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MATRIC NO: 18/ENG05/065

DEPT: MECHATRONICS ENGINEERING

COURSE CODE: ENG 224

COURSE TITLE: STRUCTURED PROGRAMMING

SOFTWARE DEVELOPMENT CYCLE

1. **PLANNING STAGE**: The soil temperature differs based on its topography. Therefore, its temperature is evenly distributed on the surface area of the soil. The instrument used for measuring the average kinetic energy in the soil is called the earth thermometer. Temperature of the soil maybe due to several factors such as.
   Soil texture: A fine-grained soil carries a large amount of water they are for this reason also slow to warm. Soil moisture is the most vital controlling factor in soil temperature.
   Soil colour: Dark-coloured soils usually warm up more readily than light-coloured soils. As they possess a greater capacity for absorbing the sun's heat.
   Vegetative cover: Soils that are covered with vegetation absorb less heat than those that bare. Vegetation acts as an interceptor and retards the warming of the soil surface.
   One major factor affecting soil temperature is the soil moisture. Soil moisture is dependent on evaporation. Therefore, the more the evaporation the less the moisture content in the soil leading to an increase in temperature. Evaporation is inversely proportion to atmospheric humidity.
   A system will be developed to regulate the moisture content in the soil and all the factor affecting the moisture, provide alternative ways to solve the issue.
2. **DESIGNING STAGE:** A prototype system detects the temperature of the soil and transmit signal if the temperature is above or below the range of 65 to 75F using a thermionic diode which will convert heat to electrical energy and send a binary signal to the microprocessor which sends another binary signal to the actuator which regulates the temperature to its original temperature and send the feedback as a display to the user. The system can measure the rate of evaporation and can also distinguish the temperature and humidity of the soil using multiple sensors.
3. **IMPLEMENTATION STAGE:** A simple algorithm to retrieve sail moisture and vegetation water content from passive microwave measurements is analysed in this study. The approach is based on a zeroth-order solution of the radiative transfer equations in a vegetation layer. In this study, the single scattering albedo accounts for scattering effects and two parameters account for the dependence of the optical thickness on polarization, incidence angle, and frequency. The algorithm requires only ancillary information about crop type and surface temperature. Retrievals of the surface parameters from two radiometric data sets acquired over a soybean and a wheat crop have been attempted. The model parameters have been fitted to achieve best match between measured and retrieved surface data. The results of the inversion are analysed for different configurations of the radiometric observations: one or several look angles, L-band, C-band or (L-band and C-band). Sensitivity of the

retrievals to the best fit values of the model parameters has also been investigated. The best configurations, requiring simultaneous measurements at L- and C-band, produce retrievals of soil moisture and biomass with a 15% estimated precision (about 0.06 m^3/m^3 for soil moisture and 0.3 kg/m^2 for biomass) and exhibit a limited sensitivity to the best fit parameter. Taking advantage of positive features of the Nilson-Kuusk and the SAIL canopy reflectance (CA) models, a new fast CR model has been developed. The new model considers the diffuse and specular reflection of shortwave radiation on leaves, the canopy hot spot, and nonlambertian soil. Diffuse fluxes are treated in a four-stream approximation. An elliptical distribution has been used for leaf inclination. Comparisons of the models demonstrate a good agreement. The complete set of algorithms of the new model is appended.

4. **TESTING STAGE:**
   In this stage, the temperature is taken at different conditions of the soil. To determine the accuracy and correctness. We would also take into account of the how fast the user can get an alert of any excesses.
   DEPLOYING STAGE: This project would be deployed as soon as possible in its prototype phase due to the high demand; we would send it to those we are showing symptoms or leaving in an area where the cases are dominant, we shall also target areas where civilization hasn't reached in case there Is any outbreak there
5. **MAINTAINING STAGE:** The maintenance of the system would be done in two ways, for the software, there would be an occasional software update, to ensure that the system can be up to in ways of serving people better and for the hardware (vest), it would be taken of by the users or consumers.

HARDWARE COMPONENT

1. Thermionic diode
2. Actuators
3. Sevo motor
4. Arduino UNO board
5. Stepper motor
6. Microprocessor

SOFTWARE COMPONENT

1. Wireless sensor network

ALGORITHM

Start

Enter password

If passcode = water

Measure soil temperature

Else

Return to start

If soil temp between 65 to 75F

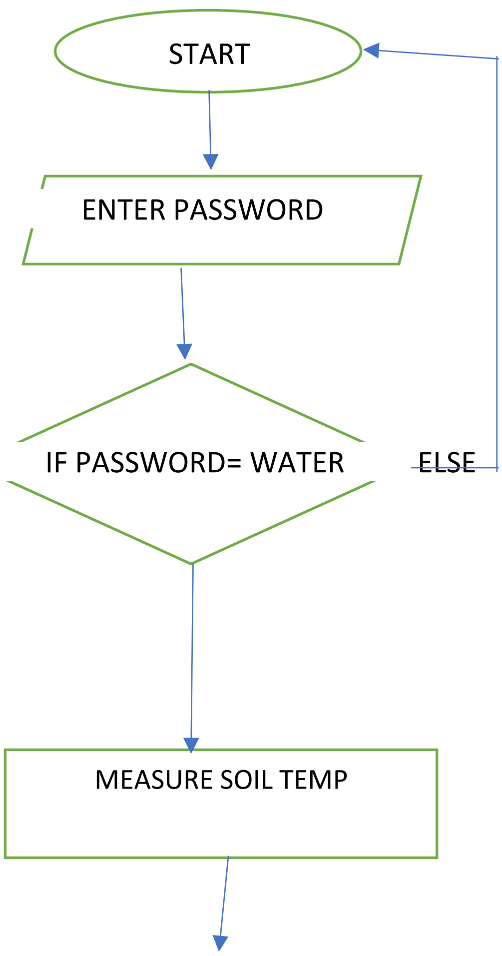
Send feedback to the user

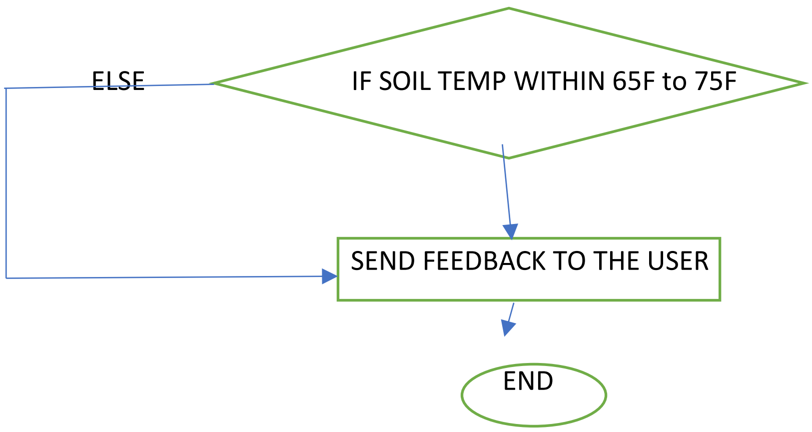
Else

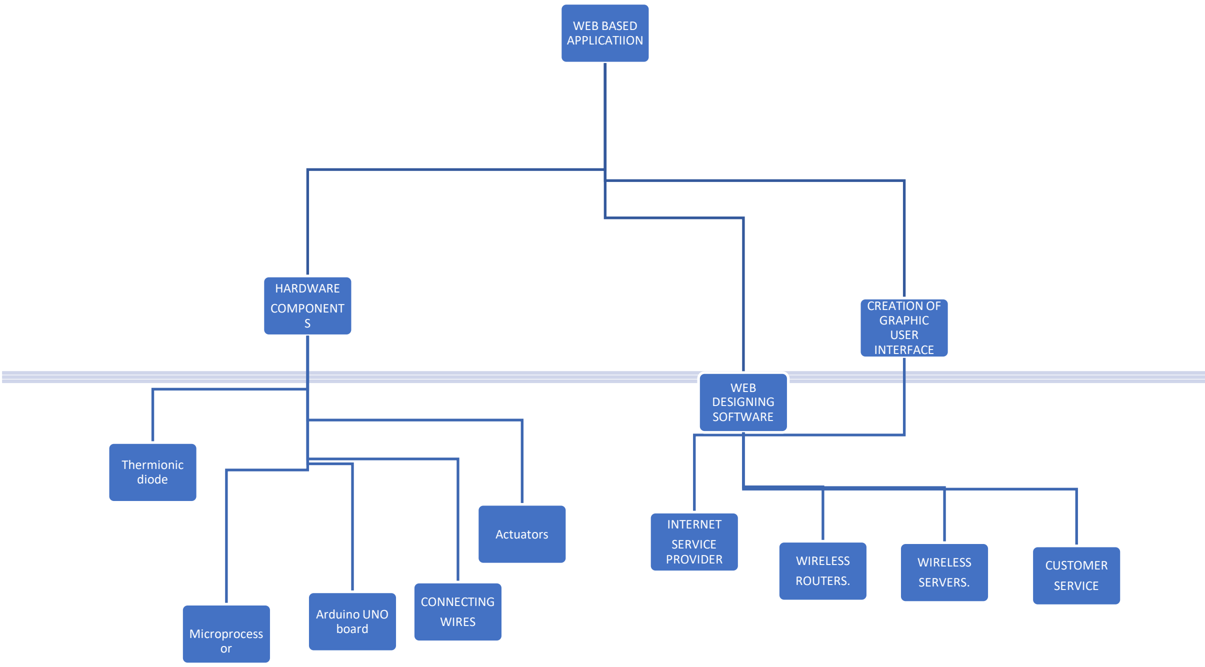
Send feedback to the user

End

FLOWCHART




ELSE
IF SOIL TEMP WITHIN 65F to 75F
SEND FEEDBACK TO THE USER
END


WEB BASED APPLICATIION
HARDWARE COMPONENTS
CREATION OF GRAPHIC USER INTERFACE
WEB DESIGNING SOFTWARE
Thermionic diode
Actuators
Microprocessor
Arduino UNO board
CONNECTING WIRES
INTERNET SERVICE PROVIDER
WIRELESS ROUTERS.
WIRELESS SERVERS.
CUSTOMER SERVICE