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MATRIC NUMBER: 18/ENG08/007

DEPARTMENT: BIOMEDICAL ENGINEERING

COURSE: ENG224; STRUCTURED COMPUTER PROGRAMMING

ASSIGNMENT (CLASSWORK 2)

QUESTION

One of the major challenges of ABUAD farm, Ado Ekiti during the dry season is the irrigation system of the farm. The board of the company decided the best way to resolve the problem is to automate the system, as a software developer for ABUAD farm, you are mandated to develop software that interacts with the machine. The software through the machine must be able to:

- Read the temperature of the soil.
- Determine the moisture content of the soil.
- Configure time interval for the water system based on the above.
- Triggered an alarm if there is no sufficient water in the tank for the irrigation.
- Enabled password for the system.
    A. Discuss the application development following the software development cycle.
    B. Critically discuss the hardware and software features.
    C. Support your answer with a flowchart and an algorithm.
    D. Draw the Top-down or Bottom-up design approach of the application.

PDF submission only, no copy and paste and copying from other students as I will not grade such.

Note: Bonus mark will be awarded for clarity and uniqueness.

A…SOFTWARE DEVELOPMENT FOR AN IRRIGATION SYSTEM FOR ABUAD FARM, ADO EKITI by 18/ENG08/007

Conceptualization:

- Due to the major challenges the ABUAD farm is facing during dry season, a software is to be developed to read the temperature of the soil, determine moisture content of the soil, configure time interval for the water system based on temperature and moisture content, must also contain an alarm that triggers if there is no sufficient water for irrigation and an enabled password for the system. This software will be needed to improve the irrigation (that is the process of applying controlled amounts of water to plants at needed intervals) system for the ABUAD farm.
- There are different types of irrigation systems; we have flood irrigation, sprinklers irrigation, drip irrigation and micro irrigation. Drip and Micro irrigation are out of it because they are used mainly for small scale farming which ABUAD Farm is not, there for I have considered both Flood and Sprinklers irrigation, due to the fact that Floods are a constant during dry season. I have chosen to base my system of an adaptation of a sprinklers irrigations.
- My adaptation is for my water outlet to be done through a sprinkler to mimic rain and to provide efficient coverage for small to large areas and it should be suitable for wide range of discharge capacity.

Specialization:

- *Hardware*
    1. Pipe System.
    2. Sprinklers.
    3. Temperature sensor.
    4. Humidity sensor
    5. Moisture sensor.
    6. Proportional-Integral derivative controller (PID controller).
- *Software*
    1. GUI- Specifically a GUI based automatic irrigation system.
    2. Timer.
    3. Windows Application Software.
    4. Processing software.
    5. Security software.

Design:
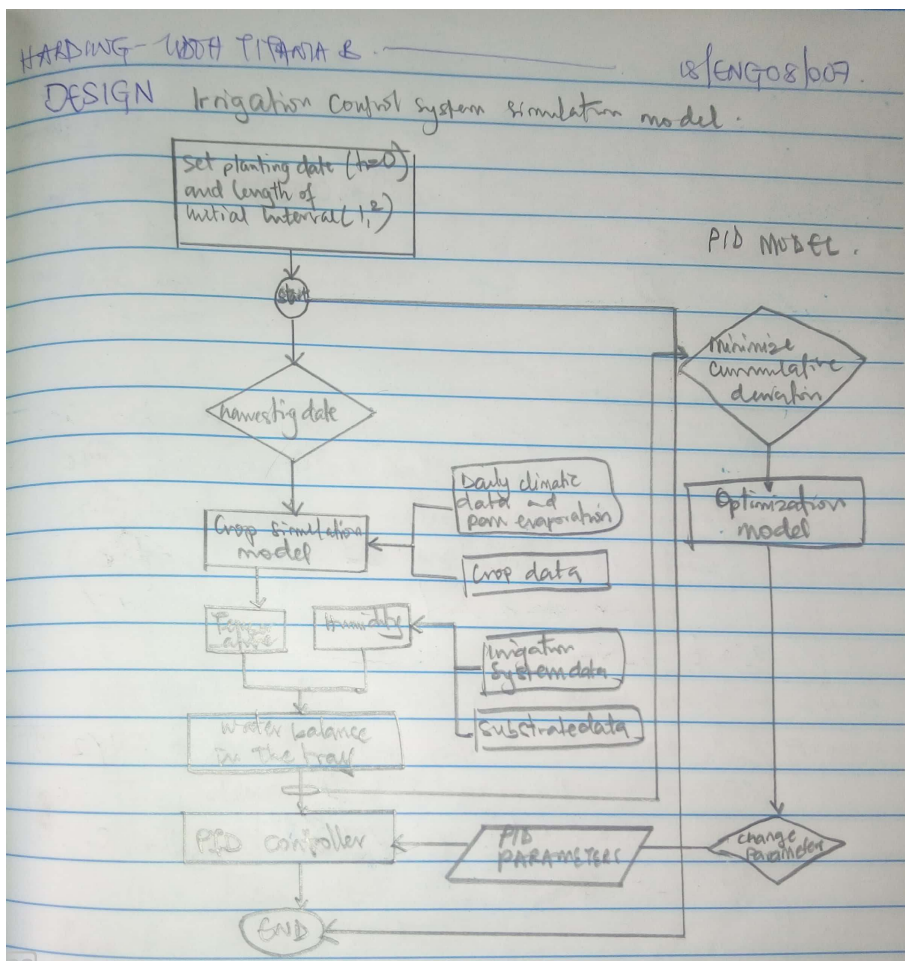
Implementation:

- The software was implemented using various programming languages (High Level language (HLL), Low Level Language (LLL) and Machine Language.

Testing and Debugging:

- Scripts and codes written did not run smoothly during the first two times of testing the data of the program due to logical and syntax errors. A debugging was done using a diagnostic to identify the bugs and a process of removing them manually was done.
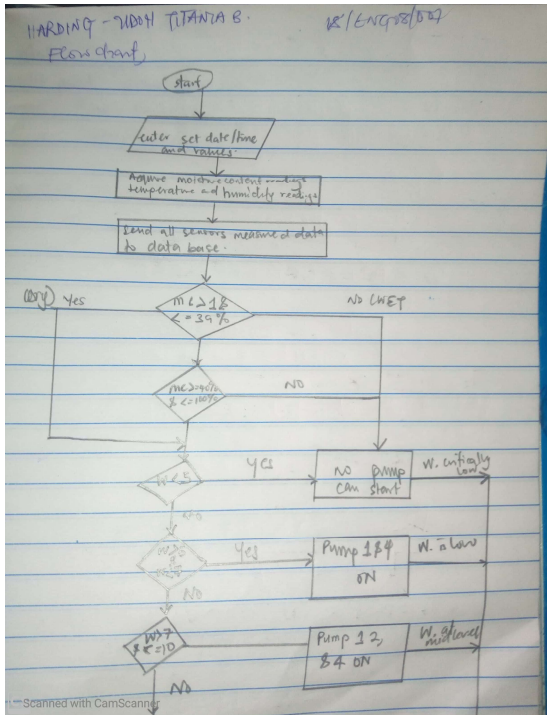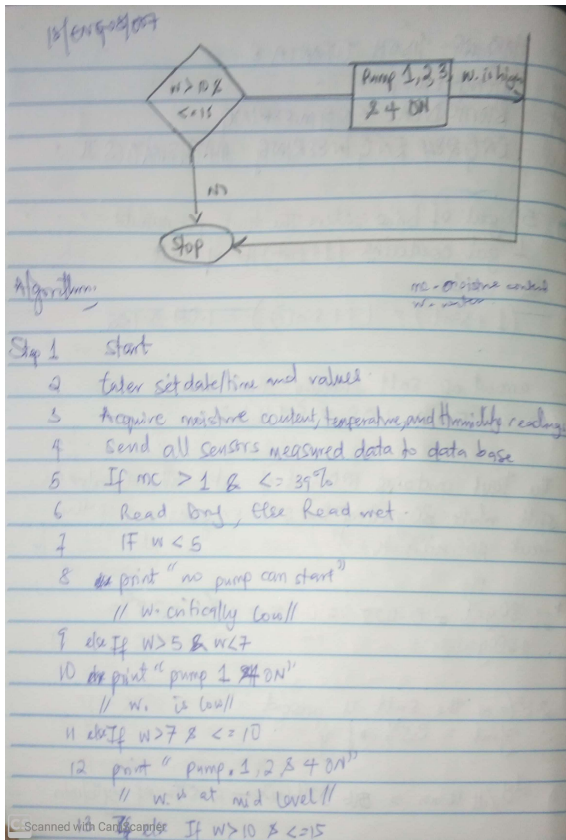
Release and Update:

- The application is released with real time data and updated every 2 weeks for an accurate running of the system.

B. Critical discussion of each of the hardware and software features

- *Hardware*
    1) Pipe System - Polyethylene pipes will be used for the piping system because they are durable and can withstand many environmental elements, the pipes will be snaked in trench to allow expansion and contraction.
    2) Sprinklers - water outlet will be done using a sprinkler system to mimic rain and to provide efficient coverage for small to large areas and it should be suitable for wide range of discharge capacity.
    3) Temperature sensor – the sensor will be used to measures the temperature of its environment and converts the input data into electronic data to record, monitor, or signal temperature changes.
    4) Humidity sensor – this sensor will be used to detect and measure water vapor by measuring the capacitance or resistance of air samples.
    5) Moisture sensor – this sensor will be used with an inline moisture meter to measure the moisture of the soil.
    6) Proportional-Integral derivative controller (PID controller) - this will be used as a control loop mechanism and to employ a feedback system.
- *Software*
    1) GUI- Specifically a GUI based automatic irrigation system.
    2) Timer – to time the water flow.
    3) Windows Application Software – this will be used for schematic capture simulation and printed circuit board layout design.
    4) Processing software - this software will be used as an open source graphical library and integrated development environment.
    5) Security software - this software will be used to employ passcode system to provide quick and easy authentication.

C.The flowchart and algorithm to support my answer.

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Algorithm:

mc - moisture content
w - water

Step 1   Start
2   Enter set date/time and values
3   Acquire moisture content, temperature and humidity readings
4   Send all sensors measured data to data base
5   If mc > 1 & <= 39%
6   Read dry, else Read wet
7   IF w < 5
8   do print "no pump can start"
    // w. critically low//
9   else If w > 5 & w < 7
10   do print "pump 1 & ON"
    // w. is low//
11   else If w > 7 & <= 10
12   print "pump 1, 2 & 4 on"
    // w. at mid level //
If w > 10 & <= 15

14 print "pump 1,2, 3 & 4 on"
    // w. is high //
.5   stop.

D.The Top-down or Bottom-up design approach of the application

18/ENG08/007   Top-down design approach of The system,

Irrigation controller.

open loop controller   closed loop controller

non-feedback system

Input   Output

soil moisture   Radiation   Wind speed   water Pump   lamp

Temperature   Relative Humidity