SDJ INTERNATIONAL COLLEGE

Bachelor of Computer Applications (BCA) Program

Project Report

BCA Sem IV
AY 2023-24

Topic Title: Smart Home Management System

By

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SDJ INTERNATIONAL COLLEGE

C E R T I F I C A T E

This is to certify that **Mr**./Ms. **Purohit Vinayak Rameshkumar** examination number **2022037790** has satisfactorily completed **his**/her project work entitled **Smart Home Management System** as partial fulfilment ofrequirements for BCA Sem IV, during the academic year 2023-24.

Date: 07/03/2024

Place: Surat

Prof.Nidhi Desai

SDJ International College,
Surat

I N D E X

Introduction

1.1 Project Summary

A smart home management system is a centralized platform that allows users to control and automate various devices and appliances within their home. These systems typically utilize Internet of Things (IoT) technology to connect devices such as thermostats, lights, security cameras, and kitchen appliances to a central hub or smartphone app. Users can remotely monitor and control these devices, set schedules, receive notifications, and even integrate them with other smart home devices for seamless automation. Smart home management systems offer convenience, energy efficiency, and enhanced security for homeowners.

Voice Control Integration: Many smart home systems integrate with popular voice assistants like Amazon Alexa, Google Assistant, or Apple Siri, allowing users to control devices using voice commands.

Automation and Scheduling: Smart home systems allow users to create automation rules and schedules to streamline routine tasks and improve efficiency. For example, users can set lights to turn on automatically when motion is detected or adjust the thermostat based on occupancy patterns

Smart Devices: These are the physical components of the smart home system that can be controlled remotely or automated. Examples include:

Smart Thermostats: Allow users to remotely control and schedule heating and cooling systems, optimizing energy usage and comfort.

Smart Lighting: Enable users to remotely control and automate lighting fixtures, adjust brightness, and set schedules to save energy.
Smart Security Cameras and Sensors: Provide remote monitoring of the home, motion detection, and alerts for unusual activity.

A smart home integrates connected devices and technology to offer convenience, energy efficiency, and enhanced security for homeowners. Key features include remote control and automation of devices such as thermostats, lights, and security cameras through a central hub or mobile app. Users can set schedules, receive notifications, and even control their home using voice commands via integration with popular voice assistants. Smart home systems prioritize security and privacy, employing encryption and authentication methods to safeguard data and prevent unauthorized access. Interoperability with different brands and devices allows for flexibility and customization, while integration with third-party services expands functionality and automation possibilities.

1.2 Project Technical Profile

Software Requirements:-

Software Configuration	
Operating System	Windows 11
Front End	Microsoft Visual Studio 2022
Back End	Microsoft Office Access
Other Tools	VB.Net, SQL Queries, System Speech Recognition, OpenWeatherMap API

Hardware Requirements:-

Hardware Configuration	
Processor	Intel(R) Core(TM) i7-1065G7 CPU @ 1.30GHz 1.50 GHz
RAM	16.00 GB
Hard Disk	512 GB
SystemType	64-bit Operating System, x64-based processor

SCOPE:-

- **Device Control**: Allow users to remotely control various smart devices such as lights, Television, Wi-FI Router, cameras, and appliances via a centralized interface like a smartphone app or voice commands.
- **Energy Management**: Provide features for monitoring and optimizing energy consumption by analyzing usage patterns, recommending energy-saving practices, and integrating with smart meters or renewable energy sources.
- **Future Expansion and Scalability:** Design the smart home management system with scalability in mind to accommodate future additions of new devices, features, and integrations as technology evolves and user needs change.
- **User Interface**: Offer user-friendly interfaces across multiple devices (smartphones, tablets, computers, smart speakers) for easy setup, configuration, and monitoring of the smart home system.

OBJECTIVE:-

- Movie Ticket Booking System is **to manage the details of Available Movies Available Seats, Date and Time**. It manages all the information about Seats, Movies, All the Screens and Total Earnings.
- The Movie Ticket Booking system **helps register complete Booked Seats information**.
- It Stores the booked seats of particular Movie at a Particular date and time and stores the information about who booked that tickets.
- The main **objective** of the **Visual Basic** Project on **Movie Booking System** is to manage the details of Booked seats and Information of User and ADMIN section where you can change the screen and clear all the booking and set a new movie amount and other details

2.1 Requirement Analysis

Functional Requirements:

1) **User Authentication :**

   Implement a secure login system for users to access the smart home management system. Support authentication methods such as username/password, biometric authentication, or integration with external identity providers (e.g., Google, Facebook,Twitter).

2) **Device Management:**

   Allow users to add, remove, and manage smart devices within their home network. Support various types of devices including lights, thermostats, cameras, door locks, sensors, and appliances.

3) **Remote Control and Automation:**

   Enable users to remotely control devices through a user-friendly interface.

   Implement automation features to create custom routines and schedules for device control based on triggers like time, user presence, or sensor inputs.

4) **Energy Monitoring and Management:**

   Provide tools for monitoring energy consumption of connected devices.

   Offer recommendations and optimization suggestions to improve energy efficiency.

5) **Notification System:**

   Implement a notification system to alert users of important events such as security breaches, device malfunctions, or scheduled maintenance.

Non-Functional Requirements:

1) **Performance:**

   Ensure fast response times and minimal latency for device control and system interactions. Optimize resource usage to support a large number of concurrent users and connected devices.

2) **Usability:**

   Design an intuitive and user-friendly interface accessible to users of all technical levels. Provide comprehensive documentation and help resources to assist users in setting up and using the system effectively.

Technology Details

Technology Used:

1) Development Environment:

- **Visual Studio**: Utilize Visual Studio as the integrated development environment (IDE) for coding, debugging, and deploying the VB.NET application. .NET Framework: Develop the application using the .NET Framework, which provides a rich set of libraries and tools for building Windows-based applications.

2) Backend Development:

- **VB.NET:** Use VB.NET as the primary programming language for developing the backend logic of the Smart Home Management System.

- **ADO.NET**: Utilize ADO.NET for building query for accessing MSACCESS database to Insert, Update, Delete query in Database

3) Frontend Development:

- **Windows Forms**: Design the user interface (UI) of the Smart Home Management System using Windows Forms, which provides a rich set of controls for creating desktop applications.

- **WPF (Windows Presentation Foundation):** Alternatively, consider using WPF for building the UI if more advanced graphics and multimedia capabilities are required.

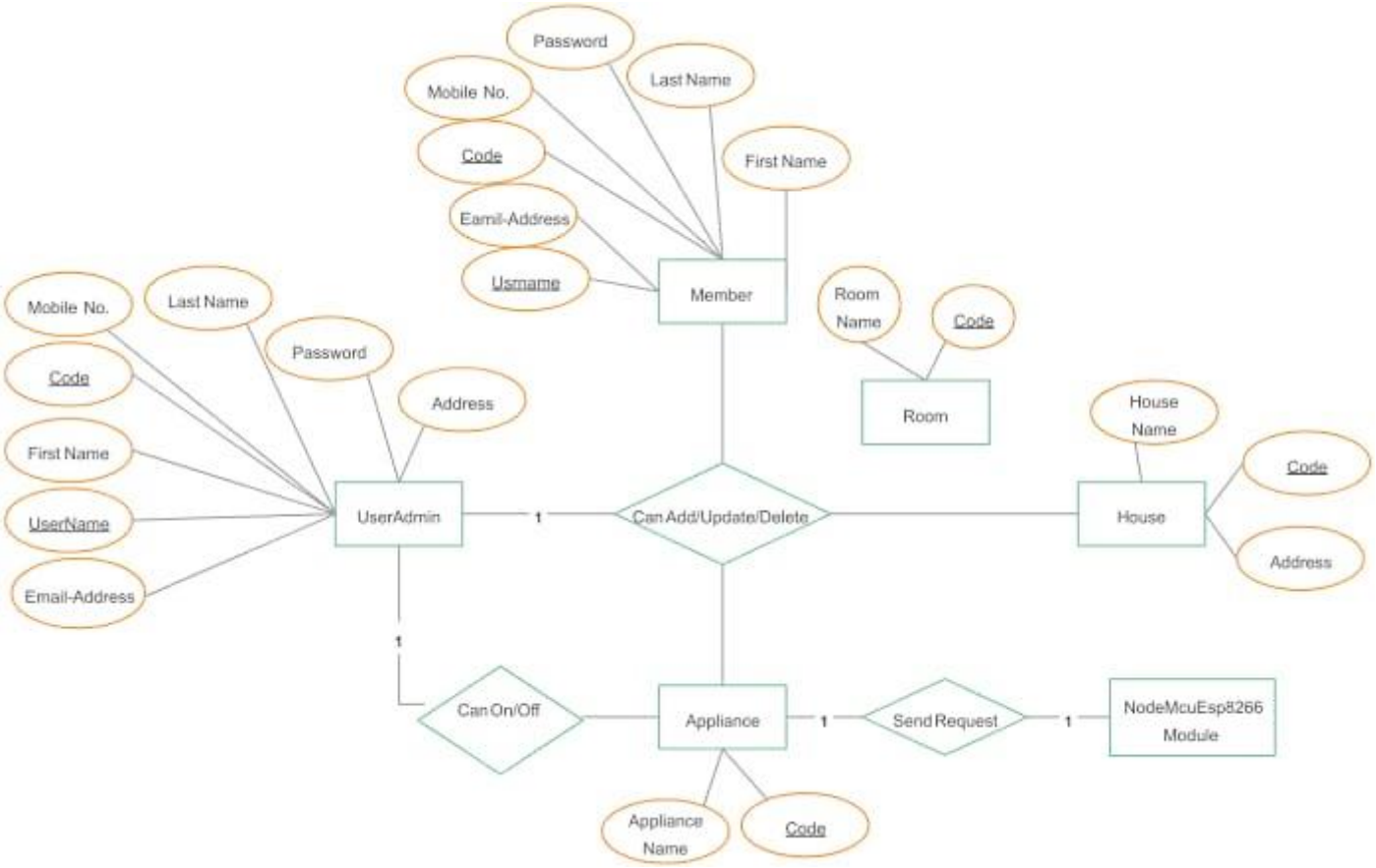
4) Database :

- Use Microsoft MS ACCESS as the relational database management system (RDBMS) for storing and managing data related to users, devices, configurations, and system logs.

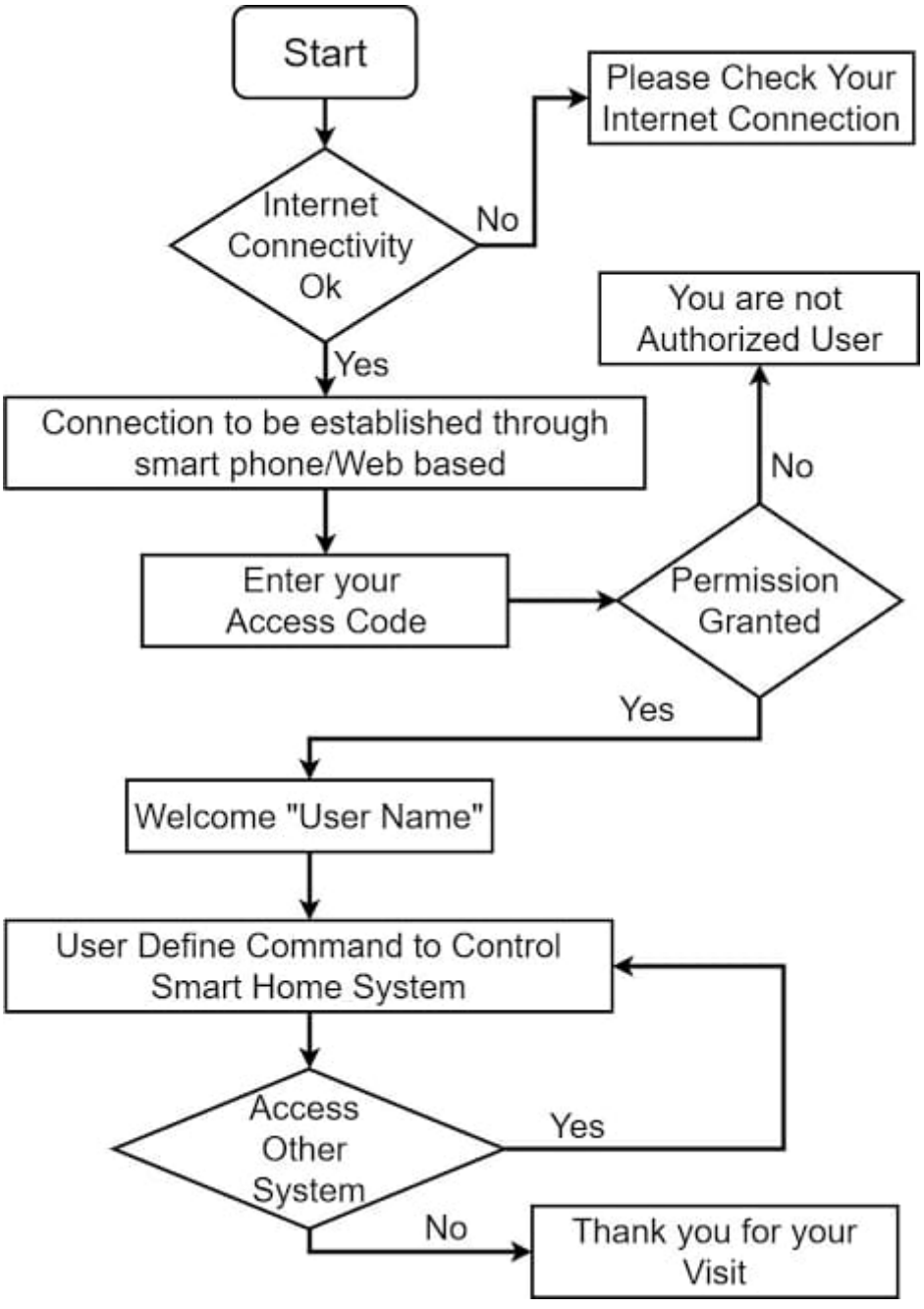
Designing

3.1 Data Flow Diagram

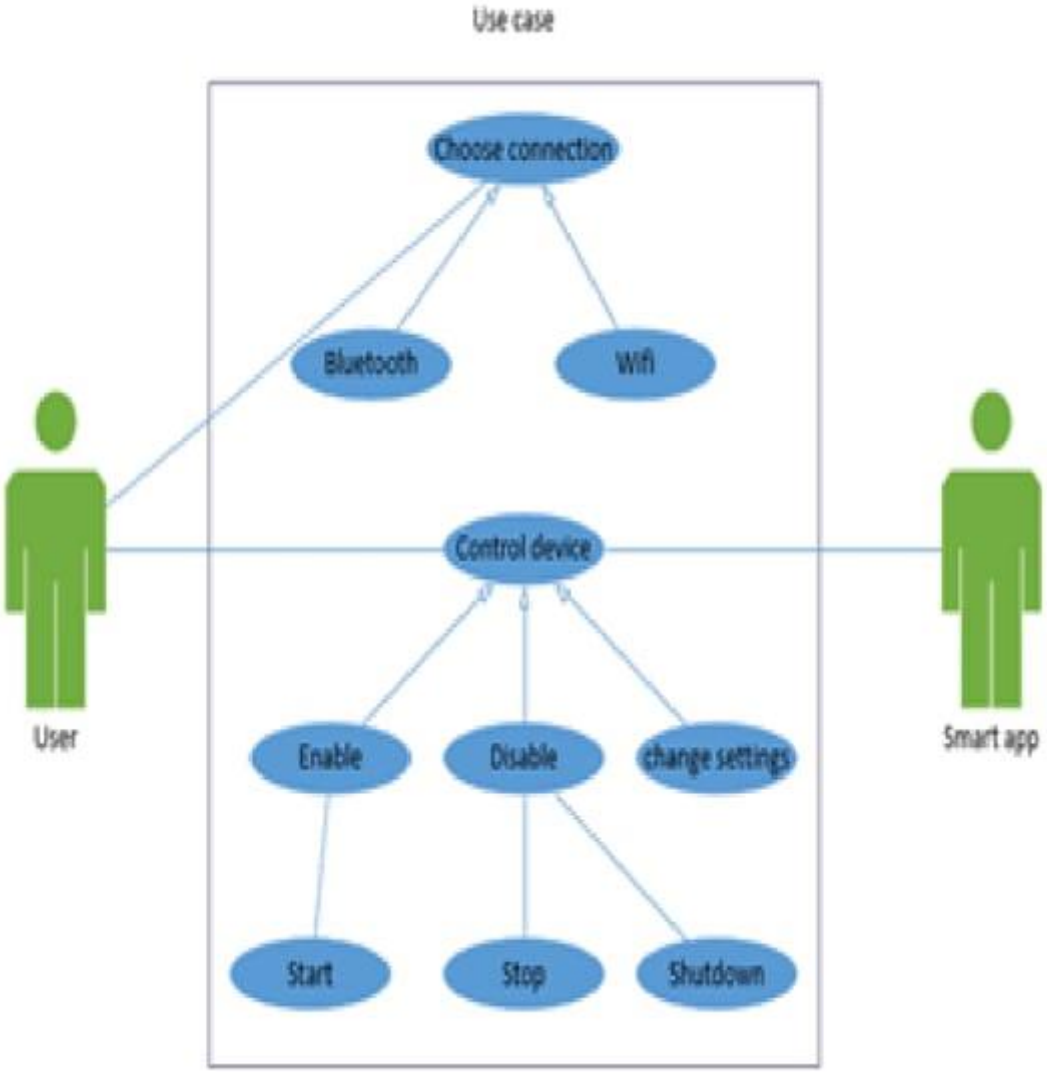
Context Level :

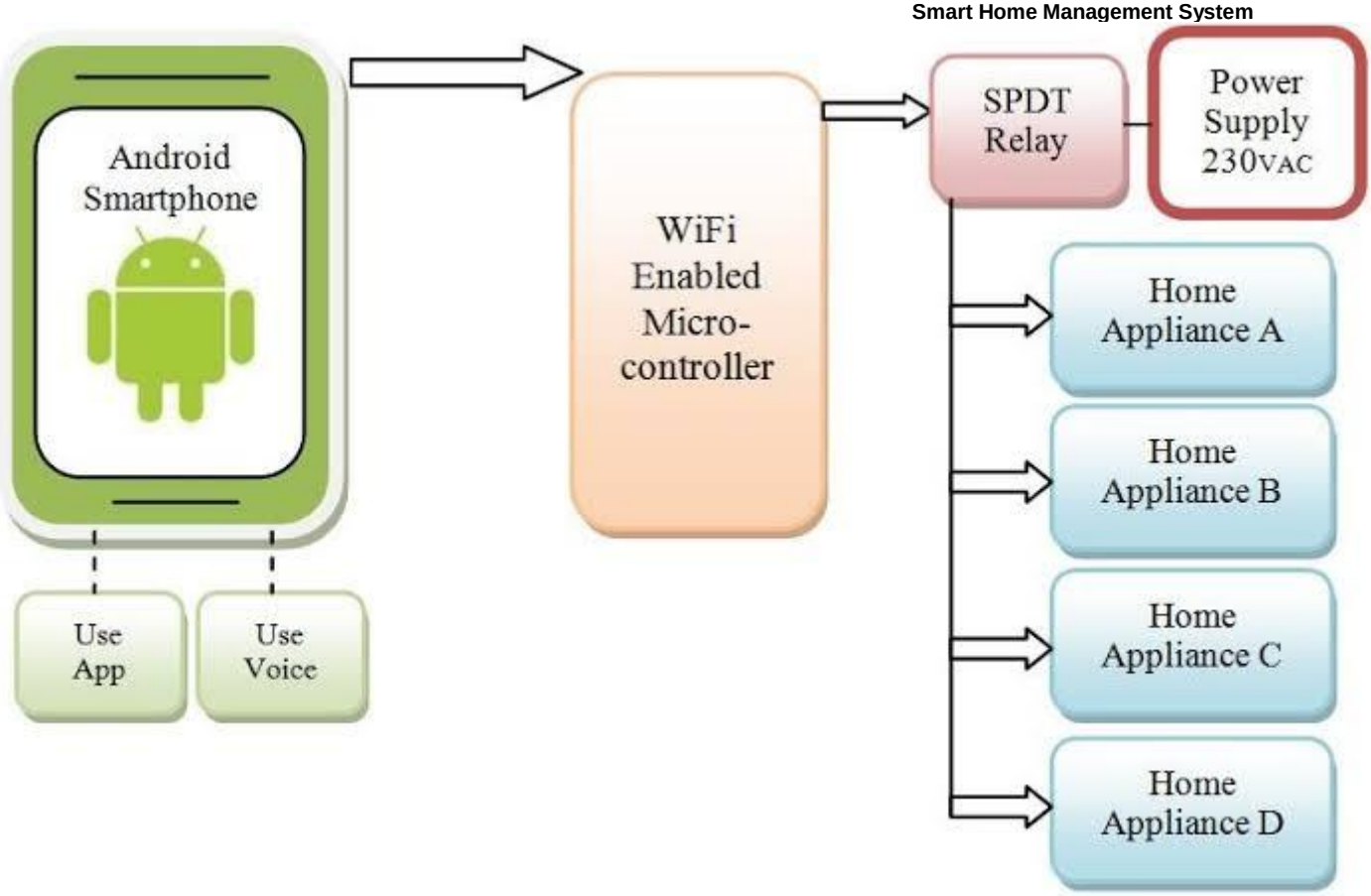


Data Flow Diagram



User Case Diagram




Android Smartphone
Use App
Use Voice
WiFi Enabled Micro-controller
SPDT Relay
Power Supply 230VAC
Home Appliance A
Home Appliance B
Home Appliance C
Home Appliance D

3.2 Database Design & 3.5 Data Dictionary

Table name : user_Table

Description : This Table gives Detail about Admin

FIELD NAME	FIELD TYPE	CONSTRAINT	DESCRIPTION
ID	AutoNumber	Primary Key	Unique Identification
Username	Short Text	Not Null	Username
Password	Short Text	Not Null	Password

Table name : EnergyMonitoring

Description : This Table gives Detail about Energy Usage of Devices in Rupees

FIELD NAME	FIELD TYPE	CONSTRAINT	DESCRIPTION
EntryID	AutoNumber	Primary Key	Unique Identification
DeviceID	Number	Not Null	Seat Numbers
EnergyConsumed	Number	Not Null	EnergyConsumed in Rupees

Table name: DeviceStatus

Description: This Table gives Detail about DeviceStatus

FIELD NAME	FIELD TYPE	CONSTRAINT	DESCRIPTION
DeviceStateID	Auto Number	Primary Key	Unique Identification
DeviceID	Short Text	Not Null	Date of the Show
State	Short Text	Not Null	State of Devices
Timestamp	Date/Time	Not Null	Timestamp of Device

Table Name : Devices_Table

Description : This Table gives Detail about All the Devices.

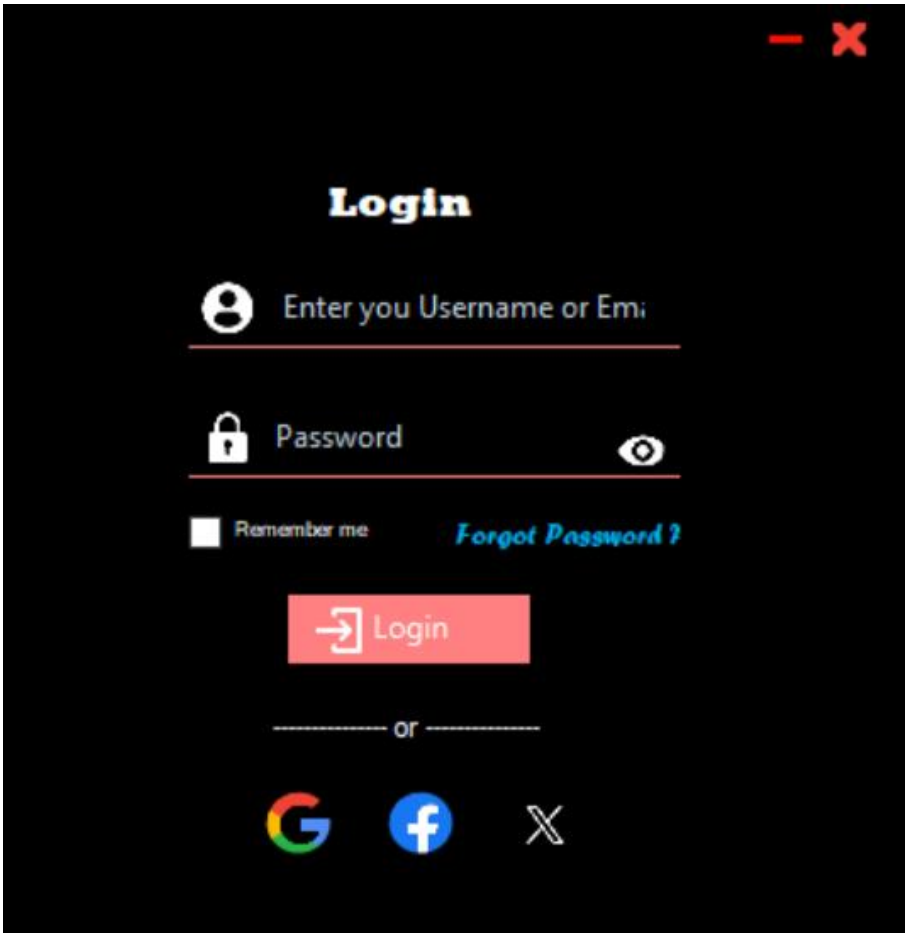
FIELD NAME	FIELD TYPE	CONSTRAINT	DESCRIPTION
DeviceID	Auto Number	Primary Key	Unique Identification
DeviceName	Short Text	Not null	Device name
DeviceType	Short Text	Not null	Device Type
Manufacturer	Short Text	Not null	Device Manufacturer

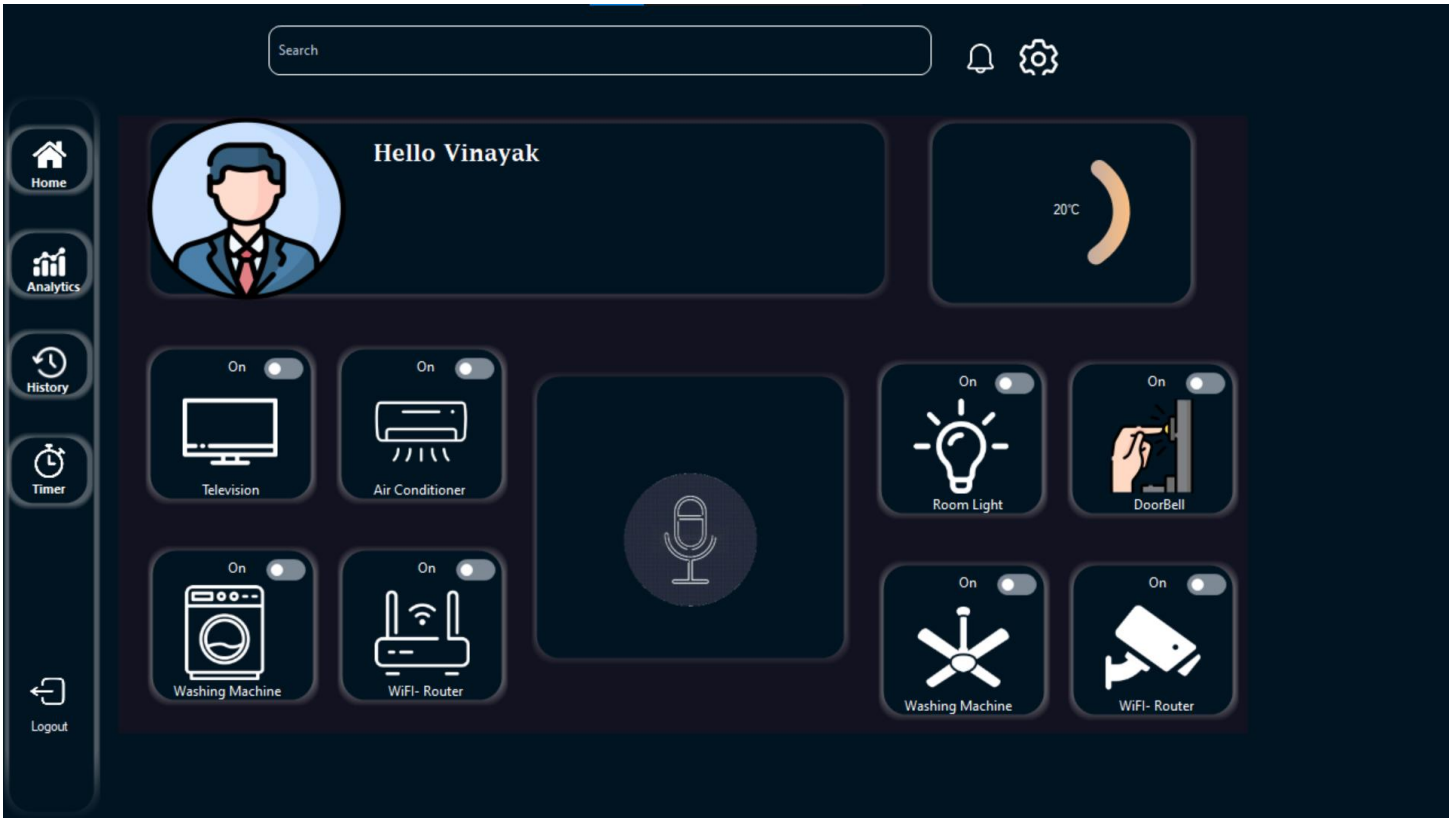
Table name: DeviceAnalytics
Description: This Table gives Detail About Device History

FIELD NAME	FIELD TYPE	CONSTRAINT	DESCRIPTION
AnalyticsID	Auto Number	Primary Key	Unique identification
DeviceID	Short text	Not Null	DeviceID
StartTime	Date/Time	Not Null	Starting time of Devices
EndTime	Date/Time	Not Null	Ending time of Devices
RunningTime	Date/Time	Not null	Running time of Devices EndTime – RunningTime
EnergyConsumed	Number	Not Null	Keep Track of EnergyConsumed in Watt
EnergyCost	Short text	Not null	Keep Track of EnergyCost in Rupees

3.6 User Interface & Coding

```
Imports System.Data.OleDb
Public Class loginpage
    Dim cn As New OleDbConnection
    Dim cmd As OleDbCommand
    Private Sub btnLogin_Click(sender As Object, e As EventArgs) Handles btnLogin.Click
        cn.ConnectionString = "Provider=Microsoft.ACE.OLEDB.12.0;Data Source=D:\Study
Materials\Jounral Projects\SmartHomeHub - Copy.accdb"
        Dim query As String = ("select Username, Password from User_Table")
        cmd = New OleDbCommand(query, cn)
        Try
            cn.Open()
            Dim reader As OleDbDataReader
            reader = cmd.ExecuteReader()
            If txtUsername.Text() = "" Or txtPassword.Text() = "" Then
                MsgBox("Please Enter All Details")
            End If
            While reader.Read()
                If txtUsername.Text() = reader("UserName") Then
                    If txtPassword.Text() = reader("Password") Then
                        MsgBox("Logined....")

                    Else
                        MsgBox("!! Incorrect Username or Password !!")
                    End If
                End If
            End While
        Catch ex As Exception
            MsgBox("Error :" & ex.Message)
        Finally
            cn.Close()
        End Try
    End Sub
    Private Sub Guna2CircleButton2_Click(sender As Object, e As EventArgs) Handles
Guna2CircleButton2.Click
        Me.WindowState = FormWindowState.Minimized
    End Sub

    Private Sub Guna2CircleButton1_Click_1(sender As Object, e As EventArgs) Handles
Guna2CircleButton1.Click
        Me.Close()
    End Sub

    Private Sub GunaCirclePictureBox4_Click(sender As Object, e As EventArgs) Handles
GunaCirclePictureBox4.Click
        If txtPassword.PasswordChar = "*" Then
            txtPassword.PasswordChar = ""
            GunaCirclePictureBox4.Image =

        Else
            txtPassword.PasswordChar = "*"
            GunaCirclePictureBox4.Image = My.Resources.eye
        End If
    End Sub
End Class
```


Login
Enter you Username or Em
Password
Remember me
Forgot Password ?
Login
or



Main.vb

```
Imports System.Net
Imports Newtonsoft.Json.Linq
Imports Guna.UI2.WinForms
Imports LiveCharts
Imports LiveCharts.Wpf
Imports System.Data.OleDb
Imports System.Timers
Imports System.Windows.Controls.Primitives

Public Class Main
    Dim cn As New OleDbConnection("Provider=Microsoft.ACE.OLEDB.12.0;Data Source=D:\Study Materials\Jounral Projects\SmartHomeHub - Copy.accdb")
    Dim cmd As New OleDbCommand
    Dim toggleSwitches As New List(Of Guna2ToggleSwitch)()

    Private Sub Main_Load(sender As Object, e As EventArgs) Handles MyBase.Load
        AddToggleSwitchesFromContainer(Me)
        SyncToggleStatus()
        getusernm()
        For Each toggleSwitch As Guna2ToggleSwitch In toggleSwitches
            AddHandler toggleSwitch.CheckedChanged, AddressOf ToggleSwitch_CheckedChanged
        Next
    End Sub

    Private Sub getusernm()
        Dim query As String = "SELECT FirstName FROM User_Table"
        Dim result As String = ""
```

```
    ' Open connection
    cn.Open()
    cmd = New OleDbCommand(query, cn)

    Try
        ' Execute the query
        Dim reader As OleDbDataReader = cmd.ExecuteReader()

        ' Loop through the results and concatenate the first names
        While reader.Read()
            result &= reader("FirstName").ToString() & Environment.NewLine
        End While

        ' Close the reader
        reader.Close()
    Catch ex As Exception
        ' Handle exceptions here
    Finally
        ' Close the connection
        cn.Close()
    End Try

    showusernm.Text = "Hello " & result
End Sub

Private Sub Guna2PictureBox1_Click(sender As Object, e As EventArgs) Handles Guna2PictureBox1.Click
    With frmvoicecontrol
        .TopLevel = False
        voicepanel.Controls.Add(frmvoicecontrol)
        .BringToFront()
        .Show()
    End With
End Sub
Private Sub SyncToggleStatus()
    Try
        cn.Open()
        For i As Integer = 0 To toggleSwitches.Count - 1
            getStatus(toggleSwitches(i), i + 1)
        Next
    Catch ex As Exception
        MsgBox("Error syncing toggle status: " & ex.Message)
    Finally
        cn.Close()
    End Try
End Sub

Public Sub getStatus(ByRef toggleButton As Guna2ToggleSwitch, id As Integer)
    Dim query As String = "SELECT State FROM DeviceStates WHERE DeviceID = @ID"
    cmd = New OleDbCommand(query, cn)
    cmd.Parameters.AddWithValue("@ID", id)

    Try
        Dim state As String = Convert.ToString(cmd.ExecuteScalar())
        If state = "On" Then
            toggleButton.Checked = True
        End If
    Catch ex As Exception
        MsgBox("Error getting device status: " & ex.Message)
    End Try
End Sub

Private Sub AddToggleSwitchesFromContainer(container As Control)
    For Each control As Control In container.Controls
        If TypeOf control Is Guna2ToggleSwitch Then
```

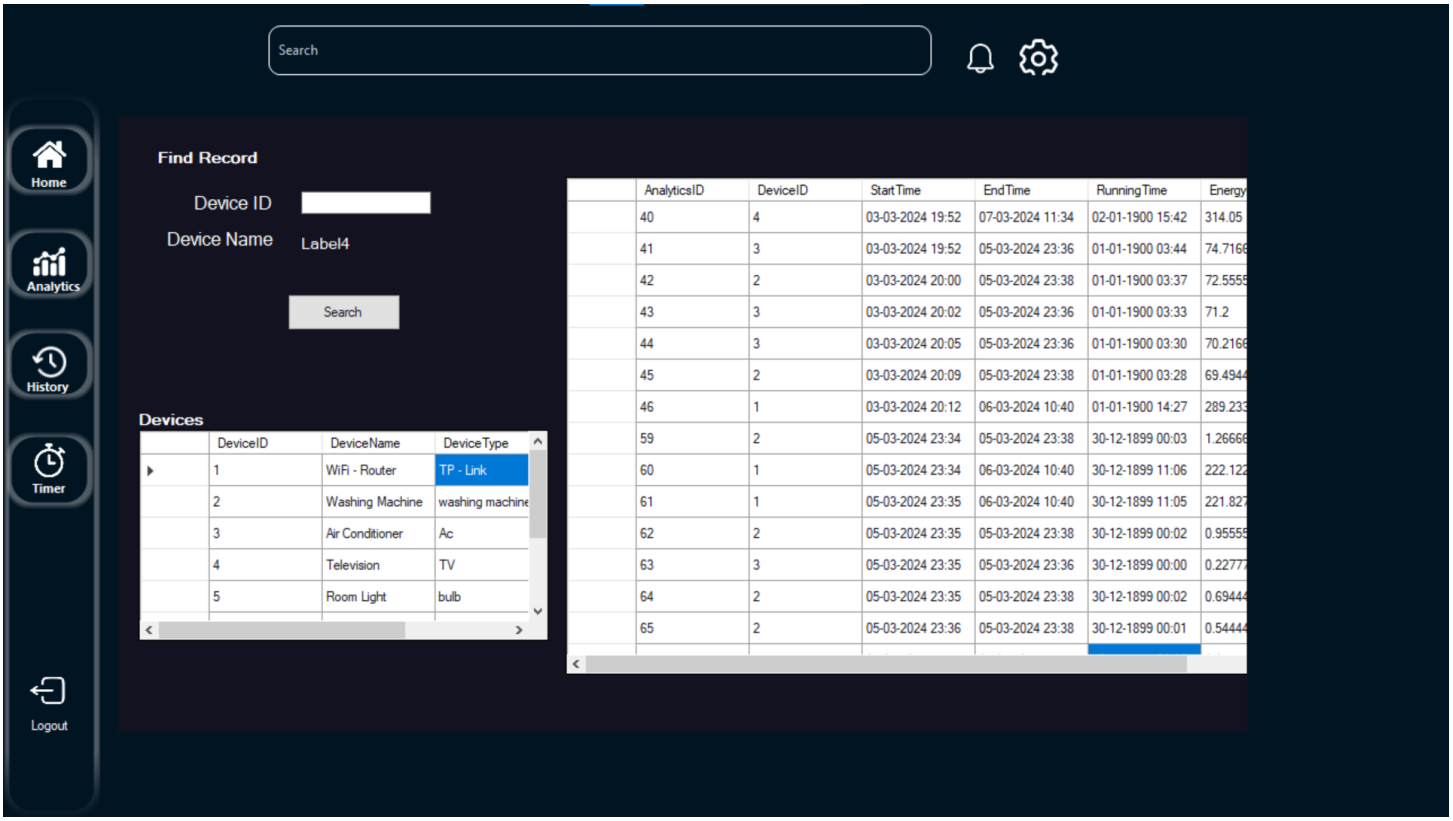
```
            toggleSwitches.Add(DirectCast(control, Guna2ToggleSwitch))
        End If

        If control.HasChildren Then
            AddToggleSwitchesFromContainer(control)
        End If
    Next
End Sub
Private Sub ToggleSwitch_CheckedChanged(sender As Object, e As EventArgs)
    Dim toggleSwitch As Guna2ToggleSwitch = DirectCast(sender, Guna2ToggleSwitch)
    Dim id As Integer = toggleSwitches.IndexOf(toggleSwitch) + 1
    Dim status As String = If(toggleSwitch.Checked, "On", "Off")

    UpdateStatus(status, id)

    If status = "On" Then
        NewUsage(id)
    Else
        UpdateUsage(id)
    End If
End Sub

Public Sub UpdateStatus(status As String, id As Integer)
    Dim query As String = "UPDATE DeviceStates SET State = @Status WHERE DeviceID = @ID"
    cmd = New OleDbCommand(query, cn)
    cmd.Parameters.AddWithValue("@Status", status)
    cmd.Parameters.AddWithValue("@ID", id)

    Try
        cn.Open()
        cmd.ExecuteNonQuery()
        query = "Update DeviceStates SET Timestamp = @timestamp WHERE DeviceID = @ID"
        cmd = New OleDbCommand(query, cn)
        cmd.Parameters.AddWithValue("@timestamp", DateTime.Now())
        MsgBox("Device status updated to " & status & ".")
        MsgBox("Device status updated to " & DateTime.Now().ToString() & ".")
    Catch ex As Exception
        MsgBox("Error updating device status: " & ex.Message)
    Finally
        cn.Close()
    End Try
End Sub

Public Sub NewUsage(id As Integer)

    Dim query As String = "INSERT INTO DeviceAnalytics(DeviceID, StartTime) VALUES (@deviceID, '" & DateTime.Now() &
"')"

    Using cn As New OleDbConnection("Provider=Microsoft.ACE.OLEDB.12.0;Data Source=D:\Study Materials\Jounral
Projects\SmartHomeHub - Copy.accdb"),
     cmd As New OleDbCommand(query, cn)

        cmd.Parameters.AddWithValue("@deviceID", id)
        Try
            cn.Open()
            cmd.ExecuteNonQuery()
        Catch ex As Exception
            MsgBox("Error inserting device analytics: " & ex.Message) ' Display error message
        End Try
    End Using
End Sub

Public Sub UpdateUsage(id As Integer)
    Dim query As String = "UPDATE DeviceAnalytics SET EndTime = '" & DateTime.Now() & "' WHERE DeviceID = @ID "
    cmd = New OleDbCommand(query, cn)
```

```
        Try
            cmd.Parameters.AddWithValue("@ID", id)
            cn.Open()
            cmd.ExecuteNonQuery()
        Catch ex As Exception
            MsgBox("Error updating device analytics: " & ex.Message)
        Finally
            cn.Close()
        End Try
    End Sub

    Private Sub Guna2ShadowPanel7_Paint(sender As Object, e As PaintEventArgs) Handles Guna2ShadowPanel7.Paint
        'UpdateTemperature()
        lblshowtemp.Text = "20" & "°C"
    End Sub
    Private Sub UpdateTemperature()
        Dim apiKey As String = "cadae7dff2a967e3f61837b7d7d910be"
        Dim city As String = "surat"

        ' API URL
        Dim apiUrl As String = $"http://api.openweathermap.org/data/2.5/weather?q={city}&appid={apiKey}&units=metric"

        ' Fetch temperature value from API
        Dim temperature As Double = GetTemperatureFromAPI(apiUrl)

        ' Update label with temperature value
        UpdateLabel(temperature)
    End Sub

    Private Function GetTemperatureFromAPI(ByVal apiUrl As String) As Double
        Try
            Using webClient As New WebClient()
                Dim jsonData As String = webClient.DownloadString(apiUrl)

                Dim jsonObject As JObject = JObject.Parse(jsonData)

                Dim temperature As Double = jsonObject.SelectToken("main.temp").ToObject(Of Double)()

                Return temperature
            End Using
        Catch ex As Exception
            MessageBox.Show("Error fetching temperature data: " & ex.Message, "Error", MessageBoxButtons.OK,
MessageBoxIcon.Error)
            Return Double.NaN
        End Try
    End Function

    Private Sub UpdateLabel(ByVal temperature As Double)
        If lblshowtemp.InvokeRequired Then
            lblshowtemp.Invoke(New Action(Of Double)(AddressOf UpdateLabel), temperature)
        Else
            lblshowtemp.Text = "Temperature: 20" & "°C"
        End If
    End Sub
End Class
```

History.vb

```
Imports System.Data.OleDb

Public Class History
    Dim cn As New OleDbConnection
    Dim cmd As OleDbCommand
    Dim ds As New DataSet
    Dim ad As OleDbDataAdapter
    Dim dr As OleDbDataAdapter
    Private Sub History_Load(sender As Object, e As EventArgs) Handles MyBase.Load
        cn.ConnectionString = "Provider=Microsoft.ACE.OLEDB.12.0;Data Source=D:\Study
Materials\Jounral Projects\SmartHomeHub - Copy.accdb"
        loadData()
        ShowDevices()
    End Sub
    Private Sub loadData()
        cmd = New OleDbCommand("select * from DeviceAnalytics", cn)
        Try
            cn.Open()
            ad = New OleDbDataAdapter(cmd)
            ds = New DataSet
            ad.Fill(ds)
            DataGridView1.DataSource = ds.Tables(0)
        Catch ex As Exception
            MsgBox("Error : " & ex.Message)
        Finally
            cn.Close()
        End Try

    End Sub
    Private Sub ShowDevices()
        cmd = New OleDbCommand("select * from Devices_Table", cn)
        Try
            cn.Open()
            ad = New OleDbDataAdapter(cmd)
            ds = New DataSet
            ad.Fill(ds)
            DataGridView2.DataSource = ds.Tables(0)
        Catch ex As Exception
            MsgBox("Error : " & ex.Message)
        Finally
            cn.Close()
        End Try
    End Sub

    Private Sub btnSearch_Click(sender As Object, e As EventArgs) Handles btnSearch.Click
        Try
            cn.Open()

            ' Retrieve DeviceName from Devices_Table
            Dim deviceNameQuery As String = "SELECT DeviceName FROM Devices_Table WHERE DeviceID
= @DeviceID"
            Using cmdDeviceName As New OleDbCommand(deviceNameQuery, cn)
                cmdDeviceName.Parameters.AddWithValue("@DeviceID", CInt(txtdeviceID.Text))
                Dim deviceNameReader As OleDbDataReader = cmdDeviceName.ExecuteReader()
                If deviceNameReader.Read() Then
                    Label4.Text = deviceNameReader("DeviceName").ToString()
                Else
                    Label4.Text = "Device not found"
                End If
                deviceNameReader.Close()
            End Using
```

```
            ' Retrieve DeviceAnalytics data
            Dim analyticsQuery As String = "SELECT * FROM DeviceAnalytics WHERE DeviceID =
@DeviceID"
            Using cmdAnalytics As New OleDbCommand(analyticsQuery, cn)
                cmdAnalytics.Parameters.AddWithValue("@DeviceID", CInt(txtdeviceID.Text))
                ad = New OleDbDataAdapter(cmdAnalytics)
                ds = New DataSet
                ad.Fill(ds)
                DataGridView1.DataSource = ds.Tables(0)
            End Using

        Catch ex As Exception
            MsgBox("Error : " & ex.Message)
        Finally
            cn.Close()
        End Try
    End Sub

End Class
```



Frmvoicecontrol.vb

```
Imports System.Speech.Recognition
Imports System.Speech.Synthesis

Public Class frmvoicecontrol
    Dim WithEvents recognizer As New SpeechRecognitionEngine()
    Dim synthesizer As New SpeechSynthesizer()

    Private Sub frmvoicecontrol_Load(sender As Object, e As EventArgs) Handles MyBase.Load
        recognizer.SetInputToDefaultAudioDevice()
        Dim grammarBuilder As New GrammarBuilder()
        grammarBuilder.Append(New Choices("turn off television", "turn off ac", "how are you",
"hello", "what is the time"))

        Dim grammar As New Grammar(grammarBuilder)
        recognizer.LoadGrammar(grammar)

        recognizer.RecognizeAsync(RecognizeMode.Multiple)
    End Sub

    Private Sub recognizer_SpeechRecognized(sender As Object, e As SpeechRecognizedEventArgs)
Handles recognizer.SpeechRecognized
        Dim recognizedText As String = e.Result.Text
        If recognizedText.Contains("what is the time") Then
            Label1.Text = "Sir now time is " & DateTime.Now().ToString()
            synthesizer.Speak(Label1.Text)
            Me.Close()

        End If
        If recognizedText.Contains("turn off ac") Then
                Label1.Text = "turning off AC successfully"
                synthesizer.Speak(Label1.Text)
                Me.Close()

            End If
        If recognizedText.Contains("turn off television") Then
            Label1.Text = "turning off television successfully"
            synthesizer.Speak(Label1.Text)
            Me.Close()
        End If


        If recognizedText.Contains("how are you") Then
            Label1.Text = "I'm Fine sir"
            synthesizer.Speak(Label1.Text)
            Me.Close()
        End If

    End Sub

    Private Sub PictureBox1_Click(sender As Object, e As EventArgs) Handles PictureBox1.Click
        Me.Close()
    End Sub
End Class
```


Listning...

Frmtimer.vb

```
Imports System.Data.OleDb
Imports System.Timers
Imports Guna.UI2.WinForms.Suite

Public Class frmTimer
    Dim cn As New OleDbConnection
    Dim cmd As OleDbCommand
    Dim ds As New DataSet
    Dim ad As OleDbDataAdapter
    Dim dr As OleDbDataAdapter
    Dim timerDictionary As New Dictionary(Of Integer, Timer)()
    Dim timer As New Timer()

    Private Sub frmTimer_Load(sender As Object, e As EventArgs) Handles MyBase.Load

        dtpTime.Format = DateTimePickerFormat.Custom
        dtpTime.CustomFormat = "hh:mm tt" ' 12-hour format with AM/PM
        dtpTime.ShowUpDown = True
        cn.ConnectionString = "Provider=Microsoft.ACE.OLEDB.12.0;Data
Source=D:\Study Materials\Jounral Projects\SmartHomeHub - Copy.accdb"
        checkTime()
        Displayrecords()
        AddHandler timer.Elapsed, AddressOf TimerElapsed
        timer.Interval = 500 ' Set the interval to 1 second (1000 milliseconds)
        timer.Start()
    End Sub
    Private Sub TimerElapsed(sender As Object, e As ElapsedEventArgs)
        checkTime()
    End Sub
    Public Sub setTimer(id As Integer, time As DateTime)
        Dim query As String = "INSERT INTO Timers(DeviceID, TimerValue) VALUES (?,
?)"
        cmd = New OleDbCommand(query, cn)
        cmd.Parameters.AddWithValue("@DeviceID", id)
        cmd.Parameters.AddWithValue("@TimerValue", time)

        Try
            cn.Open()
            cmd.ExecuteNonQuery()
        Catch ex As Exception
            MsgBox("Error : " & ex.Message())

        Finally
            cn.Close()
        End Try
    End Sub

    Private Sub btnset_Click(sender As Object, e As EventArgs) Handles
btnInsert.Click
        Dim query As String = "INSERT INTO Timers(DeviceID, TimerValue) VALUES (?,
?)"
        cmd = New OleDbCommand(query, cn)
```

```
    Try
        If txtDeviceID.Text = "" Then
            MsgBox("Please Enter DeviceID")
        Else
            Dim deviceID As Integer = CInt(txtDeviceID.Text)
            Dim selectedTime As DateTime = dtpTime.Value
            cmd.Parameters.AddWithValue("@DeviceID", deviceID)
            cmd.Parameters.AddWithValue("@TimerValue", selectedTime)
            If selectedTime > DateTime.Now() Then
                cn.Open()
                cmd.ExecuteNonQuery()
                MsgBox("Timer Added Successfully....")
            Else
                MsgBox("please select correct time")
            End If

        End If

    Catch ex As Exception
        MsgBox("Error : " & ex.Message())
    Finally
        cn.Close()
        Displayrecords()
    End Try
End Sub

Private Sub Displayrecords()
    Dim query As String = "SELECT * FROM Timers"
    cmd = New OleDbCommand(query, cn)

    Try
        cn.Open()
        ad = New OleDbDataAdapter(cmd)
        ds = New DataSet
        ad.Fill(ds)
        ShowTimers.DataSource = ds.Tables(0)

        For Each row As DataRow In ds.Tables(0).Rows
            Dim deviceID As Integer = CInt(row("DeviceID"))
            Dim targetTime As DateTime = Convert.ToDateTime(row("TimerValue"))
        Next
    Catch ex As Exception
        MsgBox("Error : " & ex.Message)
    Finally
        cn.Close()
    End Try
End Sub



Private Sub checkTime()
    Dim query As String = "SELECT TimerValue, TimerID FROM Timers"

    Try
        cn.Open()
```

```
            cmd = New OleDbCommand(query, cn)
            showtime.Text = DateTime.Now().ToString()
            Dim reader As OleDbDataReader = cmd.ExecuteReader()
            If reader.HasRows Then
                While reader.Read()
                    Dim timerValue As DateTime =
Convert.ToDateTime(reader("TimerValue"))
                    Dim timerID As Integer = Convert.ToInt32(reader("TimerID"))
                    If timerValue <= DateTime.Now Then
                        deleteTimer(timerID)
                        MsgBox("truning off devices Success.....")
                    End If
                End While
            End If
        Catch ex As Exception

        Finally
            cn.Close()
        End Try
    End Sub

    Private Sub ShowTimers_CellContentClick(sender As Object, e As
DataGridViewCellEventArgs) Handles ShowTimers.CellContentClick
        Dim i As Integer
        i = ShowTimers.CurrentRow.Index
        txtDeviceID.Text = ShowTimers.Item(0, i).Value
        dtpTime.Text = ShowTimers.Item(2, i).Value
    End Sub

    Private Sub btnUpdate_Click(sender As Object, e As EventArgs) Handles
btnUpdate.Click
        cmd = New OleDbCommand("DELETE FROM Timers WHERE TimerID = " &
CInt(txtDeviceID.Text) & "", cn)
        Try
            cn.Open()
            cmd.ExecuteNonQuery()
            MsgBox("record delated")
            Displayrecords()
        Catch ex As Exception
            MsgBox("Error: " & ex.Message)
        Finally
            cn.Close()
        End Try

    End Sub

    Private Sub deleteTimer(timerID As Integer)
        Try
            cn.Open()
            cmd = New OleDbCommand("DELETE FROM Timers WHERE TimerID = @id", cn)
            cmd.Parameters.AddWithValue("@id", timerID)
            cmd.ExecuteNonQuery()
        Finally
            cn.Close()
        End Try
    End Sub
```

```
    Private Sub btnDelete_Click(sender As Object, e As EventArgs) Handles
btnDelete.Click
        Try
            cn.Open()
            cmd = New OleDbCommand("update Timers set TimerValue = '" &
dtpTime.Value & "' where TimerID = " & CInt(txtDeviceID.Text) & "", cn)
            cmd.ExecuteNonQuery()
            MsgBox("Record Updated SuccessFully....")
        Catch ex As Exception
            MsgBox("Error : " & ex.Message)
        Finally
            cn.Close()
        End Try
    End Sub
End Class
```