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Systems and Monitoring Apparata based on Reflectometric Techniques for Agricultural applications (SMART_APP)

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TTP Problem

Precise control of irrigation in agriculture



Problems

Excessive irrigation can have repercussions in terms of well-being of the cultivations, and it can ultimately lead to negative environmental impacts (e.g. water scarcity), diseases, and reduced yields.



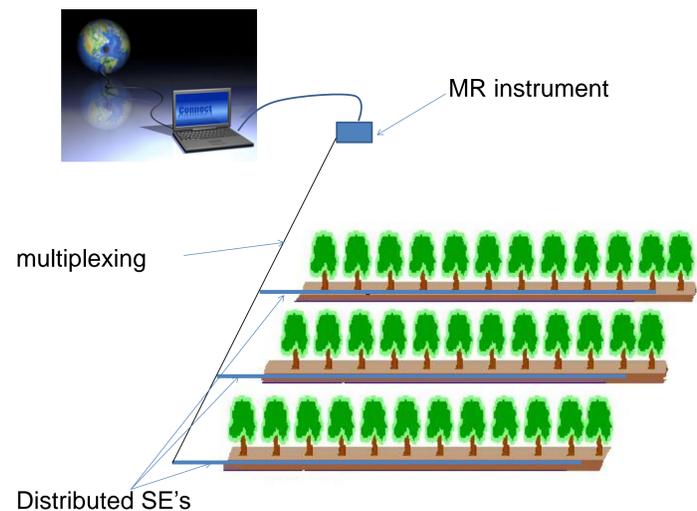
Requirements

- ❑ To improve efficiency and sustainability of agricultural water use, the irrigation process must closely follow the water requirements of the cultivations.
- ❑ To this purpose, it is necessary to effectively monitor the soil water content of cultivations.

TTP Solution

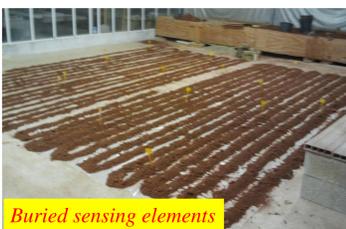
Employment of diffused, wire-like, passive sensors embedded in the soil

- ❑ This TT relates to an innovative system for the diffused, real-time monitoring of the soil water content profile in agricultural cultivations.
- ❑ The system exploits an electromagnetic technique (microwave reflectometry, MR) in conjunction with an innovative type of low-cost, wire-like, passive, maintenance-free sensors.
- ❑ The wire-like sensors are "rolled out" and buried along the perimeter/path to be monitored (e.g., along a row of plants/trees).
- ❑ Differently from traditional point sensors used in agriculture, one single SE can cover up to 200 m and can be also be controlled remotely.
- ❑ A real-time "map" of the water content status in the cultivations can be retrieved, thus allowing a tailored irrigation, based on the actual needs of the cultivation.

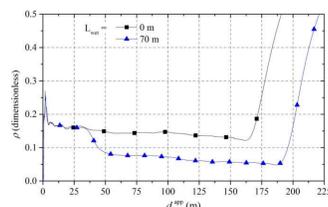


TTP Impact

Laboratory-scale implementation



Example: two 90 m-long SE's are setup following an arbitrarily-chosen, serpentine-shaped path covered with soil (mimicking a cultivation).



Each SE is used to retrieve the soil water content profile, thus localizing the soil portion in need of water.

Practical implementation and integration with the SysMan's systems

- ❑ Assessment of the proposed technology in realistic agricultural applications and environments.
- ❑ Integration of the system with SysMan's innovative solutions for agricultural applications.
- ❑ The aim is to implement a sensor network (exploiting diffused SE's), that could be able to "communicate" remotely with the irrigation systems. In this way, it would be possible to automatically control the irrigators and to activate/deactivate the electro valves, according to the actual water conditions/requirements of the specific cultivations.

TTP Facts

Contact: Andrea Cataldo
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