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CIVIL ENGINEERING

18/ENG03/035

A)(i) Conceptualization: This is the general overview of the application about to be made which is a software which can interact with the machines on the farm.

(ii) Specification: There will be use of sensors to test soil moisture and soil temperature with other hardwares such as a buzzer alarm, power supply and so on. Use of programs, classes and codes, there will be a code to trigger the buzzer alarm and codes with other functions.

(iii) Design: This has to do with the creations of flowcharts, algorithms and state diagrams needed for the application development.

(iv) Implementation: This is implementing the code preferably C++ for automation.

(V) Testing and debugging: This is troubleshooting the code and debugging to

ensure it's free from error.

(Vi) Release & update: This is maintenance after releasing the application making updates to make the software and system function better.

B) Hardware features read

- Temperature sensors to test the temperature such as 107 temperature probe.
- LCD display to view the temperature of the soil and moisture content.
- Soil moisture sensors to measure the moisture content of the soil.
- A buzzer alarm that will be triggered when there isn't enough water in the bank.
- A microprocessor/microcontroller that would be programmed e.g. Arduins or Raspberry pi microcontroller or ATmeg328
- A power supply to send power to the system.
- Keypad to type in password to enable the system.

- Jumper wires to interconnect all the components.

SOFTWARE ASPECT

- C++ program will be used. Visual studio will also used as an IDE or code editor.
- A separate section of the code will be for displaying/printing the temperature of the soil.
- Another section will be written to display or print the moisture content of the soil.
- Also a class will be created for the farm employees to access the system. The name of the class will be "password" and it will be set to 123456.
- Then creating a time interval class for checking the moisture content maybe every 30 seconds.
- Then a code will be written to trigger the buzzer to make sound when there isn't enough water.

C) ALGORITHM

Step 1: Start

Step 2: Input password for the system

Step 3: Read temperature of the soil

Step 4: Display soil temperature

Step 5: Read moisture content of the soil

Step 6: Display moisture content

Step 7: Recheck soil temperature and moisture content every 30 seconds
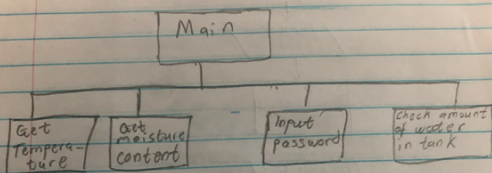
Step 8: Is there enough water in the tank?

Step 9: If NO, sound buzzer

Step 10: If yes, repeat "step 7"

Step 11: End

Top level diagram

```
                    ┌─────────┐
                    │  Main   │
                    └─────────┘
        ┌───────────┬──────────┼──────────────┐
  ┌──────────┐ ┌──────────┐ ┌──────────┐ ┌────────────┐
  │   Get    │ │   Get    │ │  Input   │ │Check amount│
  │ Tempera- │ │ moisture │ │ password │ │ of water   │
  │   ture   │ │ content  │ │          │ │  in tank   │
  └──────────┘ └──────────┘ └──────────┘ └────────────┘
```

Flow chart

```
                    (  Start  )
                        │
                 ┌──────────────┐
                 │   Input      │
                 │  Password    │
                 └──────────────┘
                        │
                 ┌──────────────┐
                 │ Read soil    │
                 │ Temperature  │
                 │ and moisture │
                 │   content    │
                 └──────────────┘
                        │
                 ┌──────────────┐
                 │ Display soil │
                 │ Temperature  │
                 │ and moisture │
                 │    soil      │
                 └──────────────┘
                        │
                 ┌──────────────┐
                 │ Recheck soil │◄──────────┐
                 │  moisture    │           │
                 │ content every│           │
                 │  30 seconds  │           │
                 └──────────────┘           │
                        │                   │
                      ╱   ╲                 │
                     ╱ Is  ╲                │
              NO    ╱ there  ╲    Yes        │
            ┌──────╱ enough   ╲──────────────┘
            │      ╲ water in  ╱
            │       ╲  the    ╱
            │        ╲ tank  ╱
            │         ╲     ╱
     ┌──────────────┐
     │ Trigger      │      (  END  )
     │ buzzer to    │
     │ sound        │
     └──────────────┘
```