AMALGAMATION OF SECURITY, VEHICLE TRACKING AND PREDICTIVE ANALYTICS FEATURES FOR USER CONVENIENCE USING INTERNET OF THINGS

PROJECT REFERENCE NO.: 40S_BE_0746
COLLEGE : ATRIA INSTITUTE OF TECHNOLOGY, BENGALURU
BRANCH : DEPARTMENT OF INFORMATION SCIENCE AND TECHNOLOGY
GUIDE : DR. NEHA MANGLA
STUDENTS : MR. SHIVANANDA G.
MS. AISHWARYA KASHYAP M.
MS. VINUTHA

Keywords: Analytics, Arduino, DHT11, Face Recognition, GPS, GSM, Internet of Things.

Introduction:

The Internet of things is the internetworking of physical devices, vehicles, buildings and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data.

This project is the amalgamation of security, analytics and vehicle tracking features. Our project consists of three independent features (Home security, power manager and vehicle tracking) that are being presented to the user on a single platform.

We are integrating the aforementioned most essential features to help users transform their home into a smart home.

1. Power Manager: As the name suggests, it helps users manage the power at home. It stores the readings collected by the various sensors such as the temperature, light brightness and humidity in cloud and performs analytics and displays them in the mobile app.

2. Vehicle tracking: There are situations when a user might forget where he has parked his vehicle or what if the vehicle is lost? The App gets the user the exact location of the vehicle and displays it on a map and helps him navigate to it.

3. Home security: Almost every method there is in today’s world that intends to provide security has some flaws. Through this project, we scrutinize the process even more by installing two systems, viz. face detection and speech recognition. The user has to satisfy both the criteria to unlock the door.

Work done earlier:

Currently, there is no system available that provides the aforementioned foremost features as a single system. Nonetheless, there was tremendous work done in the individual fields separately. Digital door lock, speech recognition, impact detection, etc were implemented to provide security. Parameter identification and model based predictive control of temperature inside a house for power manager. Lastly, the GPS is used for generating coordinates for tracking vehicles.

Objectives:

An intelligent security system, a power consumption advisor and a vehicle tracking system are the most essential needs of every house. Our project is an integration of the aforementioned features that could help users transform their home into a smart home. With
this project, we intend to make user’s life easy and secure. “Life made easy” - integrating systems that work independently (vehicle tracking, home security and predictive analytics) and providing the same on a single platform. “Secure” – allowing authorized people and restricting others from entering with the help of methods such as biometrics and face detection technologies.

Methodologies:

Vehicle Tracking System:
The SIM808 modem consists of the GPS Antenna and the GSM modem. The GPS antenna connects to the satellite and generates co-ordinates (i.e. latitude and longitude). These co-ordinates are sent to the user with the help of a GSM sim-card in the form of SMS on the users request (an SMS sent initially by the user to the modem in order to receive the co-ordinates).

Power Manager:
The Power Manager module consists of various hardware and software components. It utilizes the DHT11 sensor to generate current humidity and temperature and an LM393 sensor to generate the value of light-brightness. The readings are then transferred to cloud with the help of an ESP8266 Wi-Fi module. These readings that are being stored in the cloud with the help of read/write API keys are then retrieved and the threshold will be computed alongside generating graphs. The Graphs generated and the preferred temperature along with the computed threshold values are then displayed in the mobile app.

Home Security:
The final module of our project that aspires to provide user safety, which is a prime concern in today’s world. The images captured by the raspberry pi camera and the USB microphone are transferred to the raspberry pi board which then runs a scan through its facial database and compares the recorded speech to authorize access to the person arrived in front of the door.

Results and conclusion:
A mobile application is developed that on users’ request generates the coordinates of his vehicle and sends them (the latitude and the longitude) back to the user via an SMS. The user then enters the coordinates in the slot provided in order to locate the vehicle. A marker points out the vehicle on a map and also provides an option of navigating to it. The mobile application also provides features such as “view graphs” and “view data” which display the generated graphs for temperature-time, humidity-time, light brightness-time and temperature variation graphs and displays the computed thresholds, the preferred temperature of the user and the sensor data respectively. The face detection algorithm (HaarFeatures) uses python and OpenCV to recognize the face. “Amalgamation of security, vehicle tracking and predictive analytics features for user convenience using internet of things” is a project that
will help transform their home to a smart home by allowing them to use multiple applications that run independently on a single platform.

Future scope:

The methods used to provide home security can be improvised and modified to provide better security. The power manager feature can be improved by performing more analytics on the data collected. Also, this feature can be used to manage and control the peripheral devices such as air conditioners, fans, lighting across a room, etc.