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18/SCI01/016

Computer Engineering

STRUCTURED PROGRAMMING

As a young engineer working with a multi-national health company, you are saddled with a huge responsibility of designing a web pag ed app.

A: Design the application following the software development cycle

1. Planning

a. We need to develop a flexible and transparent smartphone fingerprint scanner that can measure your temperature and pressure using the built-in temperature sensor. Because of this, the app will be restricted to be able to work only on smartphones. The phones will feature a temperature sensitive fingerprint sensor placed under the screen

b. In order to detect a patient's breathing condition, we can make the app to allow workers measure respiratory rate by tapping the touch screen every time the person inhales. In addition to calculating the rate of inhalations during a given time, the app also provides an animation of a breathing baby, allowing for a direct comparison with the breathing patient.

We can also essentially use the smartphone microphone as a stethoscope to listen to a patient's breath. But instead of relying on a doctor's ears to form a diagnosis from those sounds, we have been developing machine-learning algorithms that will automatically determine which respiratory condition a patient might have, including pneumonia, asthma, bronchitis and COPD. In the nearest future, we hope to integrate those algorithms into telehealth offerings as well as making them available for clinical use.

Analysis

The aim is that when a user gets the app and opens it, it is in a form of a questionnaire. The following may be the question involved,

- a. Do you feel you have Covid-19? Yes No
If yes is the answer, then the app will display "Continue"
If no is the answer, then the app will output the following message "Just to be on a safe side, continue the question"
- b. Do you experience any form of cough? Yes No
- c. Do you feel tired often? Yes No
- d. Do you feel feverish? Yes No

If no: "Continue the questionnaire" will be displayed.

If yes: Then the app will output a message "Please place your thumb on your fingerprint sensor button."

(This is where the built in temperature sensor measures the temperature and displays it)

If the temperature value is less than 100.4°F / 38°C

Then continue the questionnaire

else the app will output a red blinking warning saying you have a high fever.

⊗
WARNING!!
You have a high fever.
Make sure to get immediate treatment

Then it continues to the questionnaire

- e. Do you experience difficulty in breathing? Yes No
If the user answers no for this, but has a fever, feels tired often and experiences cough, the app should display a message stating "There is a 75% chance you have the covid-19 because you exhibit 3 out of the 4 main symptoms of the virus"

Also if no is the answer, and the user has a fever but doesn't have a cough or feel tired, the app should display:

"You have a fever, kindly visit the nearest hospital. Thank you"

In the other case that the answer is yes, the app will output a message saying:

"Please inhale and exhale into your phone microphone for 15 seconds."

This is where the microphone of the smartphone acts as a stethoscope and then the application tells you whether you have nasal congestion or any respiratory disease you may have.

From there it also displays the following message:

"You are at high risk of Covid-19. Please ensure to report the case to the centre for disease control in your nationality with immediate effect"

This is for the users who are not feverish, do not have difficulty in breathing, do not experience tiredness or cough, the app will display

"Please lets try to obey the government and observe social distancing/Quarantine in order to avoid contacting the contagious virus. You can help yourself by learning a new skill on the internet until this phase passes. Thank you for using us"

3. Design

We can build this app with the use of Visual Basic or Python Programming

4. Development & Implementation

This is the phase where the coding of the app is carried out. When coding the app, the most thing we do is the introduction of conditional statements (IF, Nested If, If Else)

5. Testing & Deployment

The app has been coded and it was tested on people in the hospital. We put the app on a smartphone and gave a patient with fever in the hospital, the phone to put his fingerprint on it and the temperature came back high and the message box opened informing him that he had high fever. We then gave the phone to 15 more people with fever and 3 people without fever to test the accuracy and efficiency. We also gave the app to some people with respiratory problems and the app was a success.

B. Critically describe the hardware and software feature Software features.

In the app, there are many software features such as,

a. Toolbar: The toolbar is an on-screen GUI (Graphical user interface)

in which menus, dialogue boxes, icons, etc appear on

b. Dialogue box: There will be a small area on the screen where

the user is prompted to provide information or

select commands. This is also to enable users to

write any messages or caption that they want

c. Menus: This is a collection of different other features that comes

with the app, so it makes it more convenient for the user to

tap and find what they're looking for.

Hardware features,

a. Touchscreen: This opens a ton of possibilities to enhance users'

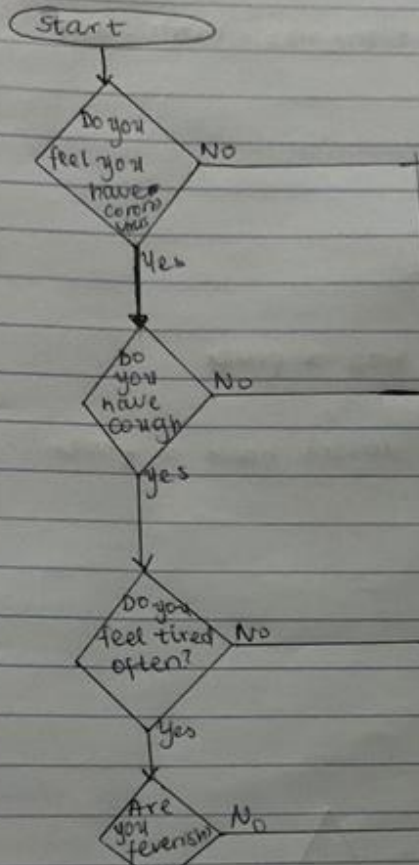
interaction with ~~the~~ ^{the} application. Users can drag, swipe,

flip or pinch to zoom.

b. Fingerprint sensor.

C Support your answer with a flowchart and an algorithm

Flowchart



Algorithm

- a Start
- b Input t
- c If $t > 38$
 Print patient has fever
 else
 Print patient has no fever
- d Stop

D. Bottom-Up design

