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**COURSE TITLE: STRUCTURED COMPUTER PROGRAMMING**

**COURSE CODE: ENG 224**

**AUTOMATED IRRIGATION SYSTEM SOFTWARE**

# SOFTWARE DEVELOPMENT CYCLE

## 1. Conceptualization

This software is developed to tackle one of the major challenges of the ABUAD farm, Ado Ekiti, which is the irrigation system during the dry season. This software is developed to interact with the machine and through the machine this software 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 temperature and moisture content of the soil. The software will also trigger an alarm if there is no sufficient water in the tank for the irrigation and enable a password for the system.

With the use of this application, the ABUAD farmers will be able to resolve the problem of irrigation system during the dry season.

## 2. Specification

This software is developed to be used by the ABUAD farmers. Therefore, the interface must be detailed and data must be displayed in real time for optimum efficiency. The information must also be properly and efficiently stored and managed

Hardware platforms

### 1. Arduino

Arduino is "an open-source electronics platform based totally on clean-to-use hardware and software". The Arduino control panel programmed by Arduino c and is based on C and C ++.

### 2. Arduino LCD

Liquid Crystal Library This library permits an Arduino board to control Liquid Crystal Display (LCD).

### 3. Bluetooth device

This tool works on serial connections and information is sent via Bluetooth when a particular button is pressed.

#### 4. SD card

The Arduino circuit makes communication with popular Micro SD cards easy and is compatible with the SD memory card library in the Arduino IDE environment, which enables easy reading and writing of files and folders, and for communication with the memory card, the circuit operates four pins of the Arduino circuit attached to it.

#### Hardware tools

##### 1. Breadboard

Breadboard is a plastic board for holding wires and electronic segments such as transistors and resistors.

##### 2. Moisture Sensor

The soil moisture sensor comprises of two tests that are utilized to the degree the volumetric substance of water. The two tests permit the current to pass through the soil, which gives the resistance esteem to the degree the dampness esteem. When there is water in the soil there will be less resistance and the soil will handle more power. But if the soil is dry it conduct power weekly and needs less power and more resistance.

##### 3. Temperature Sensor

A temperature sensor is sensor to measure the ambient temperature. This sensor has three pins – a positive, a ground, and a flag.

##### 4. Water level Sensor

A water level sensor is a gadget that recognizes water level. It creates a yield flag that is corresponding to the escalated water level.

##### 5. Water pump

It is used in this project to pump the water needed for irrigation from the main water tank through pipes. This pump can be used for different applications, in household include cleaning, bathing, space heating and flower of water. This pump is selected for this project because it has good advantages. Such as, it has a lightweight.

## 6. Rechargeable Battery

This battery is a high-quality battery that is designed in order to give top performance, strength and long life.

### Software platforms

Android development kit was used to create this software:

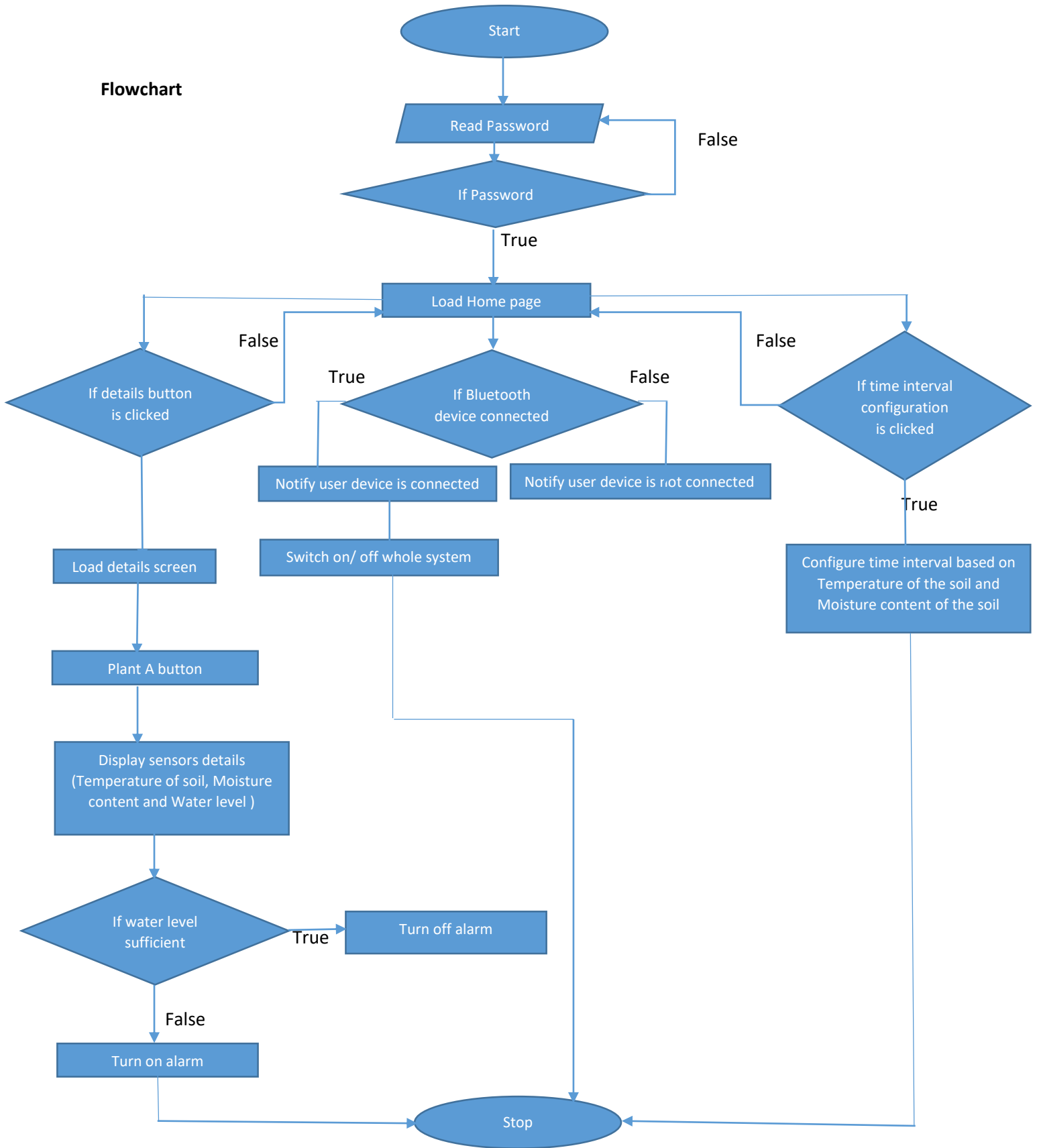
1. About Button. If it is clicked, it goes to the user to About Page, which have information about the app.
2. Help Button. If it is clicked, it goes to Help Page, which have information about the app.
3. List Picker. When it is clicked, it shows a list of all connected Bluetooth devices When a Bluetooth device is clicked.
4. Connection. If the device is connected, the text color change to green for feedback and says 'Connected'.
5. ON /OFF buttons allow the user to switch on or off the system.
6. Details button. When clicked take the user to a details page which shows all the information and let user control system line by line.
7. List Picker. When it is clicked, it shows a list of all connected Bluetooth devices When a Bluetooth device is clicked.
8. These two labels, shows the temperature and amount of water go from tank flow4 is the main one.
9. Plant button. When clicked it shows user list of details about plant such as (Name of the plant, humidity and amount of water).
10. These three labels, it is not visible unless the user clicks on plant button, when user click on plant A all these labels become visible.
11. Responsive button, when it is clicked, it takes a user to the Home page.
- 12- ON/OFF button in each line allow a user to switch on or off each line individually.

### 3. Design

#### Algorithm

1. Start
2. Read password
3. If password = True:
  - Display Home page
- Else password = False:
  - Go back to line 2
4. If Bluetooth device connected:
  - Notify user device is connected
- Else:
  - Notify user device is not connected
5. If details button clicked:
  - Display details screen
    - If plant A clicked:
      - Display sensors details (Temperature of soil, Moisture content and Water level)
        - If water level sufficient:
          - Turn on alarm
        - Else:
          - Turn off alarm
      - Else:
        - Display details screen
- Else:
  - Go back to line 4
6. If time interval configuration is clicked:
  - Configure time interval based on Temperature and Moisture content of the soil
- Else:
  - Go back to line 4
7. Stop

**Flowchart**



## **4. Implementation**

This software will be implemented using high level languages such as Embedded C Programming Language and Java Programming Language.

## **5. Testing and Debugging**

Testing was done to ascertain the performance of the sub-circuits and then whole system degree of accuracy as well as the reliability. The testing of this automated irrigation control system was carried out in sequential manner starting from the individual component to the sub-circuits and finally the whole system as mentioned above. This was done to know whether the system is performing well or not, and if the design specifications conform with the systems operations.

## **6. Release and update**

The software is published to the application store for download. For infrastructure support, a fully functioning cloud service will be attached to the application. Application store optimization services will be used to ensure the application moves to the top of the search lists to gain and benefit more users. In order to satisfy the needs of the users, the application will be developed and updated regularly.

# TOP – DOWN APPROACH

