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18/ENG05/024

MECHATRONICS

ENG 224 CLASSWORK 2

AFE BABALOLA UNIVERSITY (ABUAD)

SMART FARM IRRIGATION SYSTEM

INTRODUCTION

Irrigation is the artificial application of water to the soil. Presently, the irrigation system being practiced in Afe Babalola University (ABUAD) is not fully automated. This method is not fully effective as water is not used efficiently, soil moisture and Ph are not being properly monitored and it always requires the availability of staff.

Hence, the concept of automated irrigation system is to be introduced. It is a sensor based irrigation system which will make use of moisture sensors to measure the level of moisture in the soil, temperature sensors, water level sensors, all with pre defined levels already stored in the system. These sensors are to interface with a micro controller and a user friendly software which I would design, so as to be able to monitor the system and its operations.

HARDWARE AND SOFTWARE SPECIFICATIONS

DEVICES AND SENSORS REQUIRED

- Arduino Uno
- Water level sensor
- Soil moisture sensor
- Temperature sensor (preferably LM335)
- Control module with LCD monitor
- Buzzer

The **Arduino** serves as the main control (micro controller) for the irrigation system and it is designed in such a way that it initiates the irrigation system when certain pre-defined parameters have been met. When programming, there will be a reference value and if the various soil readings are below this reference value, the irrigation system will be initiated else, it will not.

The **soil moisture sensor** reads the moisture content from the soil and sends it to the micro controller (Arduino), which interprets it and compares the read values with the reference values

Likewise, the **temperature sensor** reads soil temperature for the Arduino

The **water level sensor** is placed in the tank (water supply tank) to measure the level of water and its connected to its own microcontroller which pumps water into the tank if the water level is low.

The **LCD Monitor** is to display the reading gotten from the various sensors for the user to view.

APPLICATION DEVELOPMENT USING SOFTWARE DEVELOPMENT LIFE CYCLE

- **CONCEPT**

The aim of this software is to serve as an interface between the farmer and the irrigation system. This software is to enable the farmer to initiate controls to the irrigation system. Soil moisture, temperature and tanks levels will also be viewed from the software.

- **SPECIFICATION**

First, it will be able to display readings of soil moisture and temperature for the viewer or farmer.

It will monitor the water level of the tank and pump water automatically to the tank when the level is low, whilst alerting the farmer also with the aid of an alarm system. It will show time intervals at which water is supplied to the soil in relation to its moisture.

The software will be able to interface with the micro controller (Arduino) and Implement the irrigation system automatically when conditions are met.

It will keep a record with a time stamp attached to show the farmer or operator the various action that have been carried out automatically

It will be integrated with a security system (use of password) to prevent unauthorized access to the software.

- **DESIGN**

The algorithm and flowchart of the software are shown below;

ALGORITHM

- User Login

Step 1: Start

Step 2: get the username

Step 3: get the password

Step 4: If username= TRUE

 Print "enter password"

 If password= TRUE

 Print "Access Granted"

 OPEN the application

 Else,

 Print "Access Denied "

Step 5: Stop

- System Operations

Step 1: Start

Step 2: A= x //reference value of moisture(A) is x

Step 3: B= y //reference value of temperature(B) is y

Step 4: C= z //reference value of water level(C) is z

Step 5: Read temperature, moisture and water level

Step 6: If temperature > y

 Print "soil temperature is high"

 If moisture < x

 Print "low moisture, applying water now"

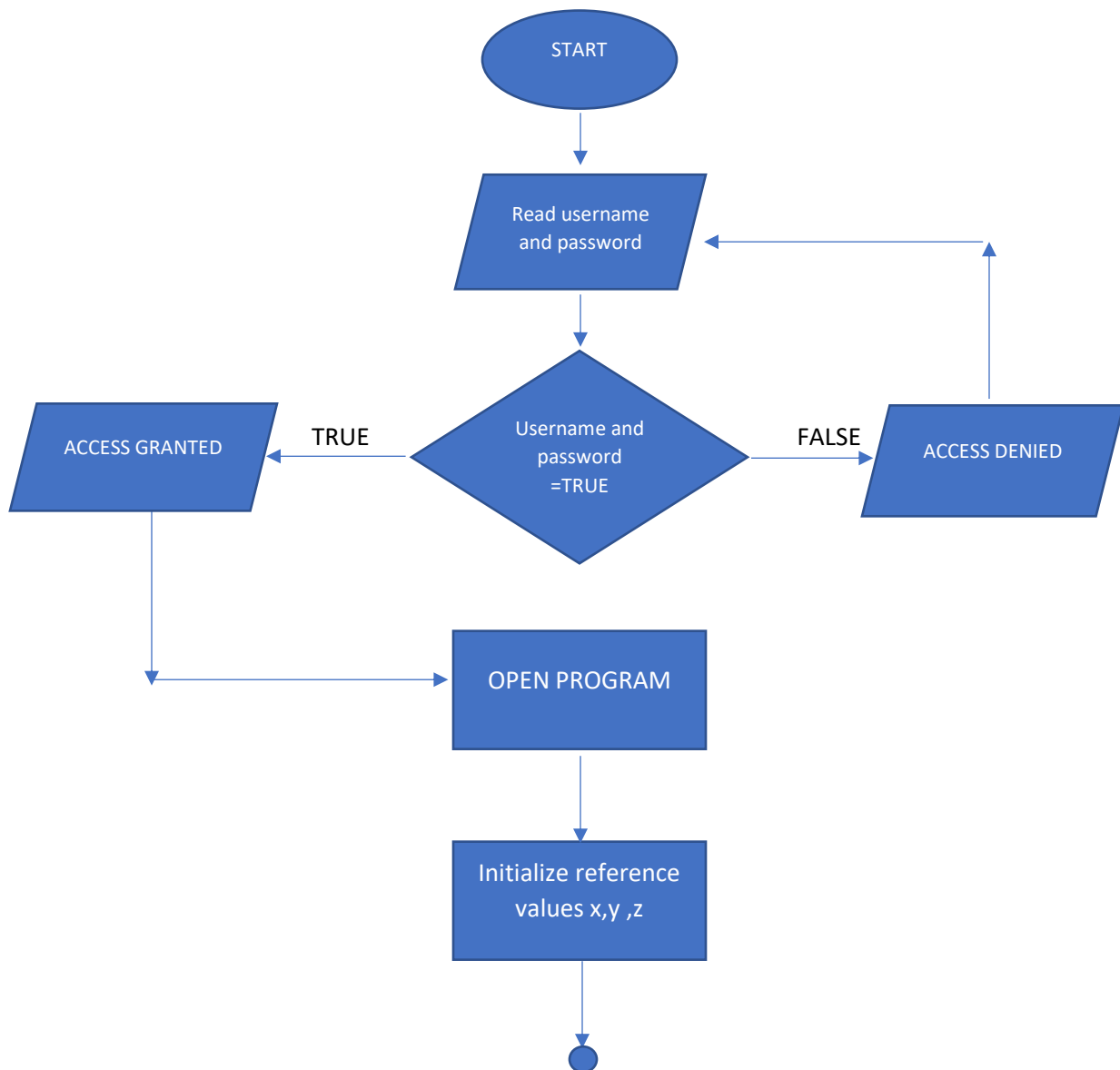
 Turn on sprinklers

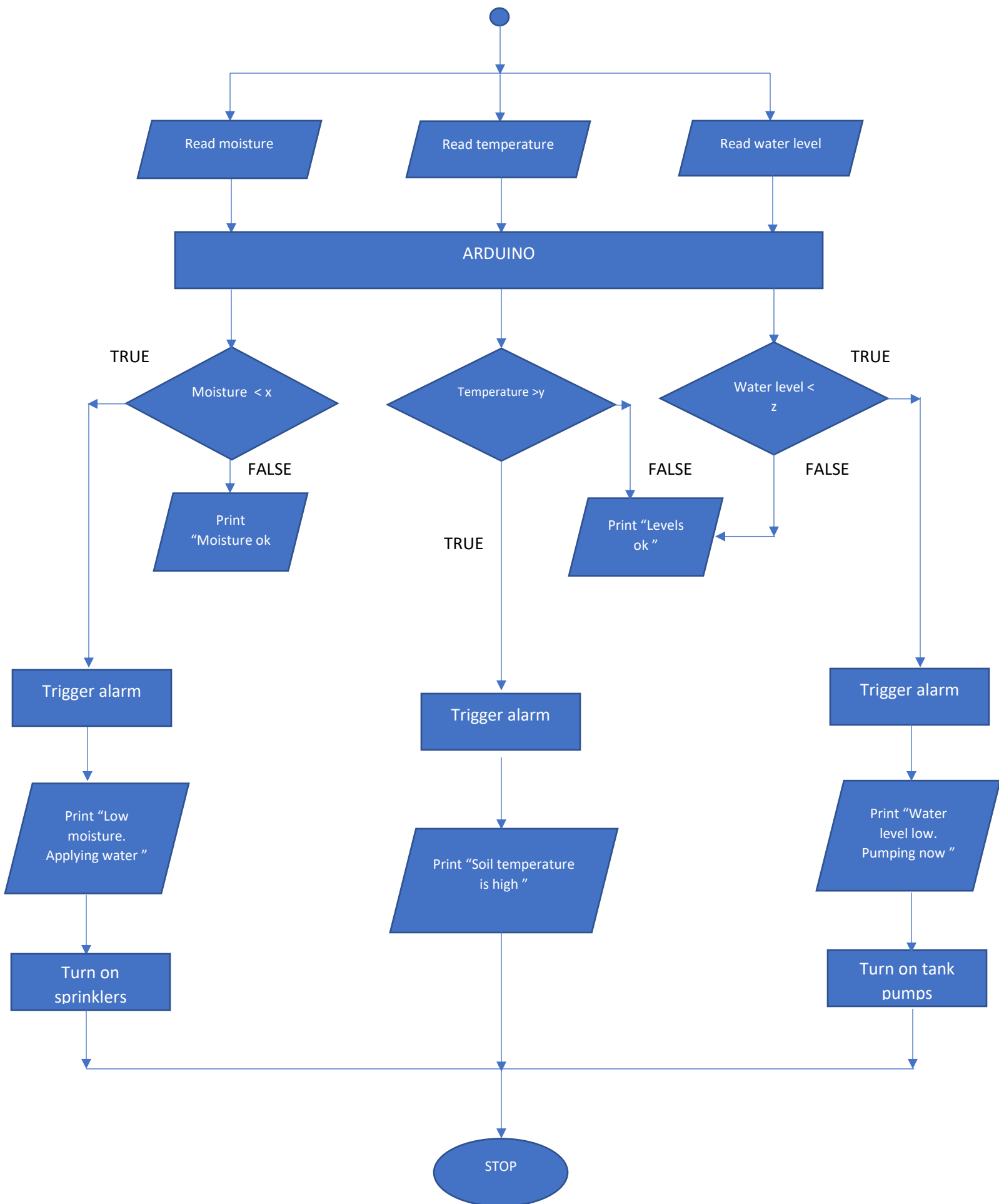
If water level < z
Trigger alarm
Print "water level low. Pumping water now"
Turn on tank pumps

Else,
Print "system ok"

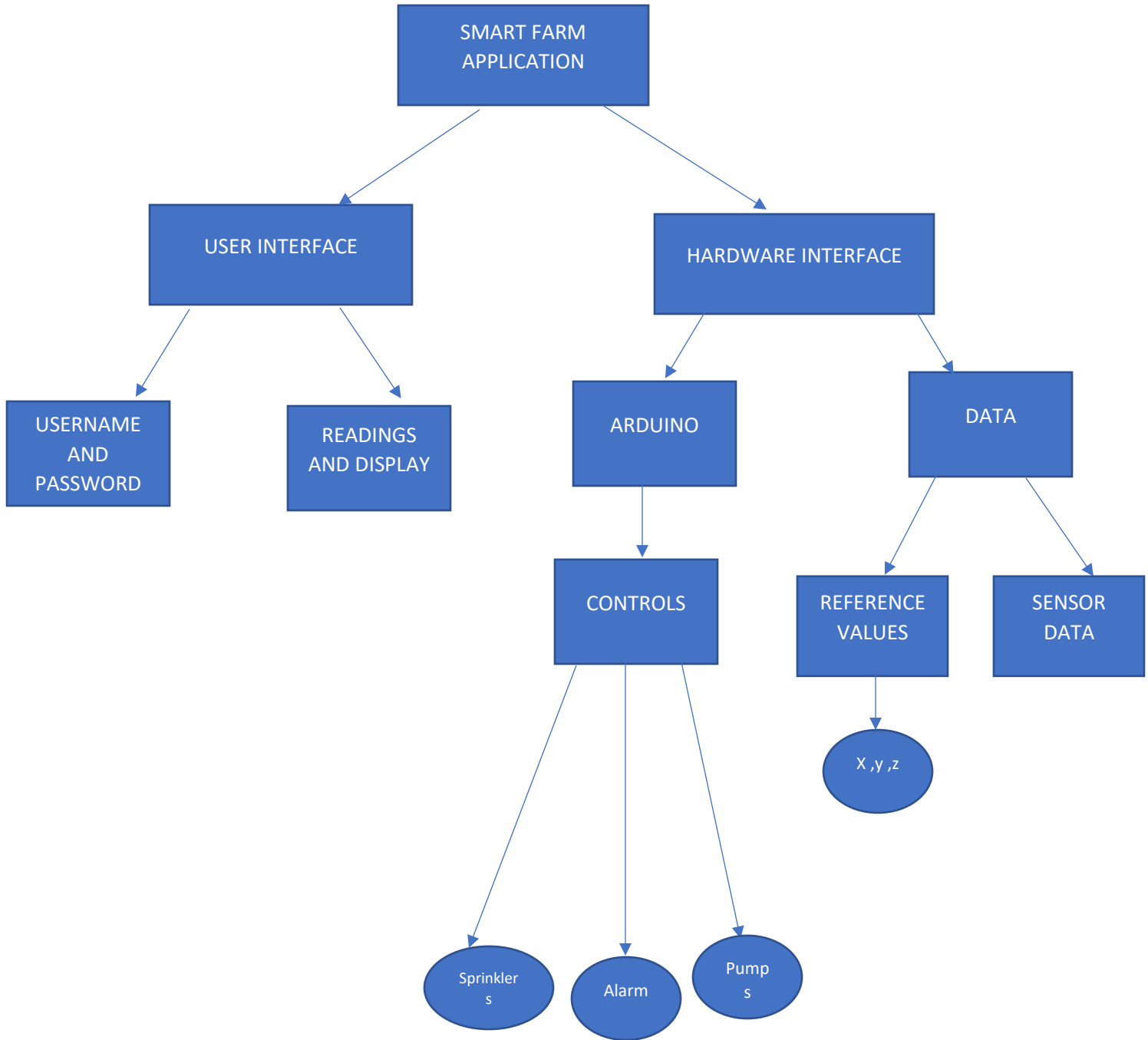
Step 7: Stop

FLOWCHART





TOP-DOWN DESIGN



- **IMPLEMENTATION**

The software will be designed in high level code according to the algorithm and flowchart shown above

- **TESTING AND DEBUGGING**

The smart farm software will be tested for three days after implementation to monitor any errors made in the design

- **RELEASE**

Once tested and debugged, the irrigation software will be ready for use