

FITME DIABETES PLANNER

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ABSTRACT

Since ancient times, health has always been the focus of people's attention but with the rapid development of society, people's attention slowly moved to other things such as earning money. The typical example is Malaysia, as we can see Malaysia's economy and development is increasing every year but the number of people who have diabetes is also on the rise. Although there are currently some applications available for tracking diabetes, these applications lack in the aspect of user-friendliness as they seem to have a lot of information crammed in their home page. People nowadays do not have the patience or time to scan through lines of texts to get the information they wish to see. They prefer to be able to view important information quickly and efficiently. In order to achieve this, "material design" comes into the picture. As technology is becoming more progressive, people expect to have some new and creative elements added to the traditional applications to attract their attention. To overcome this issue of lacking user-friendliness and minimalism, the "FitMe Diabetes Planner" application is introduced. As for the "FitMe Diabetes Planner" application, the main components are the diet plans and the exercises. These plans should be created uniquely according to the different levels of diabetes the user is facing and how much strenuous exercise they are able to push themselves to carry out. Thus, this application will be developed to allow the user to initially input their current diabetes information and a list of diet plans and

exercises will be suggested to them, where they will be able to customize and create their own fitness plan by choosing from them. To ensure this application promotes user-friendliness and minimalism, fewer texts will be used and a 3D virtual model will be used to show the difference that will occur in the bodies of the user after they effectively carry out their fitness plan. The 3D element of the user's virtual body will act as a catalyst to make the application appear more fun and motivating to use.

1. Introduction

Globally, mobile health initiatives have driven the development of the healthcare industry as the preferred choice for all healthcare providers. According to the global survey, the World Health Organization (WHO) found that mobile health was being promoted in almost all countries, but with varying degrees of adoption.

On top of that, the world is facing the same problem which is the availability, affordability and quality of health care. The high cost of health care poses affordability challenges for millions of different people, based on significant disparities in income and geography. Based on that a lot of people can't get the quality care they actually need. (Darrell M. West, 2013) However, health care is always one of the most important problems that have to be solved as soon as possible in every country.

2. Problem Statement

Today, Malaysia has the highest incidence of diabetes in Asia and one of the highest in the world, perhaps second to Saudi Arabia. About 2.5 million adults in Malaysia have diabetes and are over the age of 18. (Datuk Dr Mustaffa Embong, 2018) Statistics show that almost half of Malaysians do not know they have diabetes, according to NADI (National Diabetes Institute)'s records. If we review the previous data, in 2006 only 8.6 percent of adults had diabetes, but in 2011 the number already increased to 15.2 percent. More than that, almost one in five Malaysian adults has diabetes in 2015 which means

the number already raised to around 20 percent. The data exceeds the Health Ministry's 2014 prediction that the milestone would not be reached until 2020. (Farezza Hanum Rashid, 2017). Although it has been confirmed that diabetes is a preventable chronic disease and can be controlled to delay or prevent its complications for those affected, the quantity of diabetics in Malaysia is still increasing fast.

Due to people not paying attention to diabetes and also health care problem cannot be fundamentally solved, dangers of diabetes has further worsened in Malaysia and more and more people are suffering from diabetes in Malaysia. As mentioned before, diabetes can be controlled, but because of some people not having enough knowledge to prevent diabetes or some people due to their stress in life, they are unable to spare more energy on preventing diabetes properly, currently diabetes seems to be really out of control.

However, currently, we do have some applications related to diabetes but all of them have some common deficiencies. First, they are overly focused on providing information that leads to overcrowding of words in the application. Therefore the users' sense of vision becomes tired and they lose their interest for long-term use. Secondly, their functions lack stimulation that can really motivate users to change themselves, such as creativity and interaction. Most of the times, the main function of the application is just purely focused on recording and tracking the users' information.

3. Objectives

To make the application with complete functions which can provide a brief 3D model of user's body and analyze user's body's information.

To make the application connect to a database correctly so all of the user's information can be stored properly.

To make the application can successfully use internet so that can provide some relevant information to user as reference.

4. Methodology

For the methodology, this application will use the Agile SCRUM method. Due to the constant change or increase in the stakeholders' requirements based on the rapidly changing environment, this will be the most suitable methodology as a consistent interaction can be maintained with the stakeholders. On top of that, this will also help to control the chaos of conflicting interest and needs. This will, in turn, help to reduce the Research & Development (R&D) costs.

4.1 Sprint Planning

For this project, a questionnaire will be prepared and distributed to 10 respondents, which includes the general public and doctors. After the survey results are obtained, the answers are analyzed to determine the functional requirements of the application. According to the different answers collected, the functional requirements will be prioritized accordingly.

4.2 Sprint

At this stage, the development of the application will take place corresponding to the product backlog to be created, the sprint goals, and the sprint backlog. The product backlog, sprint goals, and sprint backlog will be created to ensure that the project is on track. On top of that, the progress will also be checked across with the Gantt Chart that has been created.

4.3 SPRINT REVIEW

During the sprint review phase, the product of the previous sprint that has been completed will be shown as a demo to the product owner to show the progress of the sprint. Feedback will be taken from the product owner whether the product of the sprint reaches their expectations or if there are some changes that needs to be made. In case there are changing or new requirements, they can be implemented in the next sprint that will be carried out.

5. Development Results

The process of developing this application was divided into three phases which were initially developing the system registration, followed by each individual function within every fragment and the 3D virtual model to correspond with the information entered by the user. The first and second and phases were developed by using Java in Android Studio and Firebase. For the final phase where the 3D model is developed, the software 3Ds Max was used to create the model and was exported to Unity. Then the scene in Unity was combined with Android Studio to make the 3D model appear in the application.

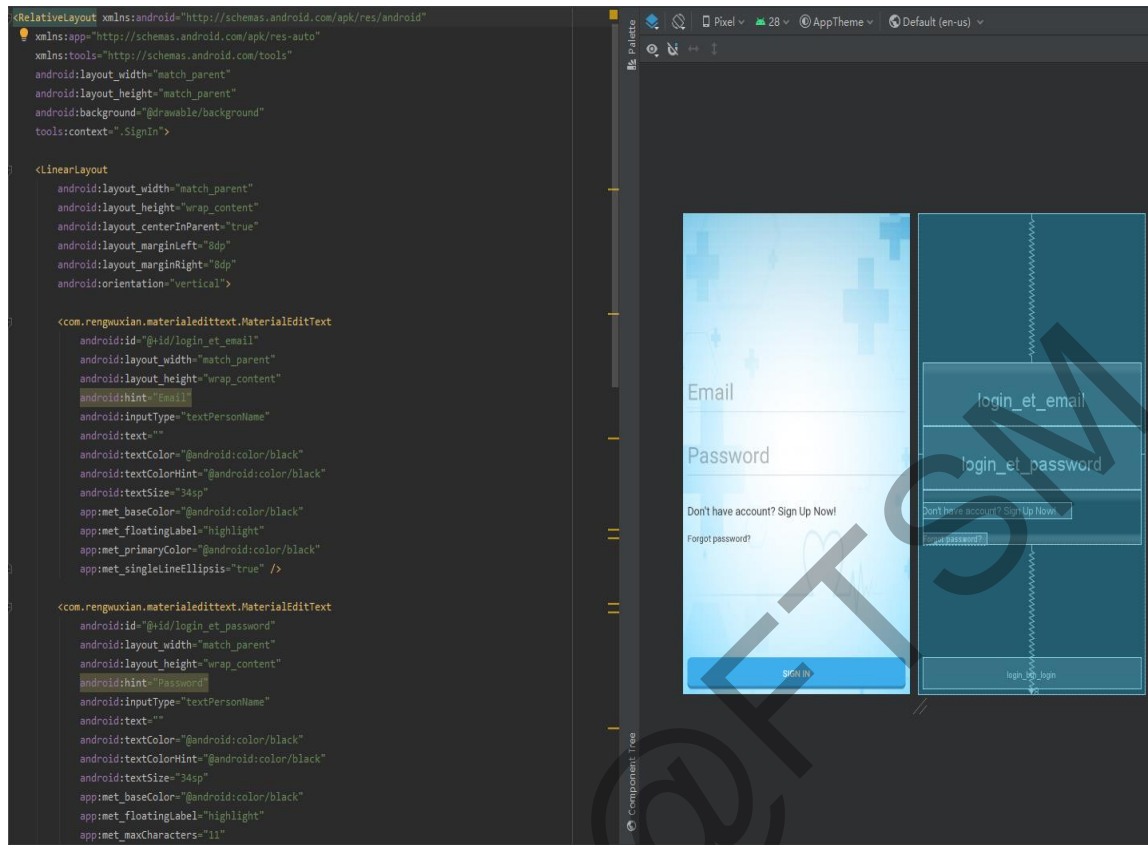


Figure 5.1.1 Registration-Sign In

```

tvSignup.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        Intent intent = new Intent( packageContext: SignIn.this, SignUp.class);
        startActivity(intent);
    }
});

tvForgotPassword.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        Intent intent = new Intent( packageContext: SignIn.this, SignUp.class);
        startActivity(intent);
    }
});

btnLogin.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {

        String password = etPassword.getText().toString();
        String email = etEmail.getText().toString();

        password = password.trim();
        email = email.trim();

        if (password.isEmpty() || email.isEmpty()) {
            //remind user to key in the data
            AlertDialog.Builder builder = new AlertDialog.Builder( context: SignIn.this);
            builder.setMessage("Please enter your email and password correctly").setTitle("Warning").setPositiveButton( text: "OK", listener: null);

            AlertDialog dialog = builder.create();
            dialog.show();
        } else {
            mFirebaseAuth.signInWithEmailAndPassword(email, password).addOnCompleteListener( activity: SignIn.this, new OnCompleteListener<AuthResult>() {
                @Override
                public void onComplete(@NonNull Task<AuthResult> task) {
                    if (task.isSuccessful()) {
                        GoToMainActivity();
                    } else {
                        Toast.makeText( context: SignIn.this, text: "Login failed", Toast.LENGTH_SHORT).show();
                    }
                }
            });
        }
    }
});

```

Figure 5.1.1 Registration-Sign In Coding

Users will be able to manually register their own account, once they have finished signing up. The application will then save the user's account information into Firebase. When the user logs in with their account, the system will then send an account verification link to their email address. After the user verifies the link, they will be able to successfully log in to the application.

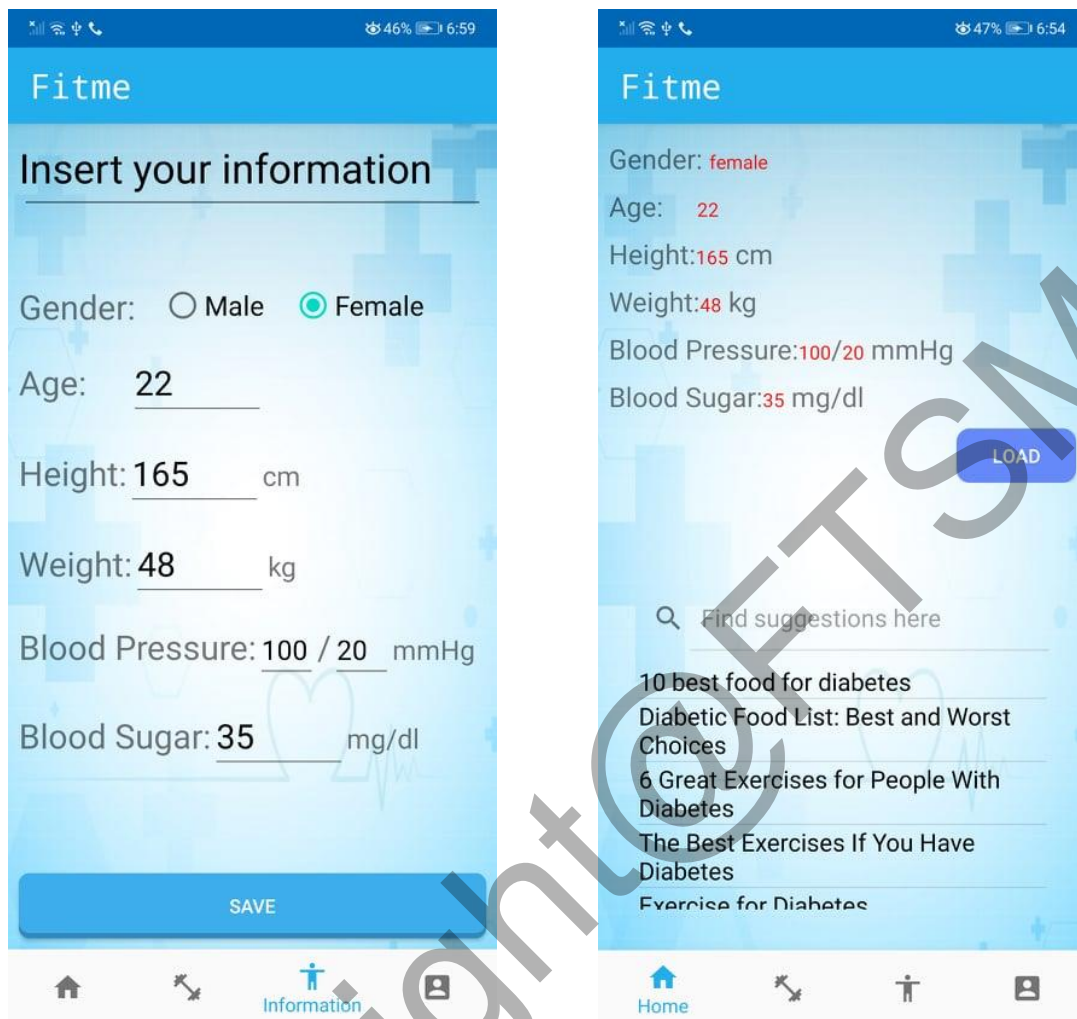


Figure 5.2.1 Functions in fragment Information and Home

Users can save their information once they insert their information and click the save button, the information will be displayed in the home page along with a 3D virtual body based on the user information. On top of that, user will be able to search and view the healthcare tips about diabetes, exercise and diet in the bottom of the home page by clicking the article title.



Figure 5.2.2 Functions in fragment Planning

```

public void onReceive(Context context, Intent intent) {

    // Get id & message from intent.
    int notificationId = intent.getIntExtra( name: "notificationId", defaultValue: 0);
    String message = intent.getStringExtra( name: "todo");

    // When notification is tapped, call MainActivity.
    Intent mainIntent = new Intent(context, PlanningFragment.class);
    PendingIntent contentIntent = PendingIntent.getActivity(context, requestCode: 0, mainIntent, flags: 0);

    NotificationManager myNotificationManager =
        (NotificationManager) context.getSystemService(Context.NOTIFICATION_SERVICE);

    // Prepare notification.
    Notification.Builder builder = new Notification.Builder(context);
    builder.setSmallIcon(android.R.drawable.ic_dialog_info)
        .setContentTitle("Time for EXERCISING!!!")
        .setContentText(message)
        .setWhen(System.currentTimeMillis())
        .setAutoCancel(true)
        .setContentIntent(contentIntent)
        .setPriority(Notification.PRIORITY_MAX)
        .setDefaults(Notification.DEFAULT_ALL);

    if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.O)
    {
        String channelId = "channelId";
        NotificationChannel channel = new NotificationChannel(
            channelId,
            name: "notification",
            NotificationManager.IMPORTANCE_HIGH);
        myNotificationManager.createNotificationChannel(channel);
        builder.setChannelId(channelId);
    }

    // Notify
    myNotificationManager.notify(notificationId, builder.build());
}

```

Figure 5.2.3 Functions in fragment Planning Coding

In this function, user will be able to set an alarm to carry out their fitness plan. At the designated time, the application will send user a notification to remind them their exercise plan. The function is created by using NotificationManager method in Android Studio. It should be noted that the device used for testing is above Android version 7.1, hence the NotificationChannel had to be replaced by NotificationChannel1.

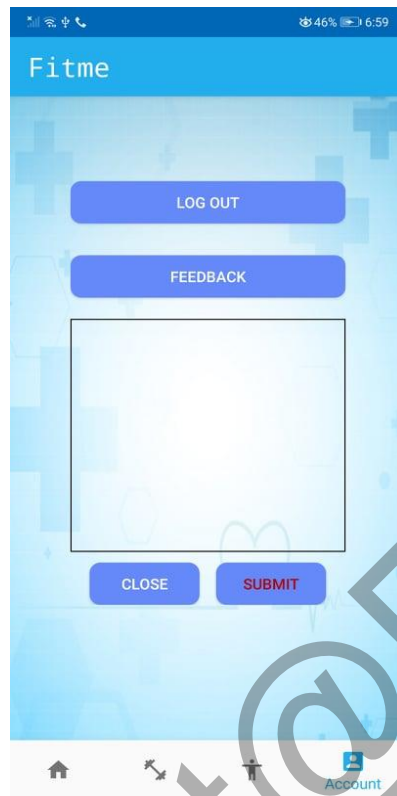


Figure 5.2.4 Functions in fragment Account

```

fitme-d3e09
├── User_Feedback
│   ├── 1
│   │   └── write_feedback: "I love it"
│   ├── 2
│   └── 3
├── User_Information
│   ├── 1
│   │   ├── blood_high: "120"
│   │   ├── blood_low: "75"
│   │   ├── blood_sugar: "88"
│   │   ├── gender: "male"
│   │   ├── user_age: "21"
│   │   ├── user_height: "179"
│   │   └── user_weight: "74"
│   ├── 2
│   └── 3
└── Users
    ├── 7BPUYTYsS7gaRb0vV33o3k1534s2
    │   ├── user_Email: "a1406196273@gmail.co"
    │   ├── user_ID: "7BPUYTYsS7gaRb0vV33o3k1534s2"
    │   ├── user_Photo: ""
    │   └── username: "jiale"
    ├── UUGSxlb6zkg0U3cwRBSNNH72BF83
    ├── bPNzeYvIK4edVd4QQtyTdtDue92
    ├── yj5KKITBk6NISFFj3BnwBpjoOyR2
    └── zppvi2svsveJsFTaijOPJ2IStg23
    
```

Figure 5.2.5 Firebase table

In the fragment “Account”, the user can choose to log out of the account and submit feedback to the developer. All the feedback from users are stored in the Firebase table for developers to take note of. In addition to that, the information about user registration and body will be also saved in different tables in Firebase. Each function which needs to store data will be allocated a particular table.

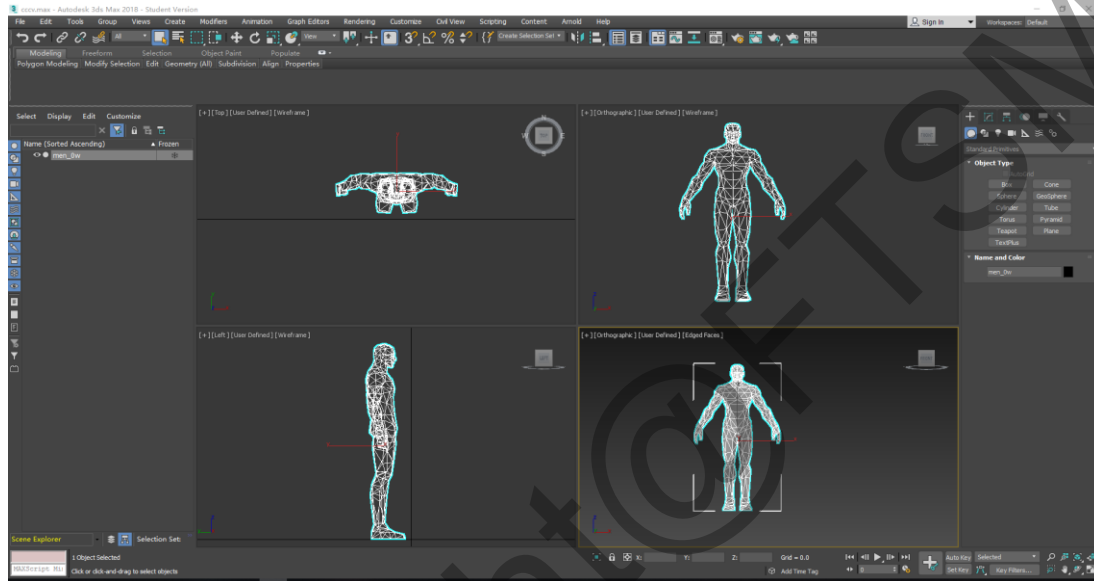


Figure 5.2.6 body in 3dsMax

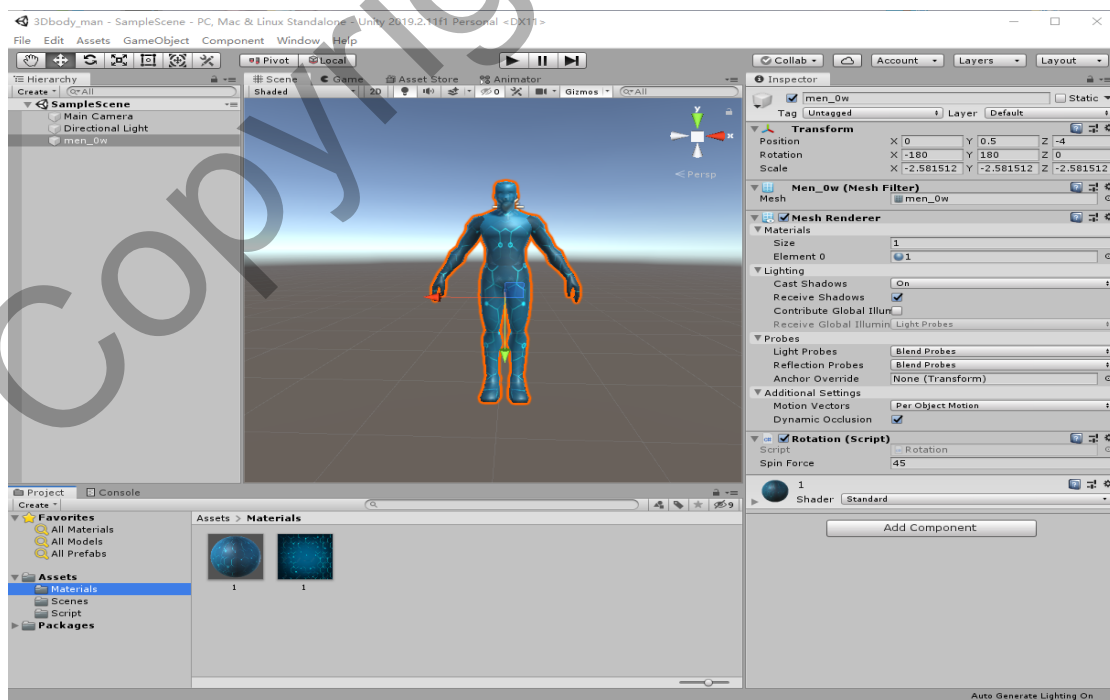


Figure 5.2.7 body in Unity

The 3D virtual model of the user's body was created in 3ds Max and exported as .FBX file, therefore it can be modified in Unity then combined with Android Studio. The virtual body will be displayed once the user has entered their body information and presses the "Load" button in the home page.

6. Conclusion

In conclusion, this project is presented as a proposed solution for helping Malaysians to prevent diabetes by making changes in their daily routine along with improving the current situation in Malaysia where the number of people being diagnosed with diabetes is on the rise. As mentioned before, in Malaysia, the number of people having diabetes is still increasing rapidly although there are some ways to control diabetes. The currently existing applications cannot really stimulate the users to make some radical changes about themselves. Therewith, the number of people with diabetes won't be able to be reduced. This application will provide a brief 3D virtual model for users' body based on the information that the user has input and analyze if the user is at risk of developing diabetes. On top of that, the 3D virtual model can be used to show the users' estimated body structure according to the fitness plan which made by user.

7. References

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