The automatic precision water-saving irrigation control system by Poplars needs

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content

- Research background
- Research of soil water sensor
- Introduction of the project

Research background

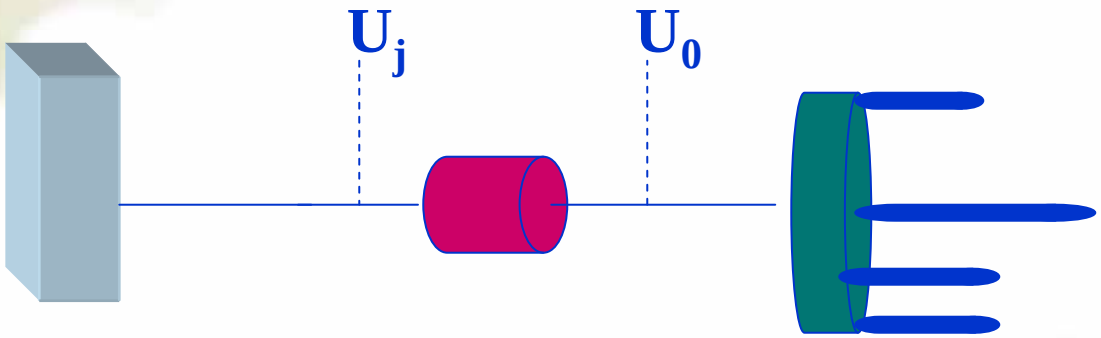
Water source is an important factor for plants to live ,also for poplars.

However, the lack of water is serious problem nowadays, water-saving technology is a hot topic all over the world.

Research of soil water sensor

- ✓ The principle of soil water sensor
- ✓ Main characteristic of soil water sensor
- ✓ Technology properties of soil water sensor
- ✓ The research of soil water sensor capability experiment

The principle of soil water sensor



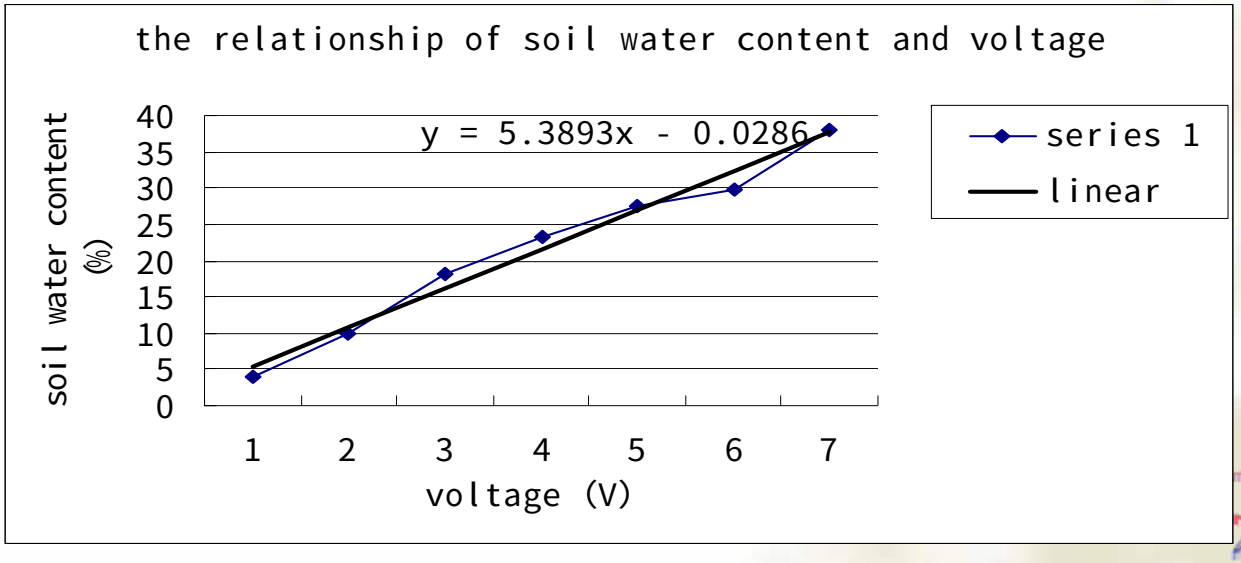
100MHz signal resource　　coaxial transmission line　　probe of soil water

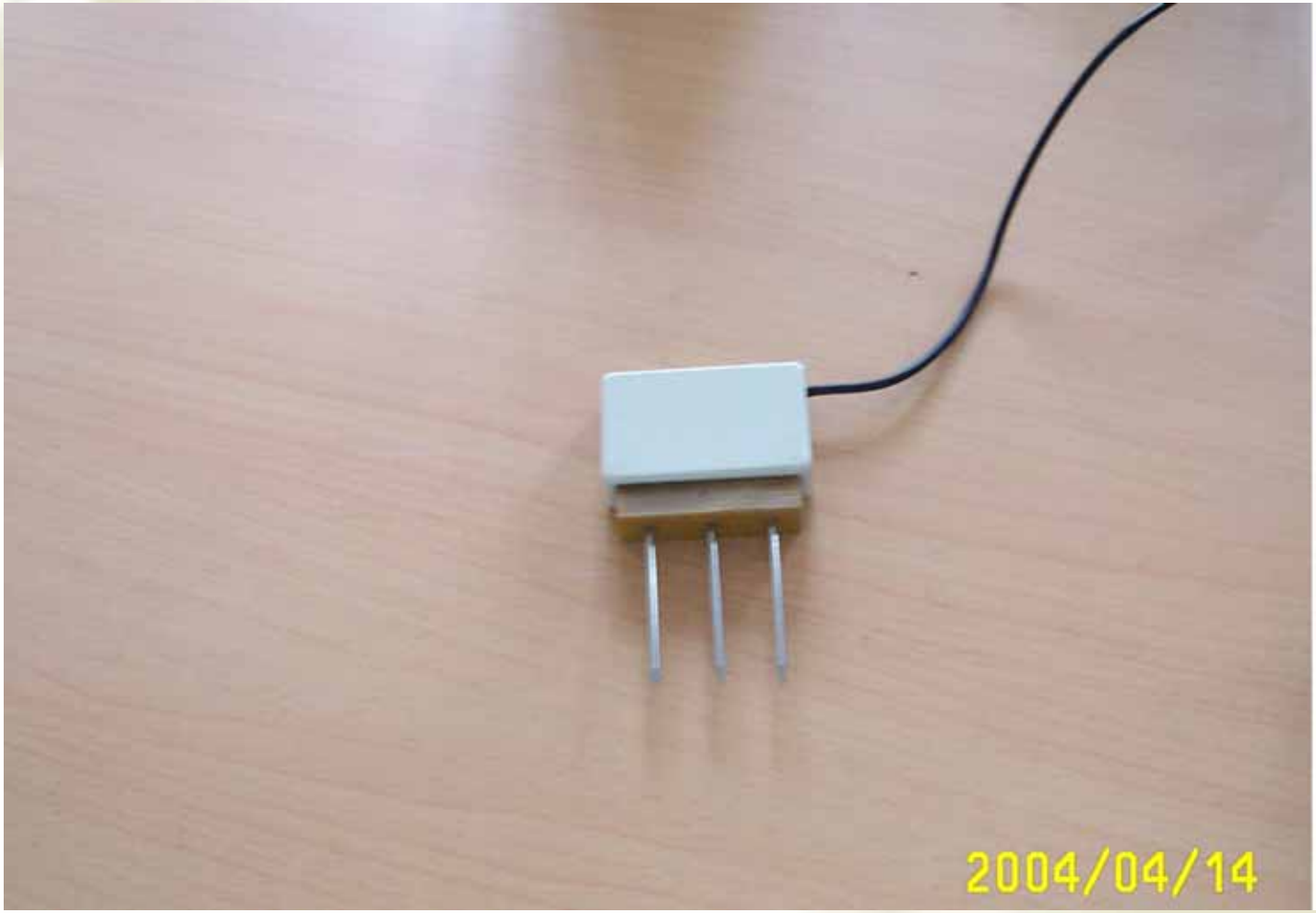
$$U_j - U_0 = 2A\rho = 2A\frac{Z_L - Z_C}{Z_L + Z_C}$$

ρ ——— reflection parameter
Z_L ——— probe impedance
Z_c ——— transmission line characteristic impedance
A ——— amplitude of signal resource

The length of soil water probe which this experiment use is 6cm

The sample of soil includes water content which are 4%、10%、18.1%、23.3%、27.6%、29.7%、38%的average soil sample。

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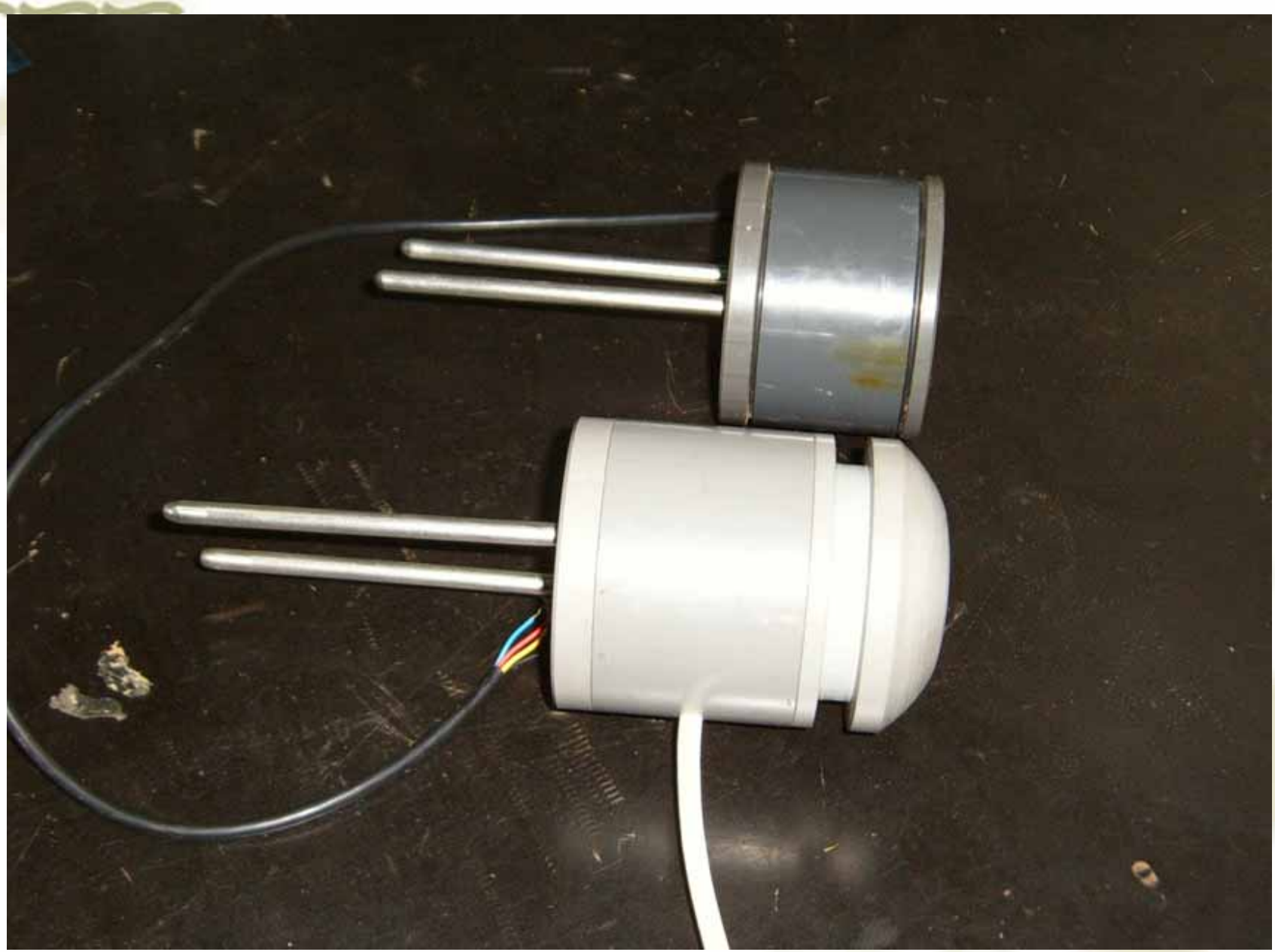

Main properties of soil water sensor

Measuring parameter ：soil volume water content

Amplitude ：0~50%（m^3m^{-3}）

Stable time： about5seconds after supply power

Supply Voltage ：9VDC

Supply current ：60~100mA，typical value为80mA

Seal material：ABS project plastic

The material of probe ：stainless steel

The length of probe：6cm

With standard 485 bus Interface

Main characteristic of soil water sensor

Operation simply , DC Input , DC output ；

High precision, good linearity , rapid response speed

The price is far lower than TDR instrument and neutron instrument , even more suitable to China national situation 。


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Measuring surface soil soil water content directly

The system includes

- ✓ soil water sensor
- ✓ Plant physiological meter
- ✓ Irrigation controller
- ✓ Wireless communication unit
- ✓ Control software

Plant Physiological meter

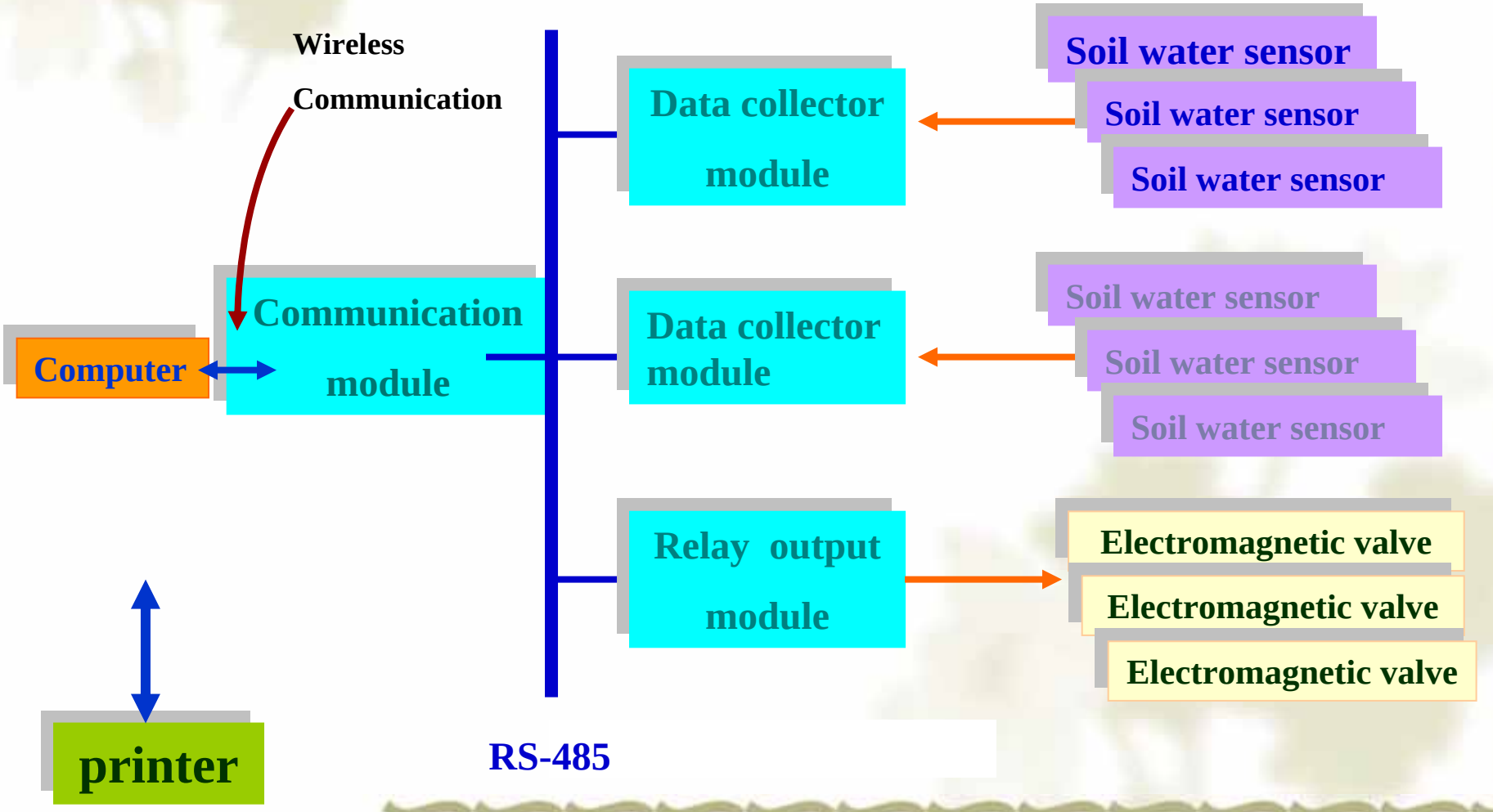
soil water sensor

Irrigation controller

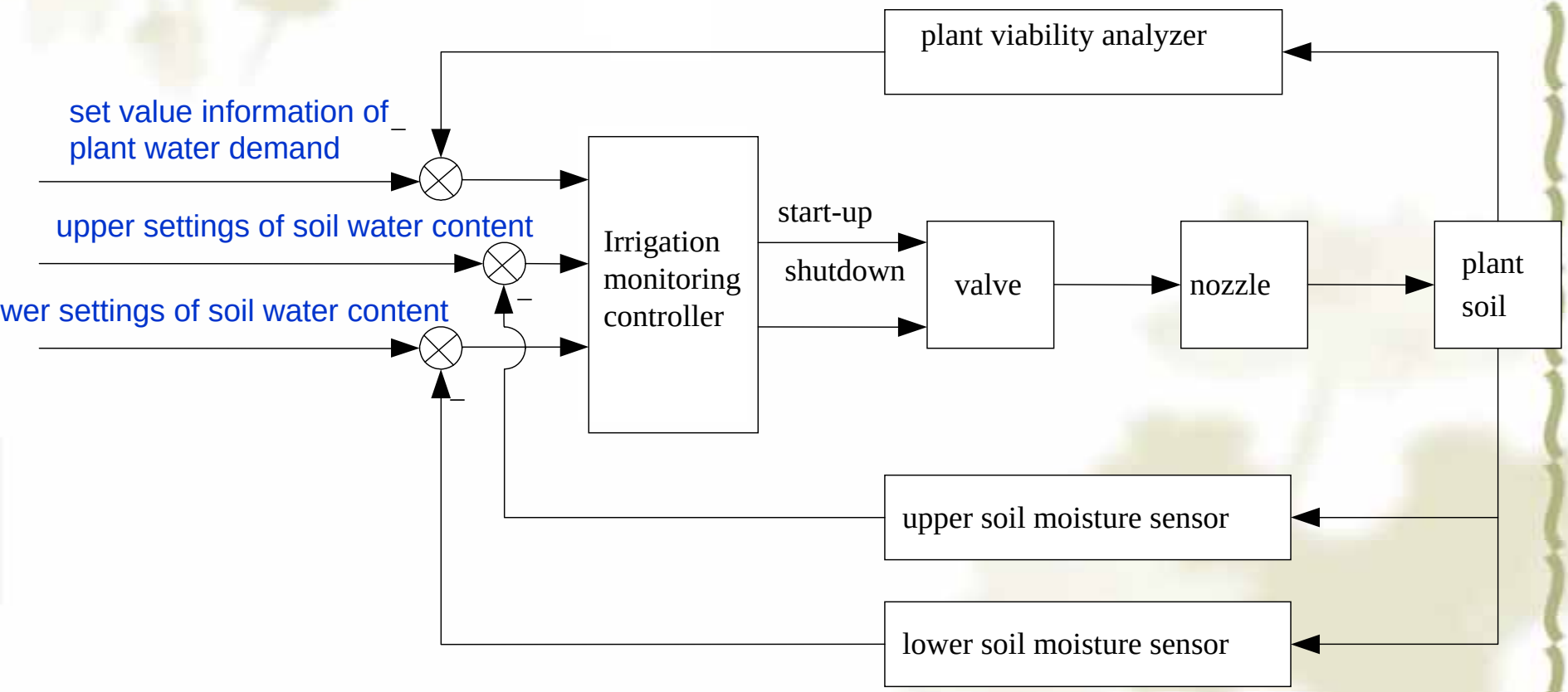
software

Wireless communication unit

Automatic water saving irrigation control system of Poplars



Principle of the system



Main characteristic of the system

Irrigation by the poplars' needs

With the knowledge of physiological water needs of poplars, we installed soil water sensors by three different layers. The soil moisture near poplars' roots(the first layer) decide whether valves open or not; we close the valves if the signal from the second layer sensor is higher than setting value.we can monitor the system by checking the water infiltrate into the third layer or not to estimate the effect of water-saving.

System function

Soil moisture real-time detection

Automatic control of irrigation；

History data query ；

Soil &irrigation information graph display;

Water report;

Data remote transmission;

Several irrigation control modes;

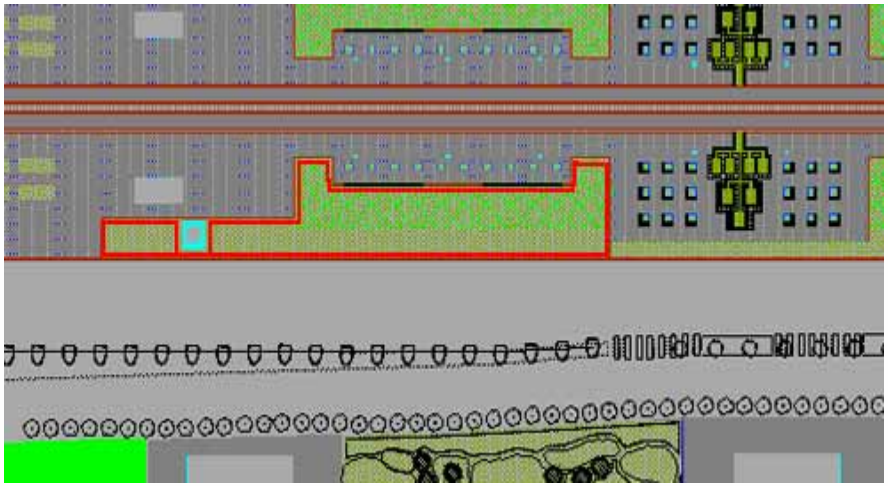
Error self-examination.

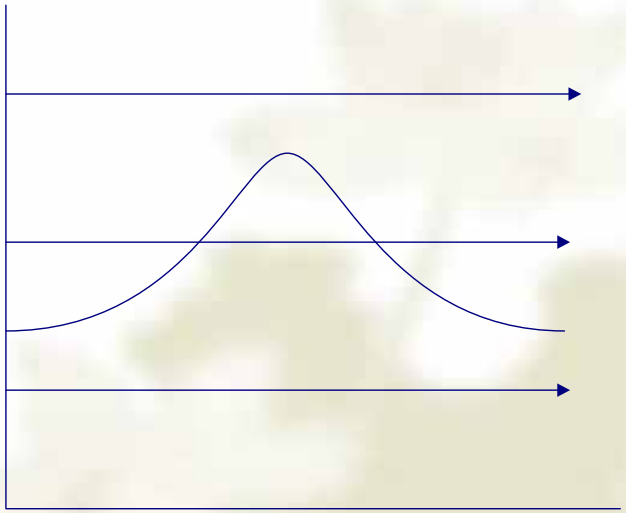
control function

- Automatic mode (main working mode) .
- Time task mode.
- Semi-automatic mode.
- Manual mode.

Automatic mode

The data sensor acquires is considered as control basis every area. On the basis of it, you can know whether the area needs irrigating。





Time task mode

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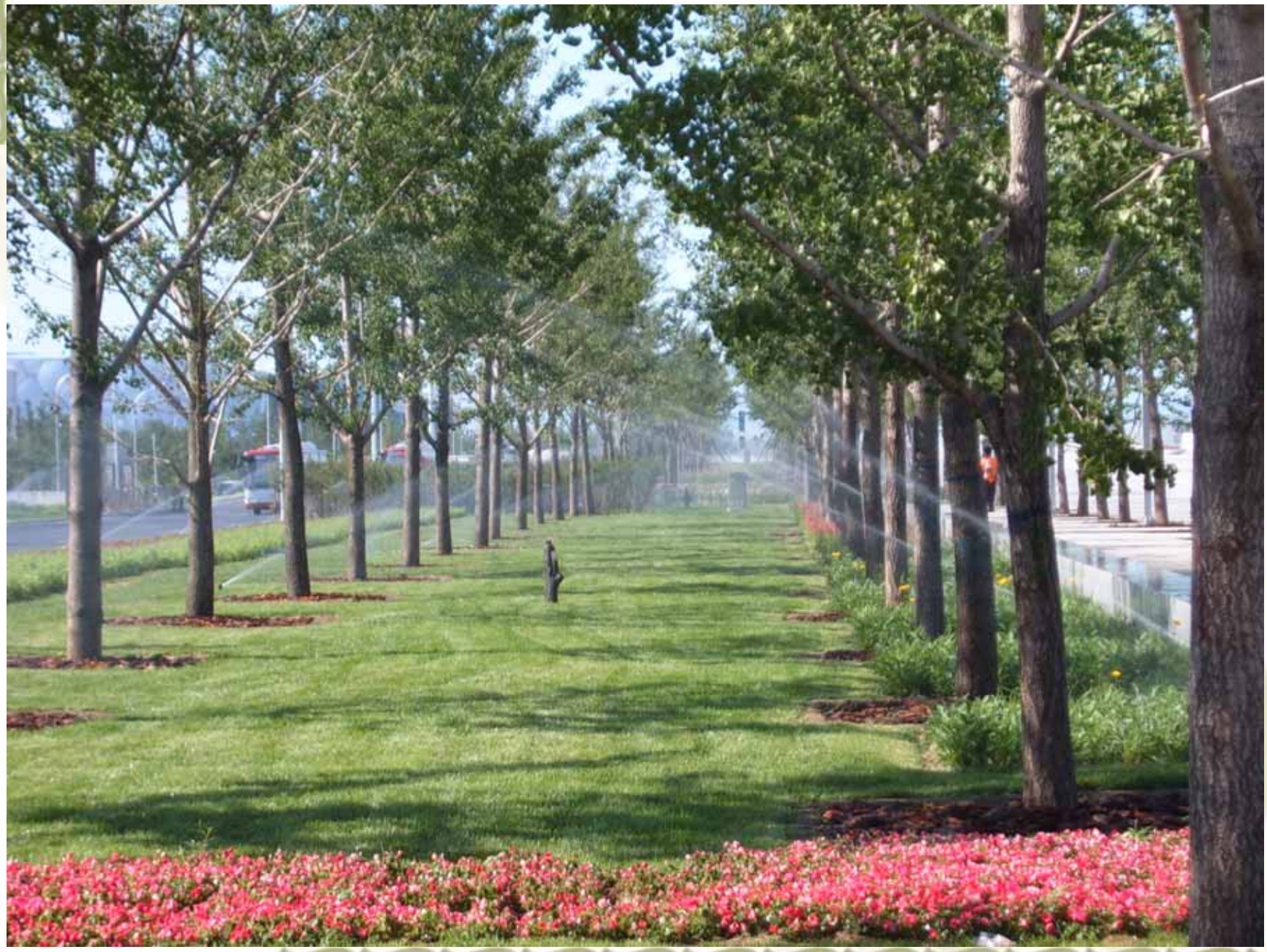

Thank You