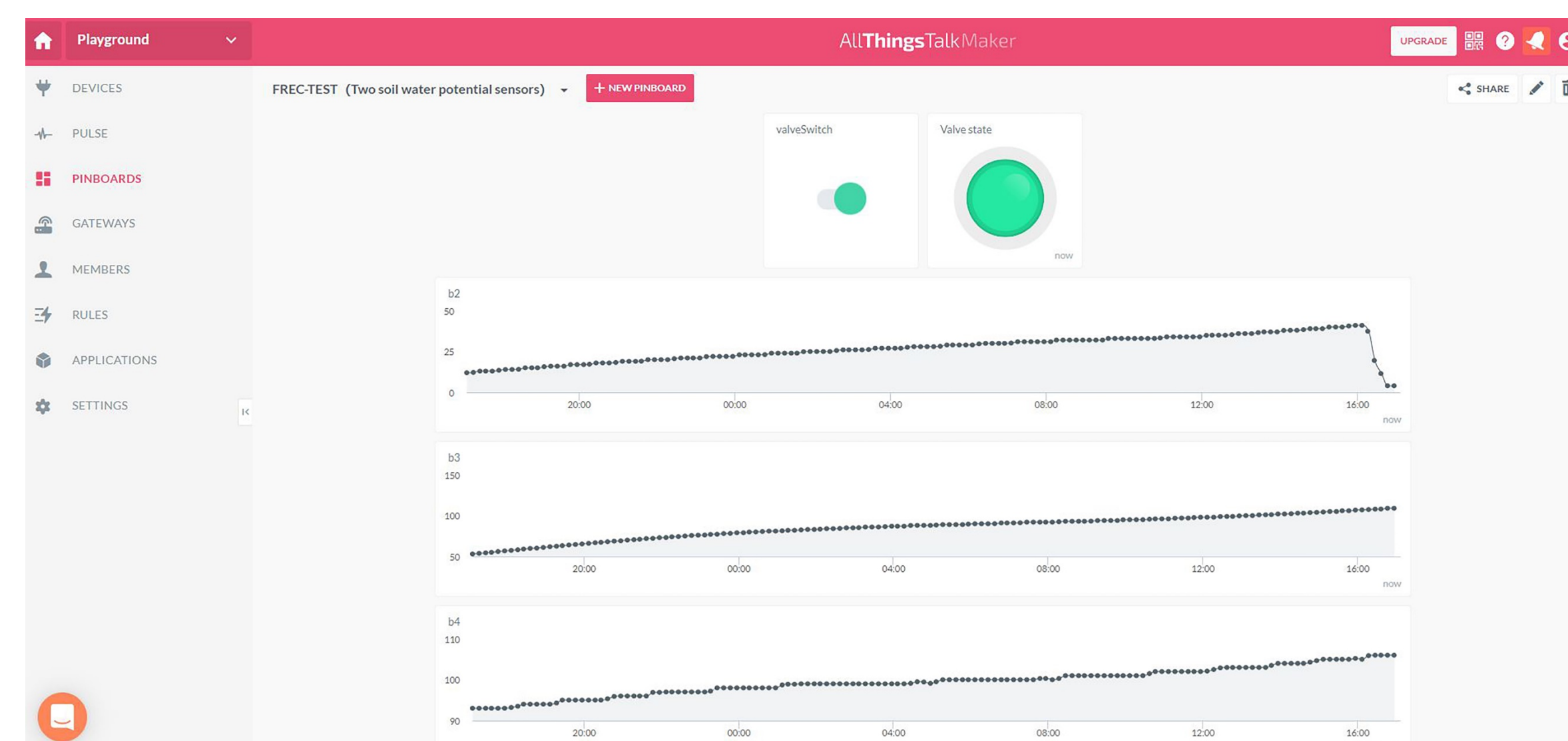
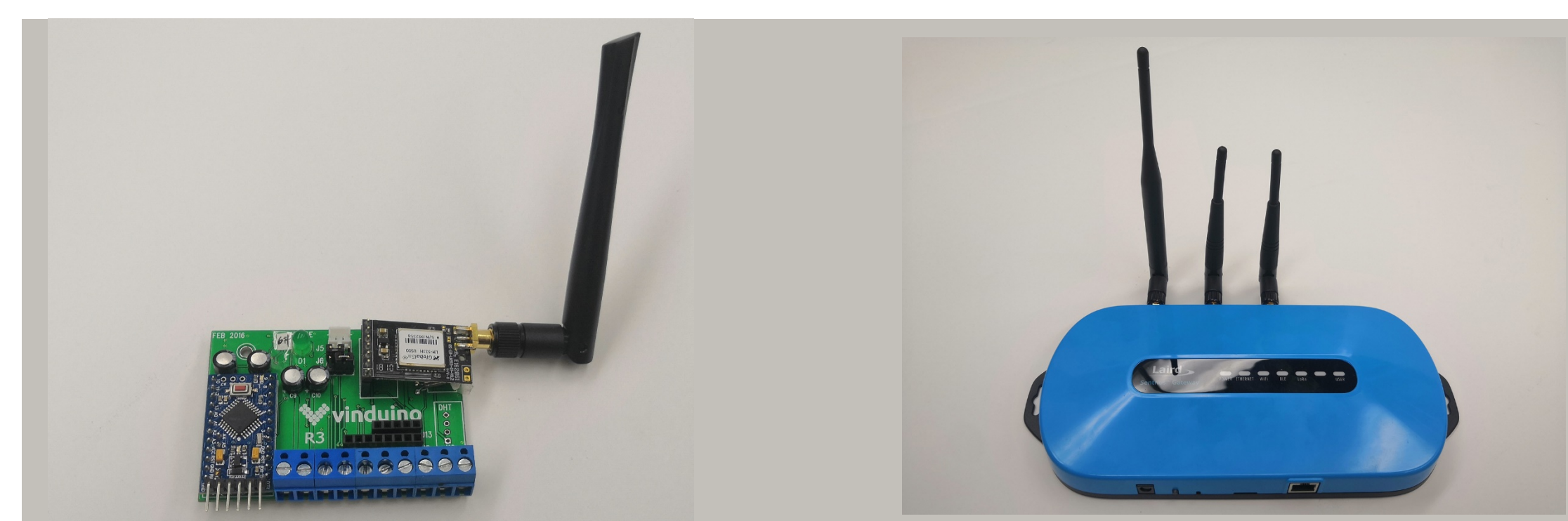
Soil moisture sensors installation

Three watermark SS200 soil moisture sensors were installed at 1, 2, and 3 feet under the ground.



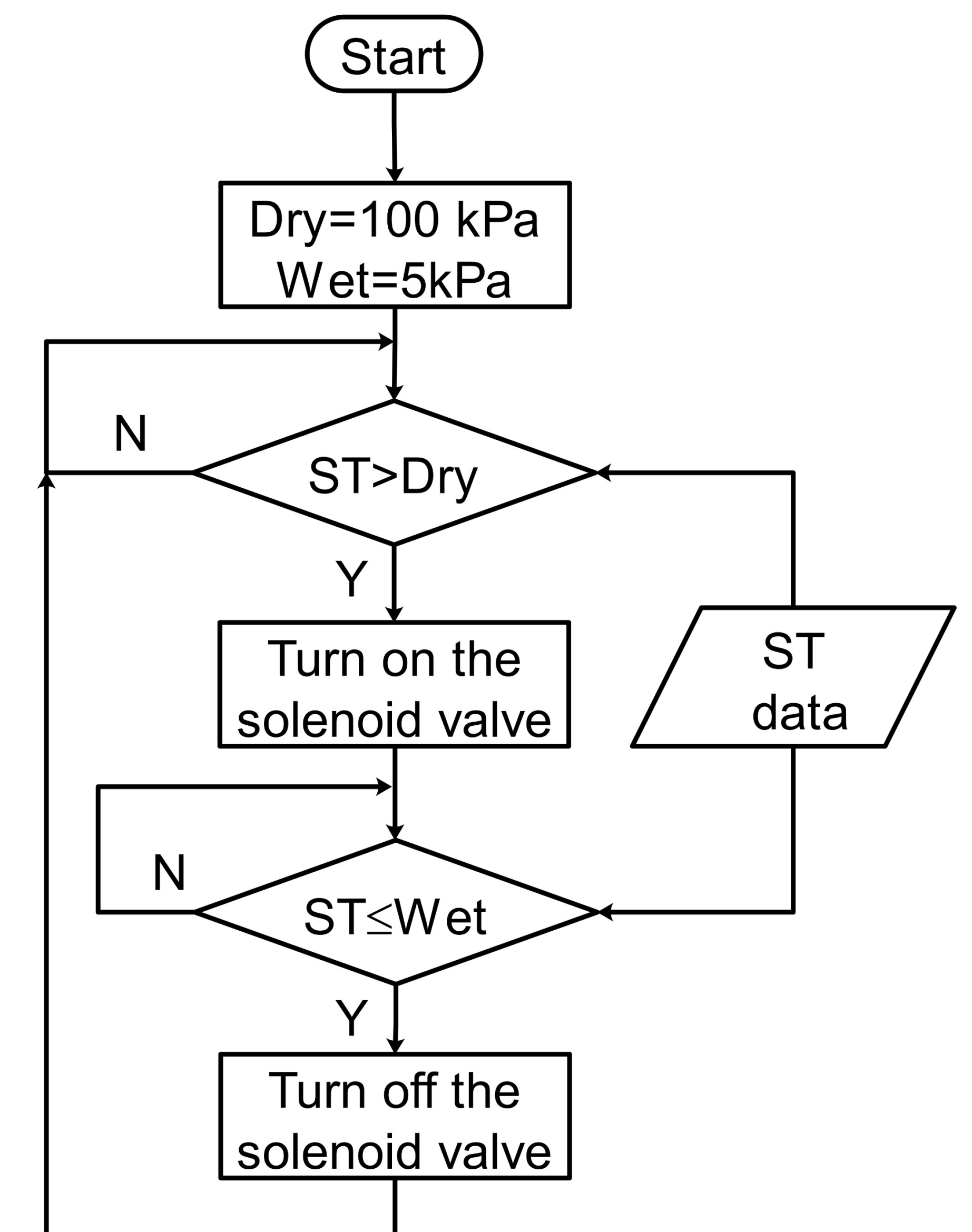
Wireless control

- Wireless control system consists of a Vinduino board, local gateway, and cloud sever.
- The solenoid valve was controlled to turn on or off remotely through an Internet of things (IoT) platform.

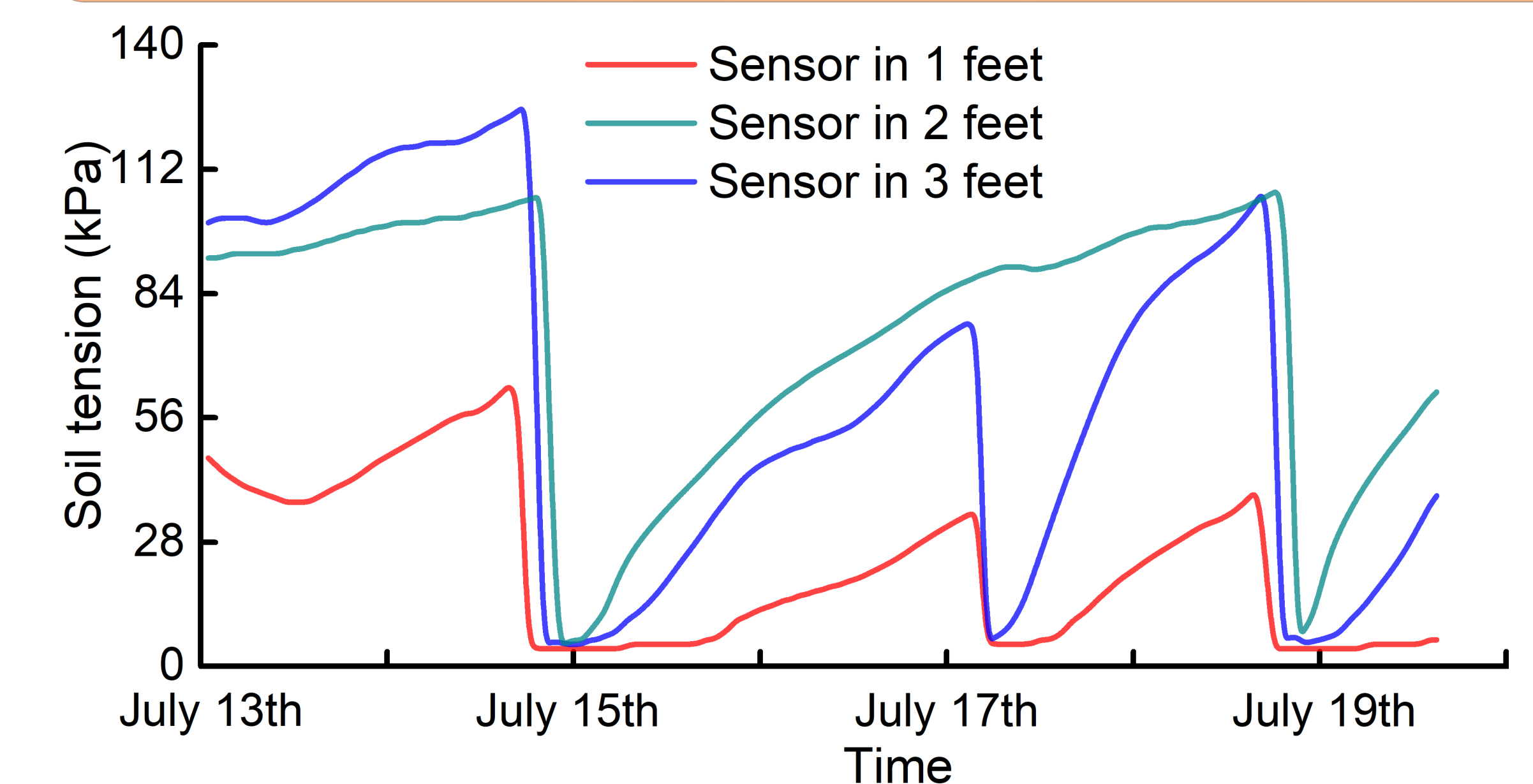


Irrigation scheduling algorithm

An irrigation scheduling algorithm was developed based on ST (soil tension) readings from soil moisture sensors.



Results and Conclusion



- The system obtained a stable and reliable data transmission.
- The system achieved real-time monitoring of soil tension and control solenoid valve.
- A fuzzy logical controller will be added to this system to improve the water saving performance.

Acknowledgements:

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