18/ENG02/090

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Computer engineering

Structured computer programming assignment

Software development cycle

1.)PROJECT SCOPE/ANALYSIS:

The project concerns the irrigation system for green areas located at different altitudes in the farmthe green areas and the palm trees placed immediately outside the farm and at a level equal to the street level

The first two areas are supplied by two pumping systems placed at different depths where water treatment systems are installed. A series of hydraulic checks were carried out to assess the achievement of acceptable levels of uniformity, efficiency and quality of the irrigation service.
For the outdoor area there is a drop and rain system (with pop-up) supplied in a single shift, and equipped with pressure reducers in order to protect the system parts with lower nominal pressures. For the recommended pump, the operating point and the acceptability of the obtained efficiency have been identified. The consultancy carefully assessed the sizes and nominal characteristics of the pipes for the pressures and load losses involved. Particular attention has been paid to the wide central flowerbed irrigated with a dense network of dripping laterals in sub-irrigation.
For the internal garden at an altitude - 30 m, an irrigation system has been planned divided into two distinct shifts:1st round at the service of vertical gardens and pots with palm trees (with pop-up and drip system)2nd round at the service of drip irrigated flowerbeds.
Several parts are equipped with pressure reducers based on the operating pressure and the nominal operating conditions of the devices.
Several supply scenarios were evaluated from the pump at the lower levels, to define a collateral junction with 3 ascents towards the garden level in order to obtain a functional distribution and a layout of the pipes with minimum impact for the crossing of the structure and intermediate floors.
Also in this case the operating point and the acceptability of the pump efficiency have been calculated.
There are two aspects of irrigation that influence the performance and efficiency of an irrigation system, and these are design and operation. This page describes some basic design concepts that may be required for an irrigation designer and provides contacts that will be able to assist with correct irrigation design.
Based on the information received from the client, our team of engineers develops the project according to the required criteria and proposes various briefings for the presentation of the project to share the intermediate results and to plan possible corrections or changes to be made. Our engineering approach allows us to offer a consulting service for plants to be designed in complex conditions and structures, achieving results of maximum efficiency and functionality.

Design/specification:

-Hardware modules:

The hardware module will consist of the following+

1.) an accumulation tank that hydraulically separates the constant flow coming from the well and the irrigation system that requires higher flow rates and shorter durations
2.) The pump that feeds the irrigation system from the accumulation tank has been sized for the different shifts so as not to exceed the volume of compensation.
3.) Pipelines for connections and distribution
4.) Sensors for detection
5.) Sprinkler system
6.) Thermometer for temperature reading
7.) An interface to communicate with the system
8.) Clock ,timer and an alarm based system

-**Software**:

Data retrieved from the sensors concerning temperature and moisture will be stored and analysis based on these analysis the system will then respond in accordance. a specified time interval will be laid out for regular irrigation independent of the conditions of the temperature and moisture.
Also an alam is installed in the even that the water level stored in the tank is insufficient for use.
A CID will calculate the seasonal water requirement based on crop stage demand and environmental conditions for the location being assessed. With a changing climate, we should expect the CID to use scenarios of hotter, drier years to calculate peak daily water requirements and a system able to deliver the right amount volume when required.
Soil structure influences the maximum infiltration rate of water into the soil, and this should determine the maximum irrigation application rate. If water is applied at a rate faster than infiltration, runoff will result.
The irrigation system will be able to deliver the right amount of water in the period required. For example, if a water sensitive crop requires 12mm between 7AM to 7PM the implied application rate required is only 1mm per hour. In practice however, you may need to apply water over 1, 2, 3 or even 4 shifts to accommodate the soil's water holding capacity in the root zone of a crop. When combined with meeting the demand for different irrigation shifts throughout the farm, a significantly different application rates may be required.
Water quality may also influence the volume and delivered type of system required. If irrigation water contains levels of salts harmful for the crop to be irrigated, extra water may be required to provide a leaching fraction. With higher levels of salts, it may also be desirable to limit spray on the leaves of plants so drip irrigation may be the preferred option.
The topography of the area will affect the hydraulic design of an irrigation system too. Increase in elevation results in pressure loss while decreased elevation results in pressure gain. A one-metre change is equal to approximately 10kPa pressure difference.
Over an irrigation system's life, running costs are usually greater than capital expenses. Correct hydraulic design will limit the power wasted from unnecessary creation of pressure and incorrectly selected pumps.
Plans for future expansion may influence the size of pipes, the layout of the system and the capacity of the system to deliver a certain volume over a certain time. Discuss planned expansion with your designer.
There will always be the question about the cost and benefit of larger pipes and pumps. By using a CID and working through the design criteria in this document, you may be able to assess the economics

between the risk of crop or yield loss, and likely frequency of that risk occurring, versus irrigation system cost over its lifetime.
IRRIPRO was used in order to design and plan viable drip irrigation systems. This software is proficient enough in planning network layout, hydraulic designing and above all simulations to obtain results. This software can also provide requisite cost estimation of drip irrigation.
Hydraulic estimation of drip irrigation system was based on a method defined by the ASAE (1999). Three emitters on a lateral were selected at the head, midpoint and tail-end and discharges were measured on them.
the IRRIPRO which has the diverse quality to calculate and design many other hydraulic parameters. It is a helping tool for water resource engineers in designing, testing, analyzing any other alternative design on precision and economical parameters.
The comparative study revealed that the drip irrigation achieved high CU and DU which imply that the existing drip irrigation system was designed on the basis of proper scaling and dimensions. The CU on average basis for the system was found to be 96.4990% (observed) and 99.9796% (simulated) respectively. Similarly, the DU on average basis for the system was found to be 94.3605% (observed) and 99.8822% (simulated) respectively. EUa of the system using pressure compensated type emitters with the length of laterals 16 meters with an average observed and simulated value was found 99.2192% and 99.99316% respectively.

-**IMPLEMENTATION**:

Several sectioning solenoid valves will be inserted so as to divide the main network and command which sections to engage and which to exclude.

In order to manage the 19 shifts, made up of groups of sectors chosen to balance the flow rate around a set average value in the various shifts, 56 solenoid valves and two control units have been provided to control the valves and the pump in two groups.

The control units can be managed remotely.
The timing of the shifts was drawn up as to have a similar flow for each turn cover irrigation within a day verify the equivalence between the incoming and the outgoing volume from the supply tank simulate further hydraulic conditions.

The turf of the green areas is irrigated with more than 500 pop-up sprinklers (dynamic and static), while the perimeter part with hedges and shrubs is irrigated with dripping (self-compensating) laterals. The pluviometric overlap of wet circles and the uniformity of distribution was verified.
More than 40 pressure reducers have been inserted to keep the pressure below certain limits in some areas of the system (especially for the drip part which requires less pressure to operate).In the project, different scenarios were assessed (some discarded due to lack of uniformity, efficiency and balancing of flow rates per shift), and finally chosen the one that at the same time reaches the daily requirement to irrigate the entire surface, has an adequate intensity of rain, an acceptable uniformity and is compatible with the conditions of compensation, volume and flow of the source.

-**Algorithm** :

Step 1.start

Step 2: read a

Step 3: a=time interval

Step 4. Get temperature readings and moisture readings from soil

Step 5: Read x,y

Step 6: x=Ideal temperature,y=ideal moisture

Step 7: if temperature is < x

Then

Sprinklers activate

Else sprinklers activate at “a”

Step 8: if moisture < y

Then sprinklers activate

Else

Sprinklers activate at “a”

Step 9: read b

Step 10: b=ideal water level

Step 11: if water level is < b

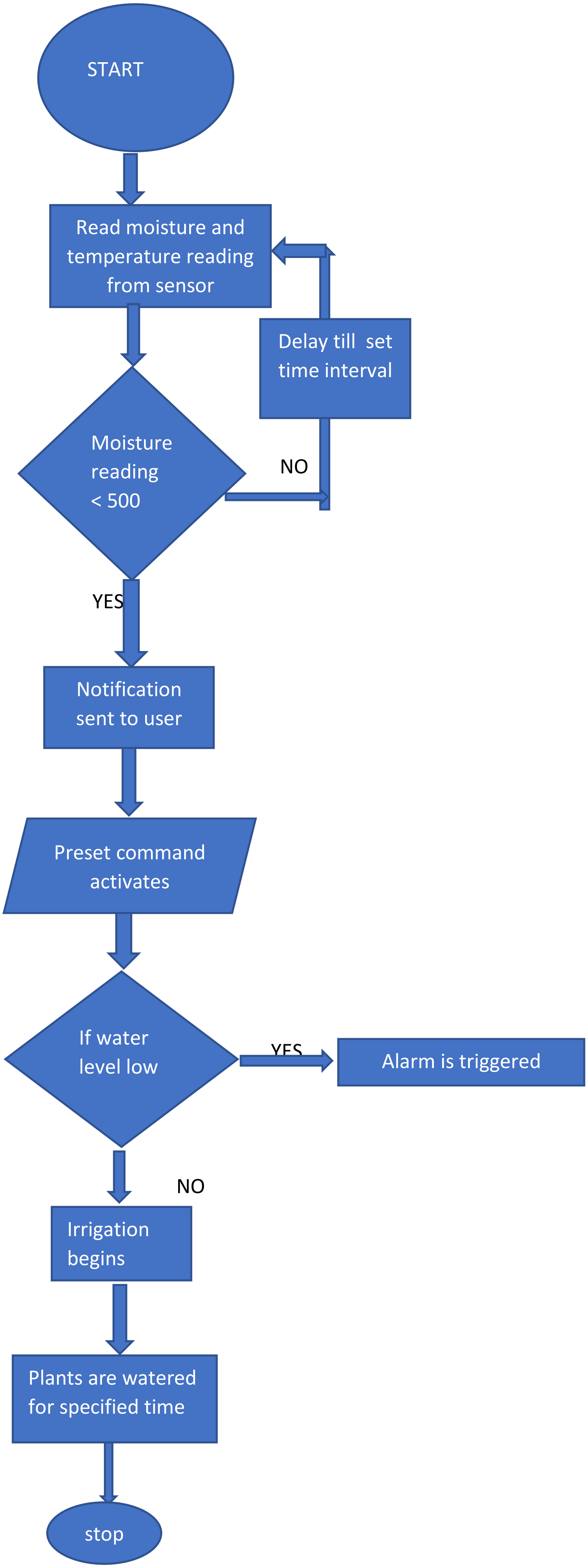
Then alarm is triggered

Else

System remains dormant

Step 12 : stop

FLOW CHARTS AND ALGORITM


START
Read moisture and temperature reading from sensor
Delay till set time interval
Moisture reading < 500
NO
YES
Notification sent to user
Preset command activates
If water level low
YES
Alarm is triggered
NO
Irrigation begins
Plants are watered for specified time
stop

BOTTOM TO TOP APPROACH