

LAW-ADUE EMMANUEL

19/ENG05/069

MECHATRONICS (200lvl)

ENG224 (C-Programming)

May 14th, 2020

CONCEPTUALIZATION:

To automate the irrigation system of the ABUAD farm; developing an application that interacts with the irrigation machine.

SPECIALIZATION:

The application software (via the machine) should be able to read the soil temperature, determine the moisture content of the soil, and configure a time interval for the water system based on the previous reading. This application should also be able to trigger an alarm to indicate water insufficiency in the irrigation tank. It should be able to enable the creation of password for the water system.

SOFTWARE FEATURES

1) Clock:

This feature consists of the date/time display feature which displays the date and time of soil temperature and moisture content readings organized in the database. It also consists of the timer feature which aids in setting up time intervals for irrigation to be carried out by the machine.

2) Database:

This feature helps in the collection and organization of soil temperature and moisture content readings from the soil, so that it can be easily accessed, managed and updated with time.

3) Password Security System:

This feature helps in the creation of passwords to protect the application from unauthorized and unwanted access thereby enhancing security. It also enables the password to be changed with time if there is a need to.

4) WIFI Connectivity:

This feature helps to establish a link/connection between the application and the irrigation machine; it creates a wireless platform where the application can be used to control the machine.

HARDWARE FEATURES

1) Temperature Censor:

This measures the degree of hotness or coldness of the ABUAD farm's soil, allowing the application user to detect or sense any physical change to the soil temperature, producing either an analogue or digital output.

2) Moisture Censor:

This measures the volume of water contained in the soil of the ABUAD farm; it indicates whether there is shortage, sufficiency or excessiveness of water in the soil.

3) Display Unit:

This helps the machine operator to visualize the temperature and moisture content readings on a screen platform; it displays the readings from the temperature and moisture sensors for record and analysis purposes.

4) Alarm System:

This would help to create an alert on the insufficiency of water in the irrigation tank.

5) Random Access Memory (RAM):

This is a form of fast-access and volatile storage that makes it possible to locate information about the soil (temperature and moisture records and analysis) easily when the need arises.

DESIGN:

ALGORITHMS AND FLOWCHARTS

Application Development Algorithm (Algorithm A)

Step1: Start

Step 2: Code the application software using a suitable IDE

Step 3: Establish a WI-FI connection between the application and the irrigation machine.

Step 4: Create a password for the application

Step 5: Display moisture content and temperature readings from the sensors.

Step 6: Attach the current date and time of the readings to the display.

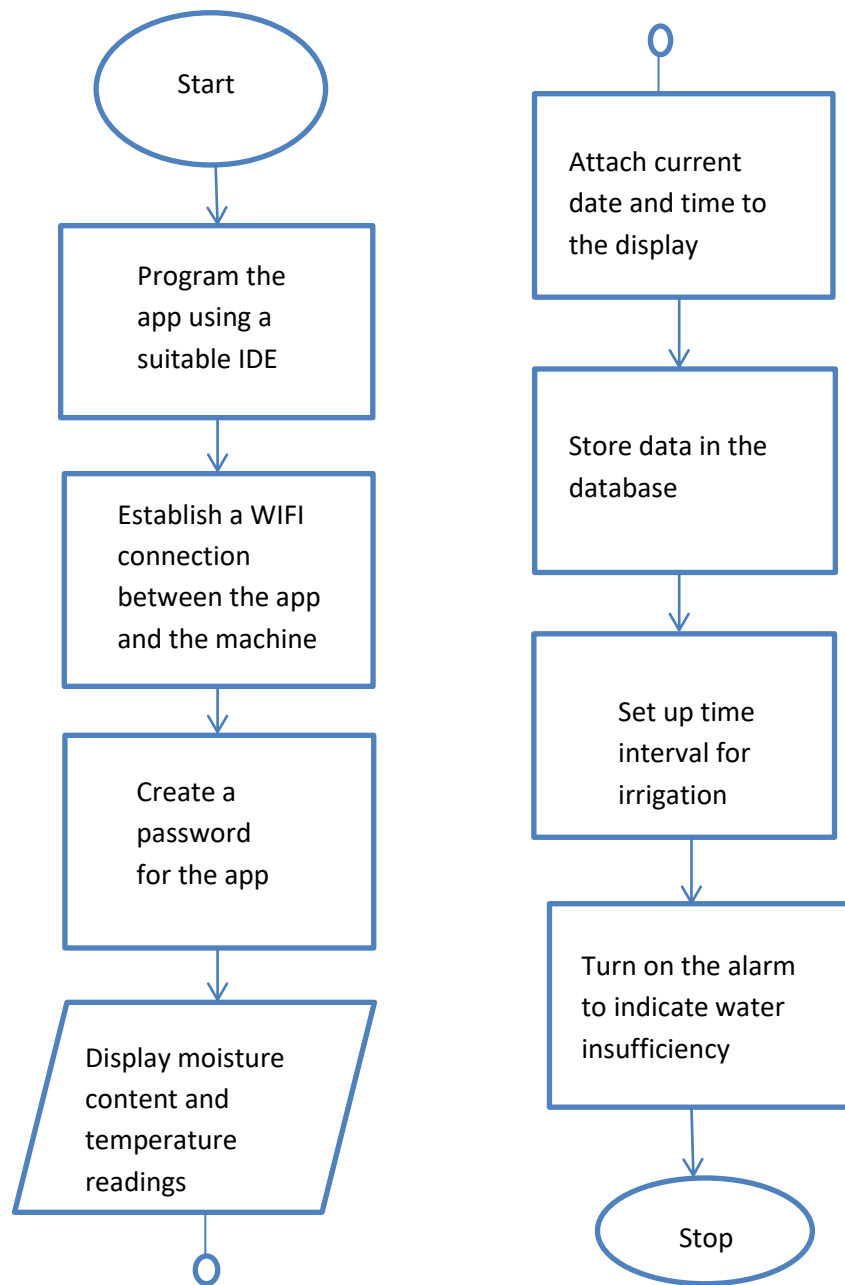
Step 7: Store data gotten from **Step 5** in the database.

Step 8: Set up time interval for irrigation, based on the readings from **Step 5**.

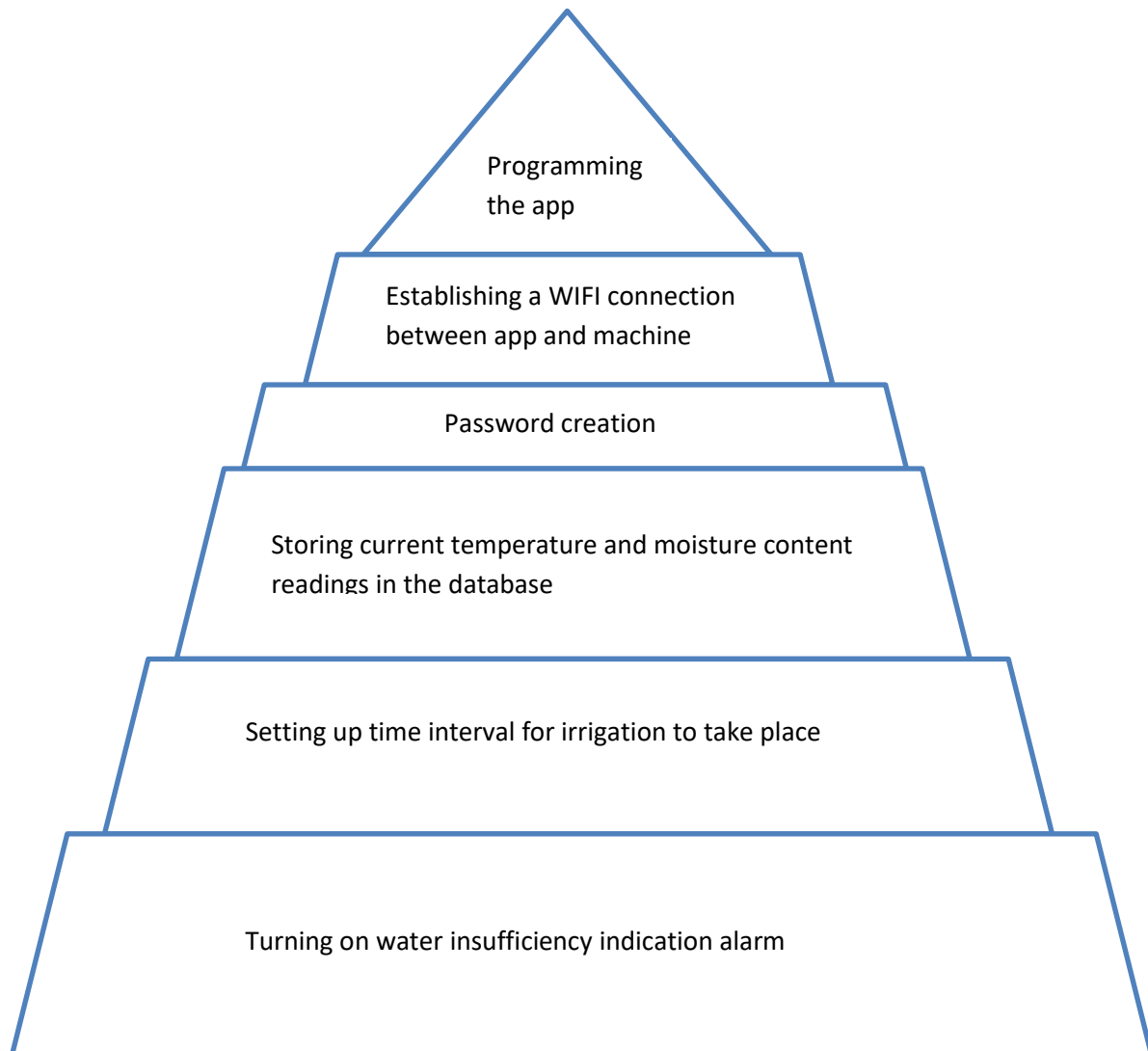
Step 9: Turn on alarm system for water insufficiency indication.

Step 10: Stop

FLOWCHART for Algorithm A:



TOP-DOWN DESIGN APPROACH FOR ALGORITHM A



User Interaction Algorithm (Algorithm B)

Start

Enter password

If (password is correct)

{

Grant user access to the application

Display an analogue/digital output of the soil temperature and moisture content measurements together with their current date and time.

If (user clicks on the water system time interval configuration feature) {

Display the timer feature for the user to set up the time interval for irrigation from the water system of the machine.

}Else

Perform no action

If (user clicks on the alarm feature) {

Display a power button to either turn on or turn off the water insufficiency indication alarm.

}Else

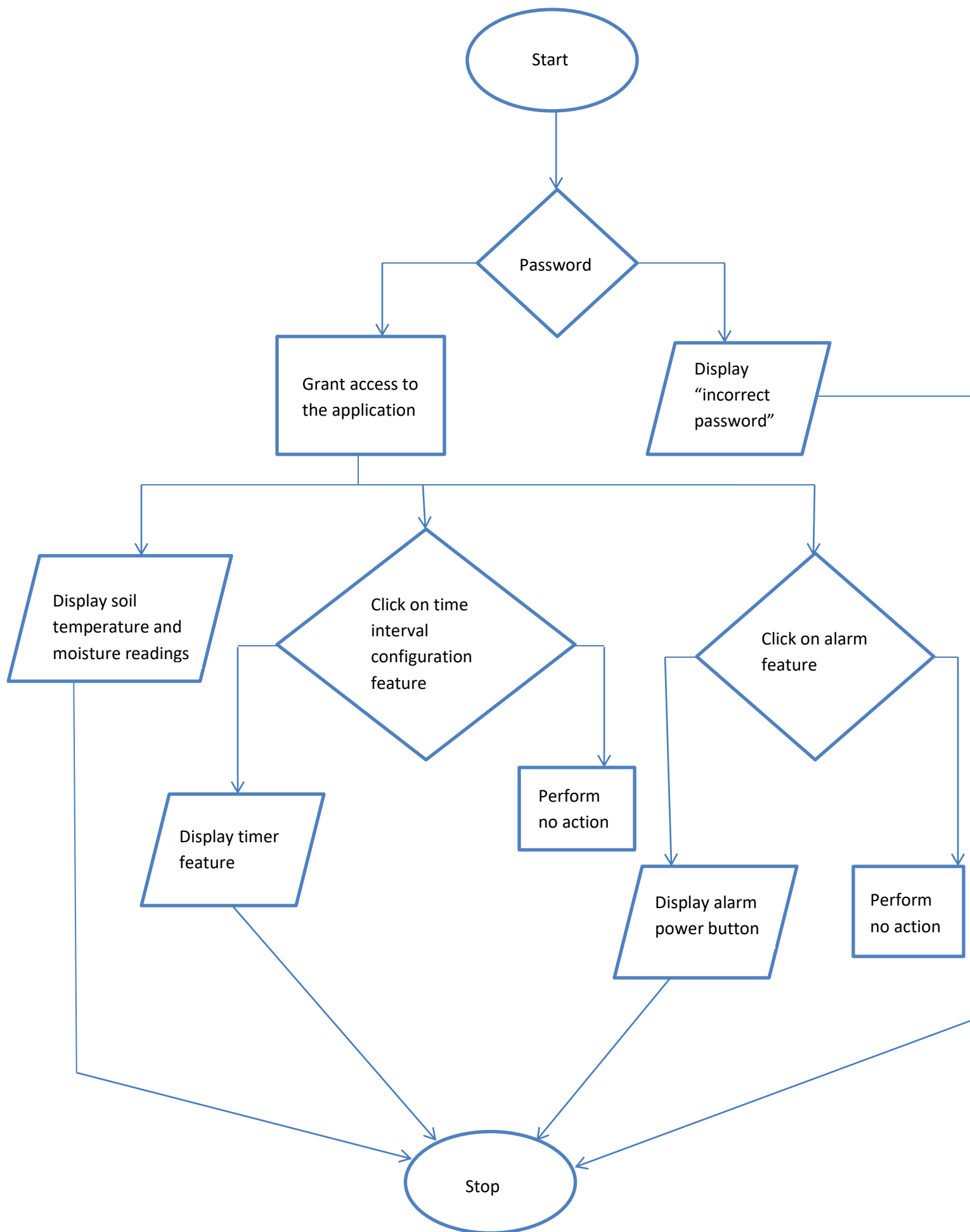
Perform no action

}Else

Display “incorrect password”

Stop

FLOWCHART for Algorithm B:



IMPLEMENTATION:

The application can be implemented using either Low-level or High-level programming languages. But more suitably, high level languages are used. Examples are: C, Python, etc.

TESTING AN UPDATE:

In this cycle, the application software is being tested using test data and diagnostic tools to identify program error, known as bugs. When the errors have been identified, the process of “debugging” is carried out to get rid of them.

RELEASE AND UPDATE:

The application is released for use with real time data and updates when necessary.