KIEN-OLALI AYEBAWATARI KINGGS

MECHATRONICS ENGINEERING

18/ENG05/027

ENG 224 ASSIGNMENT

1. **Conceptualization:**
   This is a software that controls the irrigation system of the ABUAD farm. It serves as an interface between the farming operator and the irrigation system.

2. **Specification:**
   Modus:
   i.   Soil sampling
   ii.   Temperature monitor
   iii. Moisture determination
   iv.   Water supply
   v.   Alarm system

3. **Design:**

   i.   Algorithm:
         1. Start
         2. Boot system

3. Enter password
4. Check soil temperature
5. Read soil moisture content
6. Set time interval for water supply to maintain regular soil moisture
   If water level is low, sound alarm
   Else maintain soil moisture
7. Stop

ii. Flow chart:

```
                          ┌─────────────┐
                          │    START    │
                          └──────┬──────┘
                                 │
                                 ▼
                        ┌────────────────────┐
                        │   START UP SYSTEM   │
                        └─────────┬──────────┘
                                  │
                                  ▼
                        ╱────────────────────╱
                       ╱    ENTER PASSWORD   ╱
                      ╱────────────────────╱
                                  │
                                  ▼
                        ┌────────────────────────┐
                        │  CHECK SOIL TEMPERATURE │
                        └───────────┬─────────────┘
                                    │
                                    ▼
                        ┌────────────────────────┐
                        │   READ SOIL MOISTURE    │
                        │        CONTENT          │
                        └───────────┬─────────────┘
                                    │
                                    ▼
                    ┌────────────────────────────────────┐
                    │ SET TIME INTERVAL FOR WATER SUPPLY  │
                    │   TO MAINTAIN SOIL MOISTURE         │
                    └──────────────────┬──────────────────┘
                                       │
                                       ▼
                                  ◇─────────◇
                                 ╱   WATER   ╲
                                ◇    SUPPLY    ◇
                                 ╲           ╱
                                  ◇─────────◇
                          ┌───────────┘     └────────────┐
                          ▼                               ▼
                 ┌──────────────────┐          ┌────────────────────────┐
                 │   SOUND ALARM    │          │ MAINTAIN SOIL MOISTURE  │
                 └────────┬─────────┘          └────────────┬────────────┘
                          └──────────────┬─────────────────┘
                                         ▼
                                  ┌─────────────┐
                                  │    STOP     │
                                  └─────────────┘
```
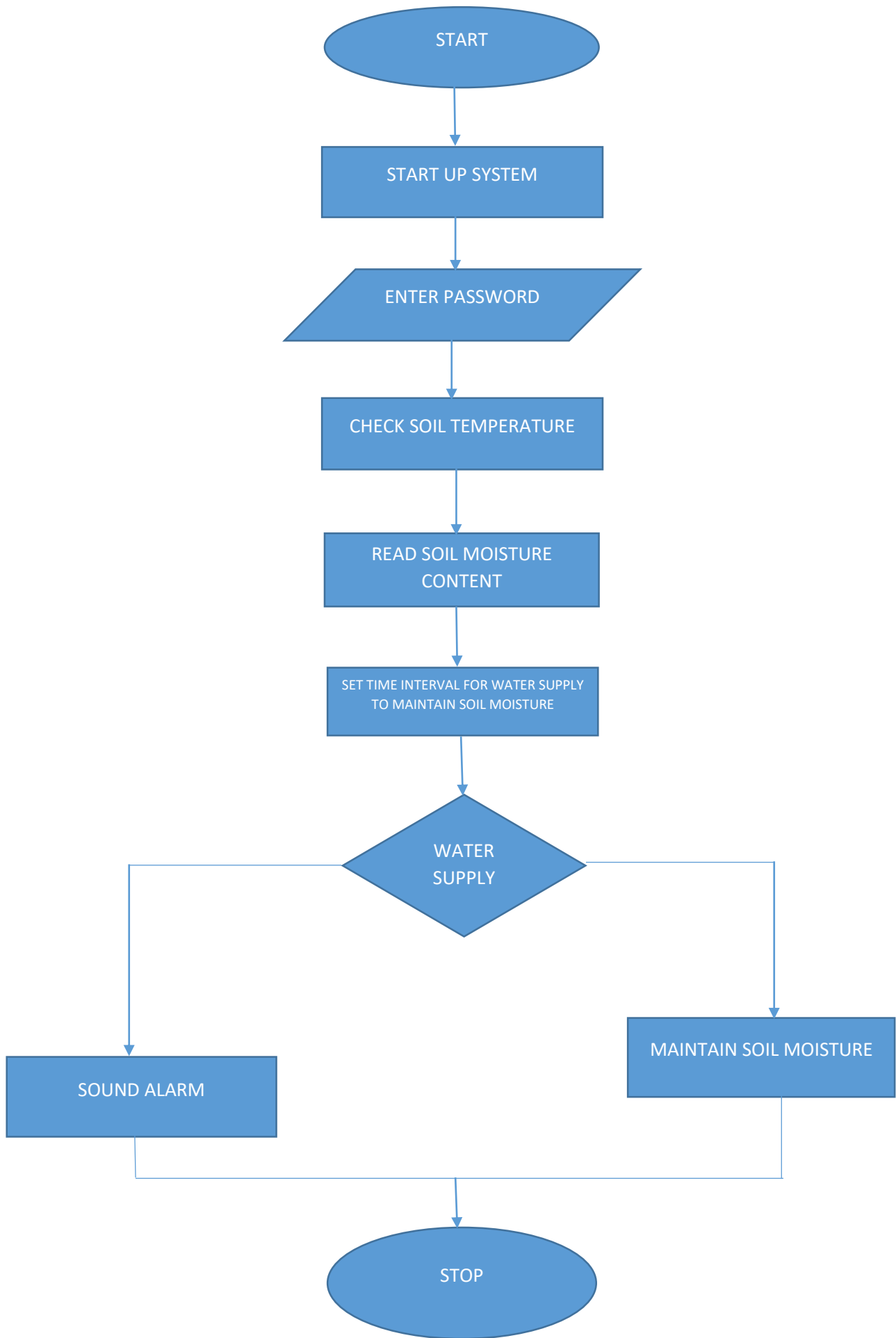
4. The program is written in a high level language including the necessary features

5. A dry run is carried out to know the state of the program and bugs are removed.

2. The program has both hardware and software components:

Hardware: Irrigation machine, the computers, the soil monitoring hardware.

Software: Soil monitoring software, irrigation control software, user interface software.

The process begins when the farm operator starts up the system.

The system start up requires all units to be powered up after which a password is required by the user to fill in.

After which the user may then begin the soil maintaining process. First the soil is collected by the hardware of the soil monitoring machine, after which its temperature is then checked along with its moisture content. Then the system compares the moisture content of the soil to the standard it ought to be. The user then sets the desired amount of moisture content to be received but the soil, if the water supply is not enough the alarm system will kick in while if the water is enough the system will maintain the moisture content of the soil.

3. Design:

iii.   Algorithm:
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7. If water level is low, sound alarm

Else maintain soil moisture
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ii.   Flow chart:

```
                    ┌──────────────────┐
                    │      START       │
                    └──────────────────┘
                             │
                             ▼
                    ┌──────────────────┐
                    │  START UP SYSTEM  │
                    └──────────────────┘
                             │
                             ▼
                    ┌──────────────────┐
                    │  ENTER PASSWORD  │
                    └──────────────────┘
                             │
                             ▼
                    ┌──────────────────────┐
                    │ CHECK SOIL TEMPERATURE │
                    └──────────────────────┘
                             │
                             ▼
                    ┌──────────────────┐
                    │ READ SOIL MOISTURE │
                    │     CONTENT      │
                    └──────────────────┘
                             │
                             ▼
          ┌──────────────────────────────────────┐
          │ SET TIME INTERVAL FOR WATER SUPPLY    │
          │ TO MAINTAIN SOIL MOISTURE             │
          └──────────────────────────────────────┘
                             │
                             ▼
                        ◇ WATER ◇
                        ◇ SUPPLY ◇
          ┌──────────────────┴──────────────────┐
          ▼                                      ▼
   ┌──────────────┐                    ┌────────────────────────┐
   │ SOUND ALARM  │                    │ MAINTAIN SOIL MOISTURE │
   └──────────────┘                    └────────────────────────┘
          │                                      │
          └──────────────────┬───────────────────┘
                             ▼
                    ┌──────────────────┐
                    │      STOP        │
                    └──────────────────┘
```

```
                          ┌─────────────────────┴─────────────────────┐
                          ↓                                            ↓
                      HARDWARE                                     SOFTWARE
                          ↓                                            ↓
           ┌──────────────┼──────────────┐               ┌────────────┼────────────┐
           ↓              ↓              ↓                ↓            ↓            ↓

      Irrigation      Control     Soil monitoring    User Interface  Soil monitoring  Irrigation

      Devices        computers      equipment                         software       control

                                                                                     program
```