SOLAR SENSOR BASED SMART IRRIGATION SYSTEM

Minor Project Review-3

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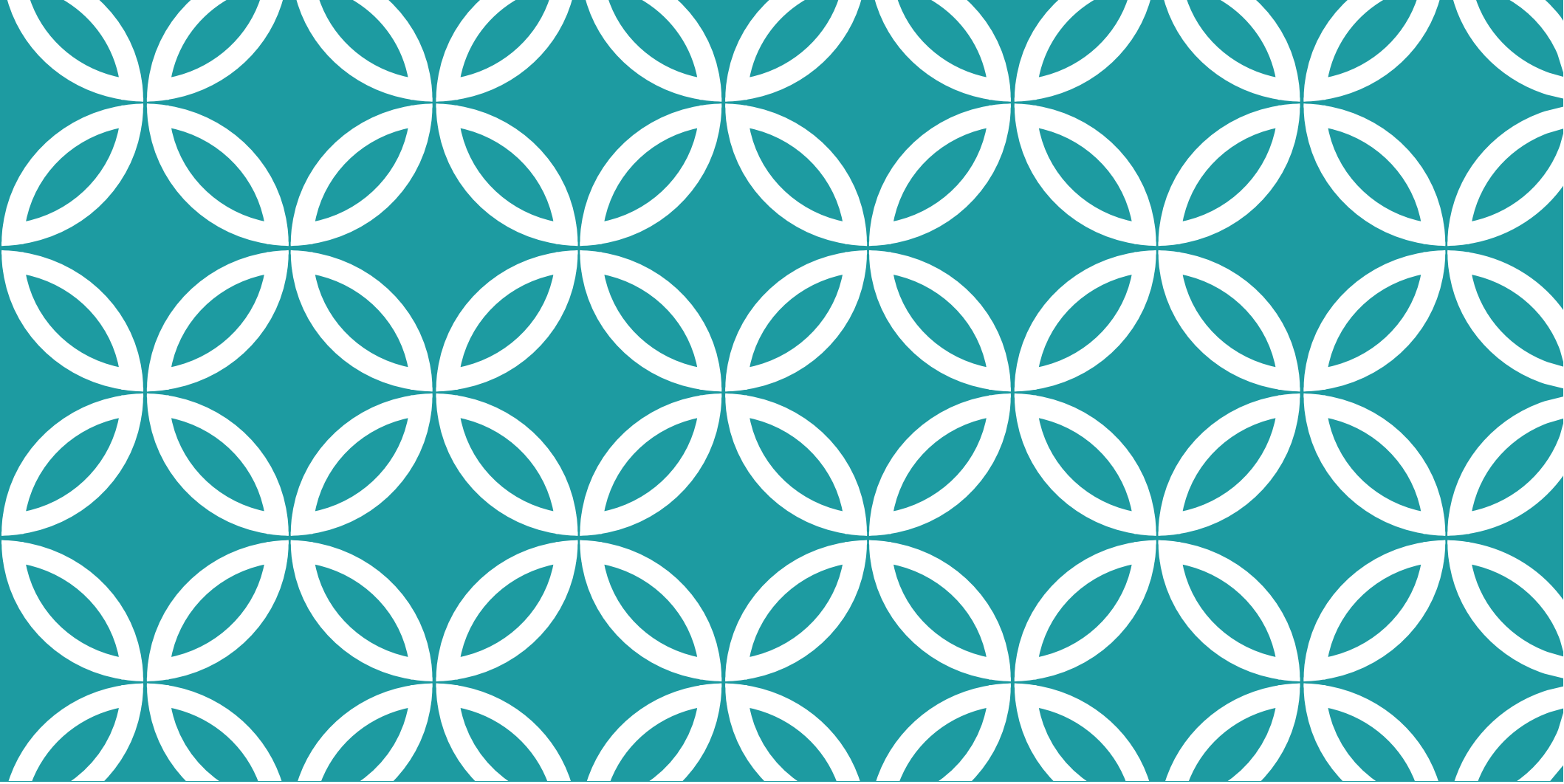


SENSORS

SOIL SENSOR

- Capacitance moisture sensors will normally read diameter of 10–15 cm around the probe.
- Soil moisture readings are within ±3% of the actual volumetric soil moisture content
- Measurement ranges from 5% moisture to fully saturated soil
- Capable of measuring changes of less than 0.1%
- Measures soil temperature
- Moisture readings are consistent in salty
- Power surge resistant
- Shock resistant
- Not affected by salts or fertlizers

SM150(SOIL SENSOR)

Measuring range 0...70% volume soil moisture.

Accuracy +/- 3%.

Measuring range temperature 0...-60 ℃,

Accuracy 0.5 ℃.

With 2 measuring pins, length 51 mm.

Output signal 0-1 Vdc.

Cost is too high.

SMS-BTA(SOIL SENSOR)

Range: 0 to 45% volumetric water content in soil (capable of 0 to 100% VWC with alternate calibration)

Accuracy: ±4% typical

Typical Resolution: 0.1%

Power: 3 mA @ 5VDC

Operating temperature: –40°C to +60°C

Dimensions: 8.9 cm × 1.8 cm × 0.7 cm (active sensor length 5 cm)

PH SENSOR

The requirement of such measurement is an amplifier with high input impedance and has the gain of voltage-pH conversion.

The standard pH probe generate voltage about 59mV per pH .

A pre-amplifier is required with high input impedance input and with gain = 16.7 to give 1 Volt per pH.

LDR LIGHT SENSOR

Diameter : 5mm

No. of Pins : 2

Type of Mounting : PCB Through Hole

Maximum Operating Temperature : +800C (Approx.)

Dark resistance:1-20M ohm

LM35 TEMPERATURE SENSOR

Calibrated directly in ◦ Celsius (Centigrade)

Linear + 10.0 mV/◦C scale factor

0.5◦C accuracy guaranteeable (at +25◦C)

Rated for full −55◦ to +150◦C range

Suitable for remote application

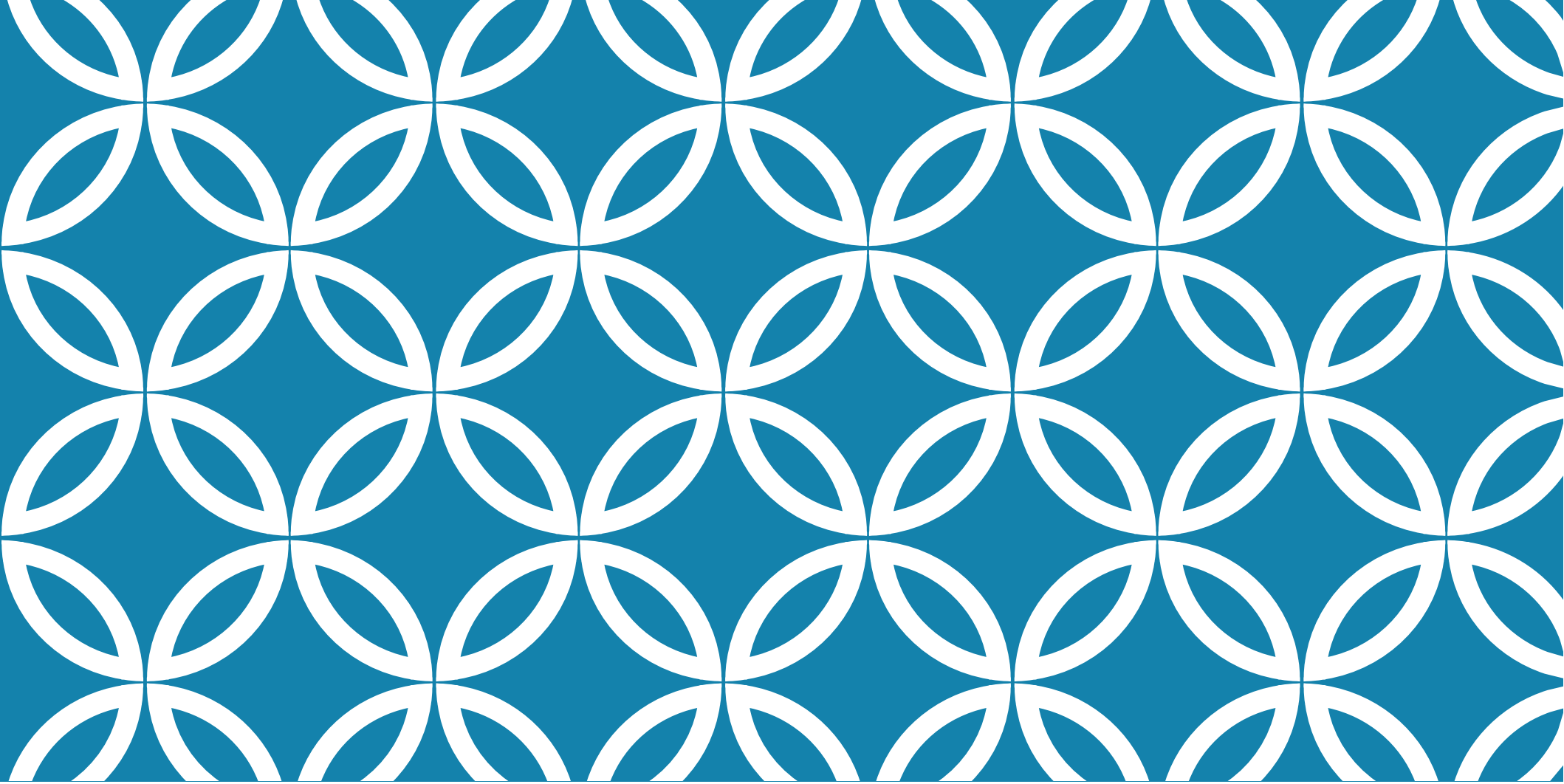
Operates from 4 to 30 volts

Less than 60 μA current drain

Low self-heating, 0.08◦C in still air

Nonlinearity only ±¼◦C typical

Low impedance output, 0.1 Ω for 1 mA load



MARKET SURVEY

SmartDrip:

- Smart home and garden automatic watering
- Drip Irrigation
- Works on WiFi
- Can be controlled from mobile devices
- Needs pre installed drip irrigation system
- Cannot sustain high pressure
- Market Price- Rs. 4399

Orbit B-hyve

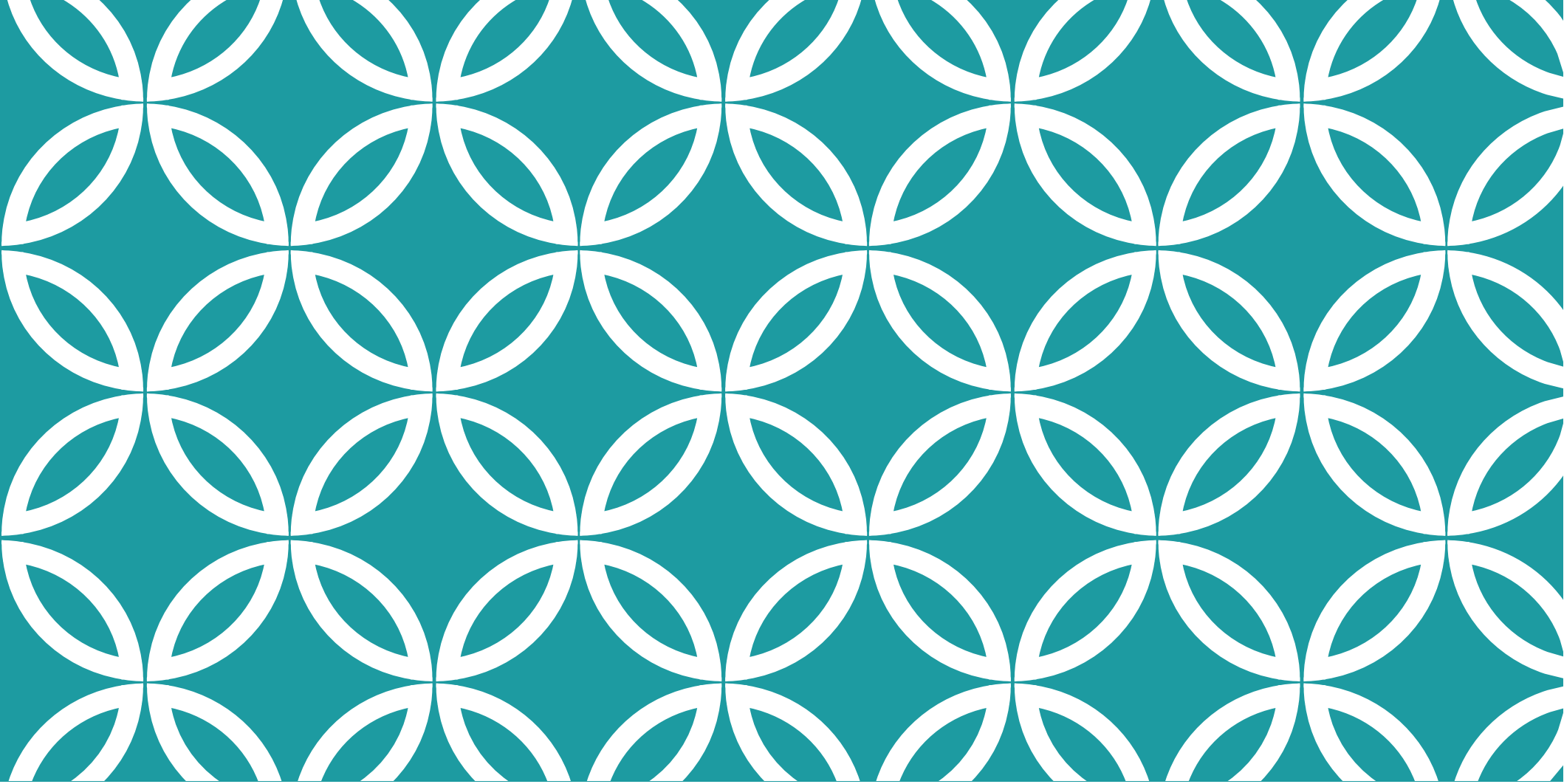
- Wifi functional with Android, iOS, and web
- Weathersense provides Smart watering based on site conditions
- Customised watering programs
- Built in manual override
- Can only be used with 110V
- RS. 4449

Hortau Precision irrigation management

- Irrigation management based on soil tension
- Provides real time sensor data with a mobile platform
- Weekly reviewing and scheduling of irrigation by company advisors
- Weather monitoring

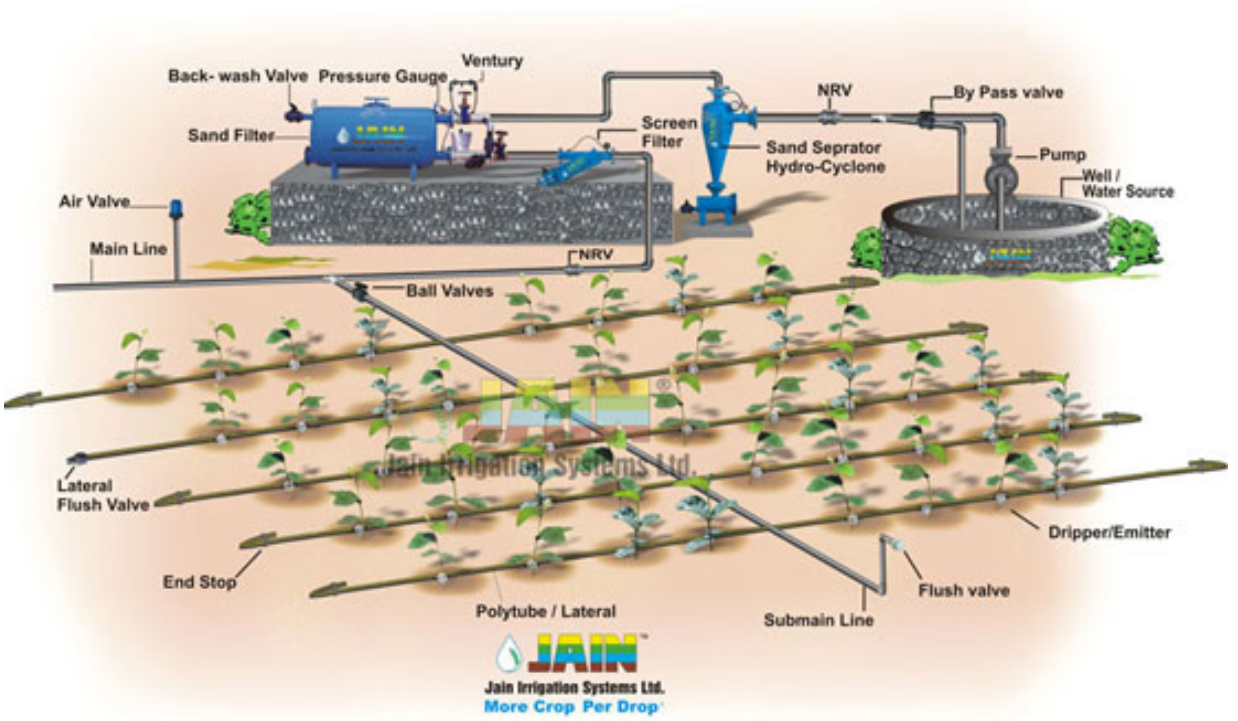
Arable decision agriculture

- Weather and plant measurements, sent to cloud for easy retrieval
- Detects precipitation, evapotranspiration, radiation, plant health, weather, harvest timing through cellular connectivity
- Solar powered



MODEL FOR DRIP IRRIGATION

DRIP IRRIGATION SETUP



MODELS DESIGN OF DRIP IRRIGATION SYSTEM

Crop = Mango (5m X 5m)

Area= 1 ha (Assume square plot)

Pan evaporation = 8 mm/day
Pan coefficient = 0.7

Crop factor= 0.75

% wetted area= 60
Soil type= medium

Water source is well at the corner of the field (well depth) = 10m

Assume pump efficiency 70% and motor efficiency = 80%

MODELS DESIGN OF DRIP IRRIGATION SYSTEM

Water requirement: 63 litre/day/plant

No. of drippers: 800

Flow rate of lateral= 160 lit/hr

Total power requirement= 1.49 hp ≈ 2hp

Irrigation time required = 4 hours

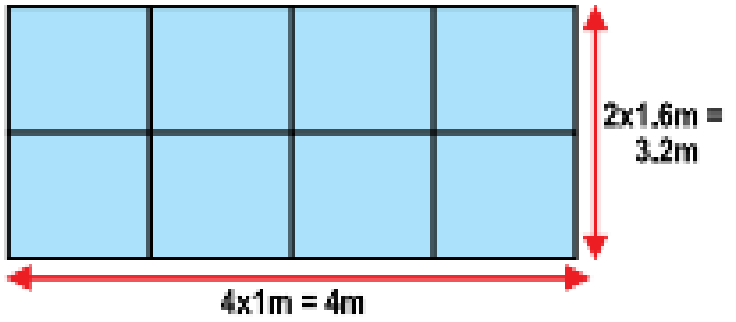
SOLAR POWERED PUMP

A 2 HP pump is ideally powered with 1,800 Wp (peak watt) capacity solar array. The solar array could comprise of eight solar modules with 225 Wp each or 24 solar modules of 75 Wp each or any combination adding up to 1,800 Wp.

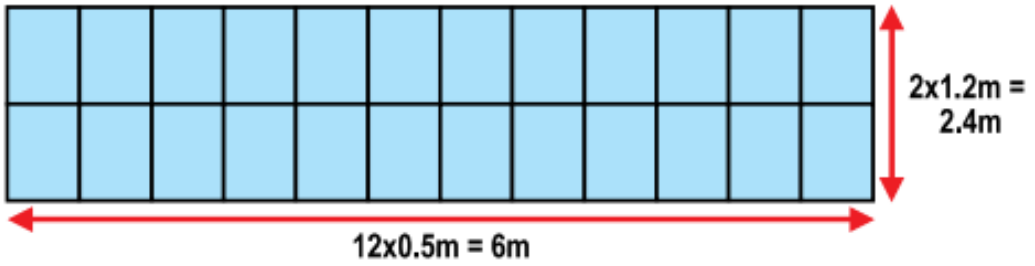
Approximately 10 sqm of land are required for every 1,000 Wp of solar panels installed.

AREA FOR SOLAR PANELS

A 2 HP solar powered pump having an 1,800 Wp solar panel installation. The required solar power can be generated using either eight modules of 225 Wp (high wattage rating) or 24 modules of 75 Wp (low wattage rating).



Total area occupied by PV Modules =
3.2m x 4m = 12.8Sq. m.



Total area occupied by PV Modules = 14.4Sq. m.