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DEPT: ELECTRICAL AND ELECTRONICS ENGINEERING

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A WEB BASED DESIGN THAT INTERACT WITH AN IRRIGATION MACHINE

The Software Development Cycle:

- Conceptualization / Planning
- Specification
- Design
- Implementation
- Testing
- Release/ Deliver

CONCEPTUALIZATION/PLANNING

- IDENTIFY THE PROBLEM

Irrigation problem of ABUAD farm due to dry season.

Irrigation is the watering of land to make it ready for agriculture. Irrigation systems are often complex combination of canals, channels, and hoses. Nutrients may also be applied to the crops through irrigation. Water moistens the soil and thus helps in penetration of roots even into the dry field.

It is easy to spot an irrigation problem when mother nature isn't providing rainfall. Dry areas become quite visible when temperature rise and little rainfall occurs. Typically, irrigation problems have a distinct pattern, when these dry spots appear it is a good time to test your irrigation system.

- AIMS AND GOALS

  The aim is to resolve the problem by automating the system. The system will be able to the read the temperature of the soil, determine the moisture content of the soil, configure the time interval for the water system, trigger an alarm if there is no sufficient water in the tank for irrigation and enable password for the system.

SPECIFICATION

The system will require the PHP as a front end and at the back end the database MYSQL will be running.

Various functional modules that can be implemented by the product will be:

i.   Reading the temperature of the soil.

ii.   Determine the moist content of the soil.

iii.   Configure time interval for the water system.

iv.   Trigger an alarm if there is no sufficient water in the tank foe the irrigation.

v.   Enable password for the system,

    In this stage the software is broken down into modules.

Hardware components required for the development of the system include the CPU or processor speed, minimum system memory, minimum free storage space CPU specification; intel and AMD processor are needed

Software components required for the development of the system include automation tools, operating system, a suitable integrated development environment for the used programming language.

DESIGN

The next phase of the software application is the design. In this phase of the software development cycle, the architecture of the software is shown which shows the process and the various interactions between the data and the activities involved. Design of the software application can be represented in various ways which include the following:

i.   Data flow diagrams

ii.   Flowcharts

iii.   Used case diagram

iv.   Sequential diagram

v.   Activity diagram

The diagram design for the software life development cycle is shown below;
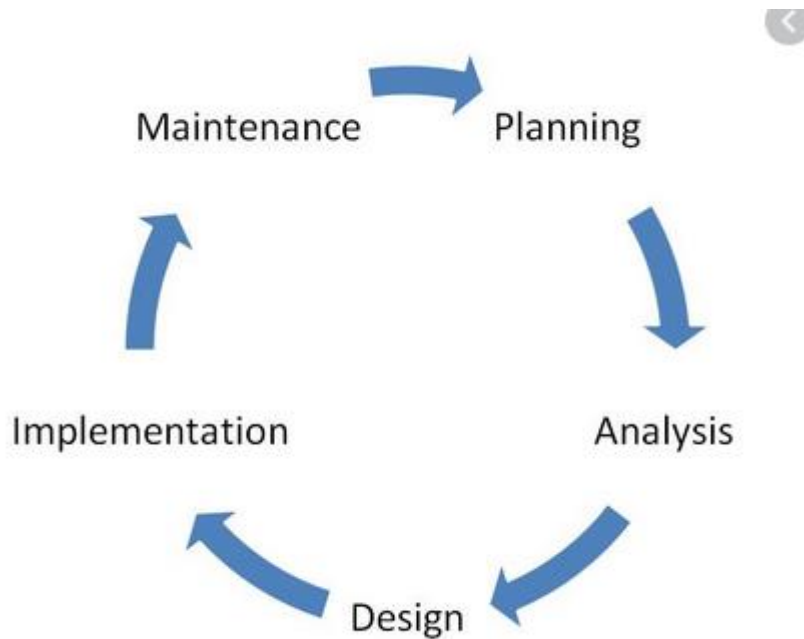
Diagram 1: Software development life cycle

The following are phases in design:

i.   Data design—This phase produces the data structures of the irrigation system, also including information about the temperature, moisture content etc.

ii.   Architectural design—This phase produces the structural units (classes) of the irrigation application software, showing the interaction between the user , data and the component of the software

iii.   Interface design—This phase specifies the interfaces between the units.

iv.   Procedural design—This phase specifies the algorithms of each method.

IMPLEMENTATION

The next phase of the application software is the implementation. In this phase, programming of the software is done including the coding, running and debugging is done. This phase is handled by the software developer/programmer using suitable programming languages. The coding here is done for both the front end and the back end of the application. After the coding and successful compilation of the program.

TESTING

After the implementation stage, testing of the application is carried out. Software testing is the execution of the software with actual test data. Testing will be done on each and every component that make up the circuit to ensure proper and satisfactory operation. For this automated irrigation software, Arduino Uno and Proteus LAB simulation software is appropriate for proper debugging.

RELEASE

After the software has been tested, the automated irrigation software can then be released to the company and used by farmers.

QUESTION TWO: Software and Hardware features.

The software and hardware features include the various component that is needed to be integrated together to build the irrigation software, the features include the following:

Hardware Features:

      a)   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 ++

      b)   Arduino LCD Liquid Crystal Library: This library permits an Arduino board to control Liquid Crystal Display (LCD) that is on the Hitachi HD44780 chipset, which is on most text-based LCDs.

      c)   CPU or Processor speed

      d)   Minimum system memory

e)   Minimum free storage space

f)   CPU Specification; Intel and AMD Processor

g)   Temperature sensor

h)   Moisture sensor

Software features

- Interface: Java, JavaScript
- Web content technology; ASP, PHP, Python
- App inventor is an open source tool provided by google. This program allows beginners to create programs that can run on Android. It uses graphical interface such as Scratch

QUESTION THREE: FLOWCHART AND ALGORITHM

Algorithm: The step by step way of the application is shown below:

Step 1: Start

Step 2: Input password

Step 3: IF password == true GOTO step 5 ELSE Step 4

Step 4: Output INCORRECT PASSWORD, TRY AGAIN

Step 5: Initialize Processor

Step 6: Initialise normal soil Temp == 18-24degree

Step 7: Read temperature with Temperature sensor, IF temperature == normal Display ABNORMAL ELSE GOTO Step 8

Step 8: Read Soil Moisture content IF Soil Moisture content == 'wet' GOTO Step 10 ELSE GOTO Step 12
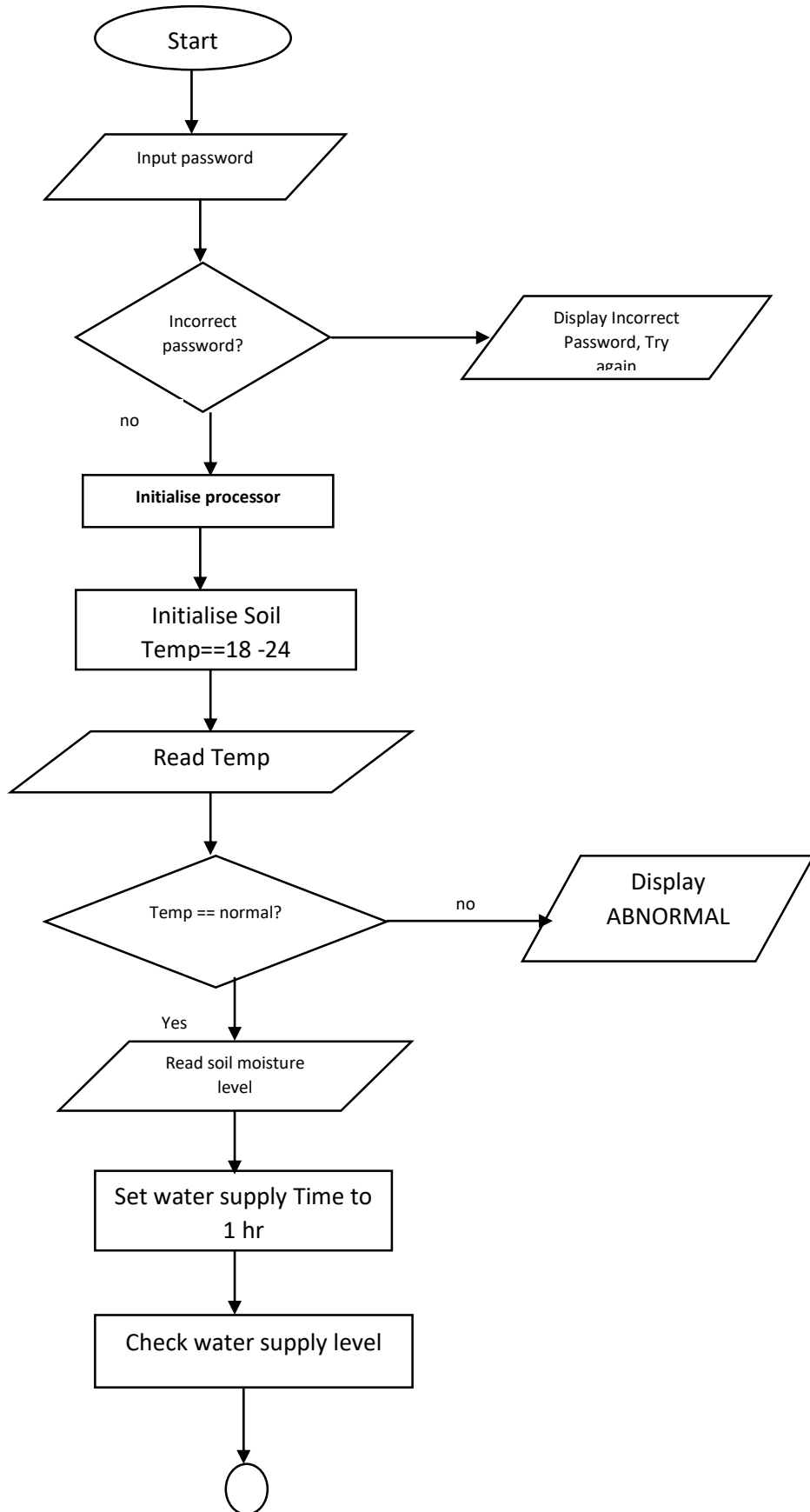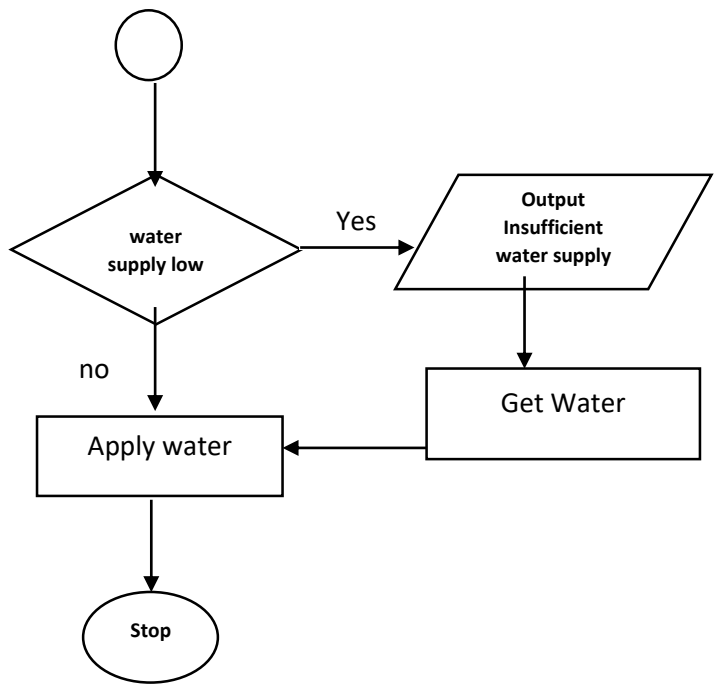
Step 9: SET Time interval for water supply == 1 hr

Step 10: Check water supply level, IF water supply == 'low' Display 'Water Insufficiency Alarm' THEN Get water supply ELSE GOTO step 11

Step 11: Apply water for soil Moisture

Step 12: Stop

Flowchart

```
                    ┌─────────────┐
                   (    Start      )
                    └─────────────┘
                           │
                           ▼
                  ╱────────────────╲
                 ╱   Input password  ╲
                 ╲                   ╱
                  ╲────────────────╱
                           │
                           ▼
                      ╱─────────╲
                     ╱ Incorrect ╲              ╱─────────────────╲
                    ╱  password?   ╲──────────▶╱  Display Incorrect  ╲
                    ╲             ╱            ╱    Password, Try       ╲
                     ╲           ╱             ╲        again           ╱
                      ╲─────────╱               ╲─────────────────────╱
                      no   │
                           ▼
                  ┌──────────────────┐
                  │ Initialise processor │
                  └──────────────────┘
                           │
                           ▼
                  ┌──────────────────┐
                  │  Initialise Soil    │
                  │  Temp==18 -24       │
                  └──────────────────┘
                           │
                           ▼
                  ╱────────────────╲
                 ╱    Read Temp      ╲
                 ╲                   ╱
                  ╲────────────────╱
                           │
                           ▼
                      ╱─────────╲
                     ╱           ╲      no      ╱─────────────╲
                    ╱ Temp == normal?╲─────────▶╱   Display     ╲
                    ╲             ╱             ╲   ABNORMAL     ╱
                     ╲           ╱               ╲─────────────╱
                      ╲─────────╱
                     Yes  │
                           ▼
                  ╱────────────────╲
                 ╱ Read soil moisture ╲
                 ╲       level        ╱
                  ╲────────────────╱
                           │
                           ▼
                  ┌──────────────────┐
                  │ Set water supply Time to │
                  │       1 hr          │
                  └──────────────────┘
                           │
                           ▼
                  ┌──────────────────┐
                  │ Check water supply level │
                  └──────────────────┘
                           │
                           ▼
                         (   )
```

QUESTION 4:

TOP DOWN APPROACH

The top down approach for the automated irrigation software is shown in the diagram below:

```
            ┌─────────────────┐
            │ AUTO IRRIGATION │
            │     SYSTEM      │
            └────────┬────────┘
                     │
                     ▼
            ┌─────────────────┐
            │    PASSWORD     │
            │   VALIDATION    │
            └─────────────────┘
```

- AUTO IRRIGATION SYSTEM
- PASSWORD VALIDATION
- ALARM SENSOR
- TEMPERATURE SENSOR
- MOISTURE CONTENT SENSOR
- WATER SUPPLY SYSTEM
- SOIL IRRIGATION