ABSTRACT

Automation of anti-suffocation system has become a very essential part of safety in automobile. The death of toddlers, disabled people and animals due to suffocation in locked cars has been a significant problem. Hence, there is a requirement for a system which autonomously operates with minimal power consumption and cost to overcome this sort of harm to human life. In this work an attempt has been made to develop a system that works invariably, irrespective of negligence of person handling the car. This system is a prototype vehicle model of how sensors and buzzers can be appropriately used as a setup to overcome this problem. The setup consists of a prototype vehicle, with engine cut off and all the doors closed, a temperature sensor, a motion sensor, a microcontroller and buzzer and the power supply is provided by a battery. This system prevents suffocation by intelligent sensing which works efficiently, this is an economical system without any compromise on its functioning.

Today we come across cases like death of a child due to suffocation in a locked car. In a recent case, where two sisters within 5 years of age playing got the car key and entered the car. Car got centrally locked when they closed the door. Unfortunately the two sisters didn't know how to open the door and got locked in with windows closed. Parents were unaware and were searching inside and outside the house. Several hours later they noticed the missing car key and ended up finding their children dead inside. Later they came to know that cause for the death was suffocation (The Hindu, 2017). Four children accidentally lock themselves inside car, two die of suffocation The above is one of the alarming cases which are less known but a rising cause of deaths in India. In U.S this is one of the major case were children are left in cars parked in hot sun unknowingly by parents or guardians. On an average, 50 children die in hot cars each year from heat-related deaths after being trapped inside motor vehicles and 819 children have lost their lives since 1998 (Kids and car, 2016). These problems are not limited to children but can also be equally dangerous to pets, disabled and physically challenged .Vehicles when parked in hot environment without overhead garages, with engine off, doors and windows closed and outside temperature above 33ºC, the inside temperature may rise above the comfort limit in a short time. This may lead discomfort to the driver or passengers if present inside and cause hyperthermia for a child or disabled.

CONTENTS **PAGE NO**

CONTENTS **PAGE NO**

List of Figures

1. INTRODUCTION

1.1 Introduction to IoT:

The Internet of things (IoT) is the network of physical devices, vehicles, home appliances and other items embedded with electronics, software, sensors, actuators, and network connectivity which enables these objects to connect and exchange data, Each thing is uniquely identifiable through its embedded computing system but is able to inter-operate within the existing Internet infrastructure.

1.2 History

As of 2016, the vision of the Internet of things has evolved due to a convergence of multiple technologies, including ubiquitous wireless communication, real-time analytics, machine learning, commodity sensors, and embedded systems. This means that the traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things

1.3 Medical and healthcare applications

IoT devices can be used to enable remote health monitoring and emergency notification systems. These health monitoring devices can range from blood pressure and heart rate monitors to advanced devices capable of monitoring specialized implants, such as pacemakers, Fitbit electronic wristbands, or advanced hearing aids. Some hospitals have begun implementing "smart beds" that can detect when they are occupied and when a patient is attempting to get up. It can also adjust itself to ensure appropriate pressure and support is applied to the patient without the manual interaction of nurses. According to the latest research, US Department of Health plans to save up to USD 300 billion from the national budget due to medical innovations.

Specialized sensors can also be equipped within living spaces to monitor the health and general well-being of senior citizens, while also ensuring that proper treatment is being administered and assisting people regain lost mobility via therapy as well. Other consumer devices to encourage healthy living, such as, connected scales or wearable heart monitors, are also a possibility with the IoT. More and more end-to-end health monitoring IoT platforms are coming up for antenatal and chronic patients, helping one manage health vitals and recurring medication requirements.

1.4 Advantages

Here are some advantages of IoT:

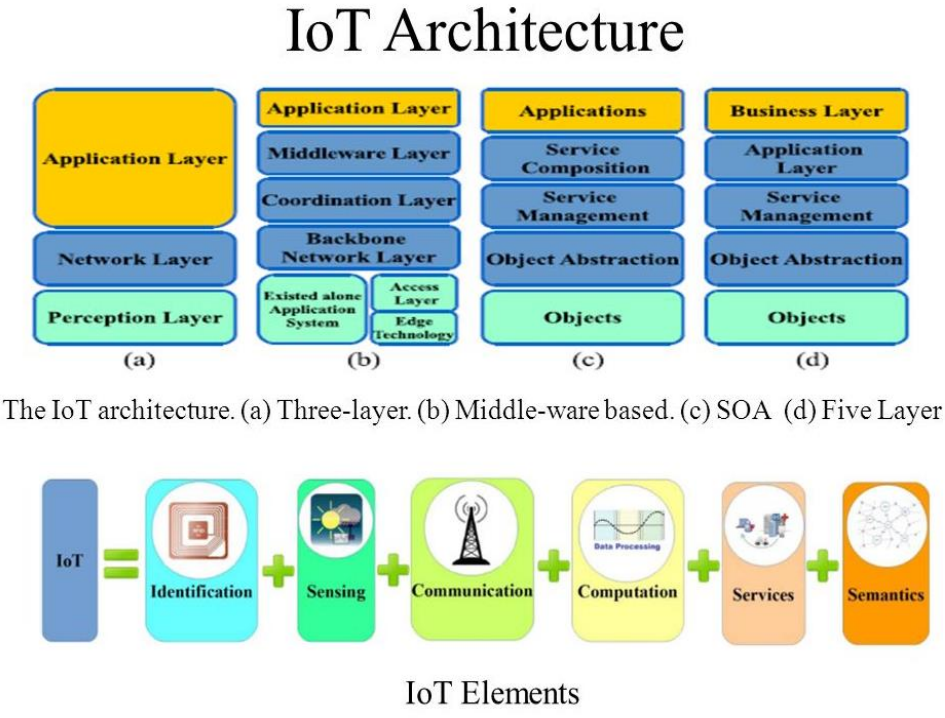
1. Data: The more the information, the easier it is to make the right decision. Knowing what to get from the grocery while you are out, without having to check on your own, not only saves time but is convenient as well.

2. Tracking: The computers keep a track both on the quality and the viability of things at home. Knowing the expiration date of products before one consumes them improves safety and quality of life. Also, you will never run out of anything when you need it at the last moment.

3. Time: The amount of time saved in monitoring and the number of trips done otherwise would be tremendous.

4. Money: The financial aspect is the best advantage. This technology could replace humans who are in charge of monitoring and maintaining supplies

1.5 IoT Architecture



The IoT architecture. (a) Three-layer. (b) Middle-ware based. (c) SOA (d) Five Layer

Fig:1.1 IOT Architecture

2. LITERATURE SURVEY

From the published information's, following are the experimental research that hasbeen carried out in this area.

2.1 Heat Stroke Prevention System

"System and method for preventing entrapment and heat suffocation in vehicles" (Dulin, 2002).Safety system for passenger vehicles to prevent entrapment of child, disabled, aged or infirm person or pets being left in sun so that they will not suffocate from heat. The invention is characterized by use of one or more systems to sense the occupancy state, temperature inside vehicle and provide one or more outputs which can be selectively employed to provide warning to permit rescue and or activate electro mechanical systems to relieve heat. System includes microcontroller, sensors and electromechanical system. Sensors include automotive occupancy sensor (AOS), ultrasound sensor, I.R. sensor, imaging sensor, microphone sensor, seat sensor, capacitance sensor, motion sensor, floor sensor, temperature sensor. Electro mechanical system includes rolling down windows, unlatching seat belts, unlocking doors, starting car, fan or air conditioning system.Interior warning includes illuminated warning, voice announcement or warning sound.Exterior warnings include vehicle lights, horns, alarms, out bound RF message.

2.2 Automatic Window and Sunroof Adjusting

"Vehicle for automatically adjusting window and sunroof positions after it being left unattended by its operator" (Liu, 2001).When an automobile is parked outside without overhead garages and with its windows closed or open it may be subjected, respectively, to freezing or overheating its interior depending upon its exterior temperature. Such extreme temperature will reduce the life span of electronic and mechanical components in or near the interior, cause discomfort to the passenger or driver and danger of life to kids, pets or disabled. System includes temperature sensing circuitry to sense interior temperature, microcontroller to sense the input signal and give the actuation signal to lower or close the power windows and sunroof.

2.3 Alerting, Monitoring and Controlling System

"System for Alerting, Monitoring and Controlling Heat Stroke inside Vehicles" (Garethiya, 2015).Has proposed a simple and effective solution to alert vehicle owners about the possibility of heatstroke inside it if any person is present and thus apparently avoiding death due to suffocation. And also making system beneficial not only to the owner but also to the law enforcing agencies, using sensor and electronic units. System includes Temperature sensing, Pressure detection, GPS and real time modules

2.4 Image Motion Detection System

"Car Suffocating Prevention Using Image Motion Detection" (Muhamad and Rasidi**,** 2013).Video based system to automatically check whether there are any human left in car when the engine has been turned off to avoid suffocation. Working: System starts when car engine is turned off and doors are locked. System then checks if there is any movement inside the car. If any

movement is detected alarm is triggered until owner comes and turns it off. If no movement is detected for about 30 minutes, it will automatically get deactivated. Hardware: Raspberry Pi, BTC PC380 webcam. Two cameras have been setup above right front and left back of window glass with 30 degree downwards so that they will only focus on car seats.Testing condition variables are; Controlled variables, Different body sizes, Different body position, Different objects, Condition where human and object exist inside the car.

2.5 Thermal Protection for Vehicle

"Vehicle having a thermal protection arrangement for toddlers and pets" (Liu, 2001).A method and apparatus is provided for automatically adjusting a vehicle's window and sunroof positions after the vehicle is parked and the vehicle operator left it unattended. Once activated, the power window and sunroof system will be disabled automatically when the vehicle operator returns to drive the vehicle away. The present invention also has a temperature sensing circuitry to be appropriately located somewhere in or near the interior of the vehicle.

2.6 Thermal Distribution within Car Cabin

"Computational Analysis of Thermal Distribution within Passenger Car Cabin" (Quadri and Jose, 2013).The analysis of the car model was done by analyzing that the car is kept in longitude and latitude in New Delhi from 2 pm onwards on 10th day of 4 month. When the Solar radiations fall on the window panes the areas around them experienced the highest temperatures and a porous slit positioned above the windows could act as a vent for hot air. From the simulation it was evident that the location of the vents plays a vital role in determining the cabin environment. When a vehicle is parked under the sun, accumulated heat affects many interiors, thus bringing about their degradation this study can be used effectively to prevent this.From the above literature survey it has been shown that car parked in sunlight is dangerousnot only to kids but every human being, and car itself. Hence there is need for a system which iseconomical and which works effectively under any conditions and saves precious lives. Death of kids due to heatstroke in car cabin is raising continuously even though people are made aware of this type of problem. Solutions though present are not so efficient and are not economical so that it can be used by mass number of people. So we are developing an economical and efficiently working mechatronic system

3. SYSTEM ANALYSIS:

3.1 Existing System

There are some web interface tools which provide security for the personally identifiable information but before providing security we need to dump all our personal data on their servers where all the security mechanisms are applied in order to enforce the security.

Many of these web interface tools provide security for our data after signing up into their database and only provide security for few days as free trail and after the completion of the trail period we need to pay the money in order to get security for our data.

Most of these web interface tools are entrepreneurship oriented mainly utilized by entrepreneurs to safeguard their organizations private data

SPIRION:

Spirion introduces a new philosophy to data leakage prevention. Traditional Data-in-Motion data loss prevention approaches defend the border of an organization, trying to keep the bad guys out. If history has taught us anything, it is that hackers, viruses, malware, and others will always find a way onto our systems. Spirion goes to the source of the data loss problem and secures Data-at-Rest. Read more about the strength of Data-at-Rest versus Data-in-Motion.

GROUNDLABS:

This have helped more than 2,500 organisations in 80 countries discover sensitive PII and cardholder data in documents, databases, emails, log files and many other locations.

3.2 Proposed system

Despite all of the great security products available today, the number of data breaches continues to rise. Even government organizations publicly display some of user content knowingly or unknowingly, it's our duty to inform them not to do so before the information goes into the wrong hands. This tool makes it possible by finding the appropriate urls from the google search, thus enabling the government of India (NIC) to do the job with an ease. The main of the project is to stop the misuse of personally identifiable information in any means.

Our solution analyses the personally identifiable information which is available open in the websites and also categorize the websites based on the security provided to a particular website. As the data leakage is the main problem now-a-days we mainly tend to target the owners of website who publish the personal data in their websites without the prior information of any particular person. It is a Web Enabled tool which is of free of cost, Robust which can be executed on any system and the tool from hackers.

Here the innocent people need not directly use this tool. National Information Centre Hyderabad will initiate the search and find the vulnerable sites and inform the owners of the sites accordingly which makes tool more.

3.3 Feasibility Study

The feasibility of the project is analysed in this phase and business proposal is put forth with a very general plan for the project and some cost estimates. During system analysis the feasibility study of the proposed system is to be carried out. For feasibility analysis, some understanding of the major requirements for the system is essential. This is to ensure that the proposed system is not a burden to the company.

Three key considerations involved in the feasibility analysis are

3.3.1. ECONOMICAL FEASIBILITY

3.3.2. TECHNICAL FEASIBILITY

3.3.3. SOCIAL FEASIBILITY

3.3.1. Economic Feasibility

This study is carried out to check the economic impact that the system will have on the organization. The amount of fund that the company can pour into the research and development of the system is limited. The expenditures must be justified. Thus the developed system as well within the budget and this was achieved because most of the technologies used are freely available. Only the customized products had to be purchased.

3.3.2. Technical Feasibility

This study is carried out to check the technical feasibility, that is, the technical requirements of the system. Any system developed must not have a high demand on the available technical resources.

This will lead to high demands on the available technical resources. This will lead to high demands being placed on the client. The developed system must have a modest requirement, as only minimal or null changes are required for implementing this system.

3.3.3. Social Feasibility

The aspect of study is to check the level of acceptance of the system by the user. This includes the process of training the user to use the system efficiently. The user must not feel threatened by the system, instead must accept it as a necessity. The level of acceptance by the users solely depends on the methods that are employed to educate the user about the system and to make him familiar with it. His level of confidence must be raised so that he is also able to make some constructive criticism, which is welcomed, as he is the final user of the system

4.SYSTEM REQUIREMENT SPECIFICATION (SRS)

4.1 Introduction

Software Requirements Specification plays an important role in creating quality software solutions. Specification is basically a representation process. Requirements are represented in a manner that ultimately leads to successful software implementation. Requirements may be specified in a variety of ways. However there are some guidelines worth following: - Representation format and content should be relevant to the problem Information contained within the specification should be nested Diagrams and other notational forms should be restricted in number and consistent in use. Representations should be revisable

4.2 Non-functional requirements:

Usability

Usability is the ease of use and learns ability of a human-made object. The object of use can be a software application, website, book, tool, machine, process, or anything a human interacts with. A usability study may be conducted as a primary job function by a usability analyst or as a secondary job function by designers, technical writers, marketing personnel, and others.

Reliability

The probability that a component part, equipment, or system will satisfactorily perform its intended function under given circumstances, such as environmental conditions, limitations as to operating time, and frequently and thoroughness of maintenance for a specified period of time.

Performance:

Accomplishment of a given task measured against present standards of accuracy, completeness, cost, and speed.

Supportability:

To which the design characteristics of a stand by or support system meet the operational requirements of an organization.

Implementation:

Implementation is the realization of an application, or execution of a plan, idea, model, design, specification, standard, algorithm, or policy

Interface:

An interface refers to a point of interaction between components, and is applicable at the level of both hardware and software. This allows a component whether a piece of hardware such as a graphics card or a piece of software such as an internet browser to function independently while using interfaces to communicate with other components via an input/output system and an associated protocol.

Legal:

It is established by or founded upon law or official or accepted rules of or relating to jurisprudence; “legal loophole”.Having legal efficacy or force’, “a sound title to the property” Relating to or characteristic of the profession of law, “the legal profession”. Allowed by official rules; “a legal pass receiver”.

4.3 System Requirements

4.3.1 Hardware Requirements:

1. Raspberry Pi 3

2.Sensors

A.DHT 11

B.PIR

C.MQ-135

3.Battery

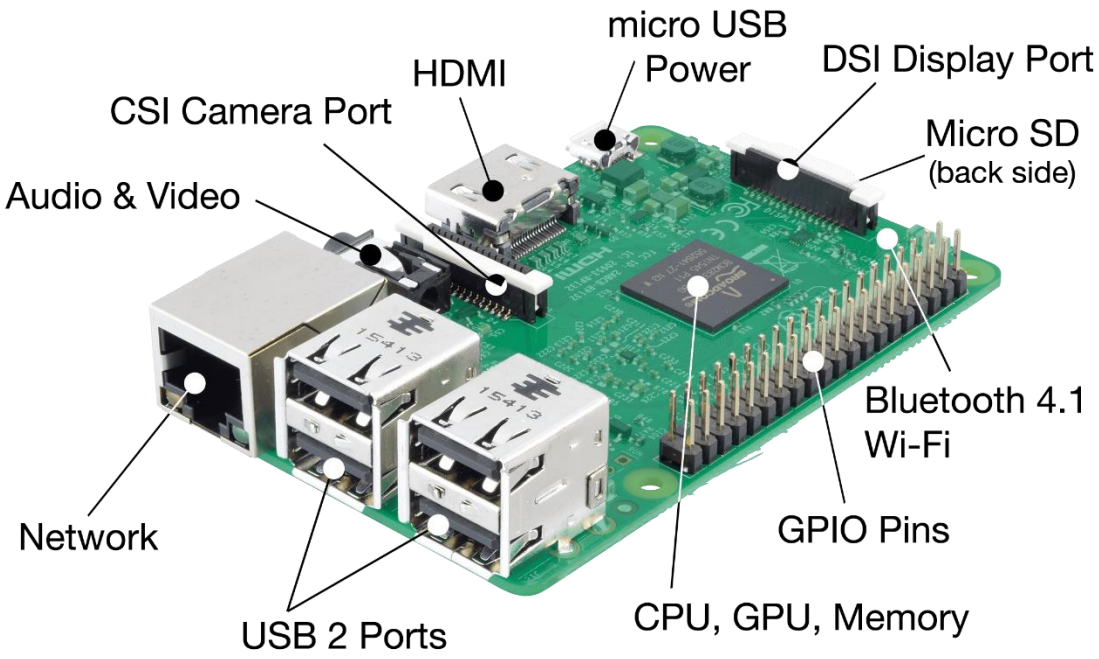
4.3.2 SOFTWARE REQUIREMENTS:

- **Operating System** **:** Windows/Linux/Macintosh/Raspbian
- **Coding Language** **:** Python
- **Tools** **:** Putty,Thunkable, IFTTT, Notepad++ ,Thingspeak

Raspberry pi

The Raspberry Pi is a credit-card-sized singleboard computer developed in the UK by the Raspberry Pi Foundation , The Raspberry Pi device looks like a motherboard, with the mounted chips and ports exposed (something you'd expect to see only if you opened up your computer and looked at its internal boards), but it has all the components you need to connect input, output, and storage devices and start computing.

You'll encounter two models of the device: Model A and Model B. The only real differences are the addition of Ethernet and an extra USB port on the more expensive Model B.



Here are the various components on the Raspberry Pi board:

ARM CPU/GPU -- This is a Broadcom BCM2835 System on a Chip (SoC) that's made up of an ARM central processing unit (CPU) and a Videocore 4 graphics processing unit (GPU). The CPU handles all the computations that make a computer work (taking input, doing calculations and producing output), and the GPU handles graphics output.

GPIO -- These are exposed general-purpose input/output connection points that will allow the real hardware hobbyists the opportunity to tinker.

RCA -- An RCA jack allows connection of analog TVs and other similar output devices.

Audio out -- This is a standard 3.55-millimeter jack for connection of audio output devices such as headphones or speakers. There is no audio in.

LEDs -- Light-emitting diodes, for all of your indicator light needs.

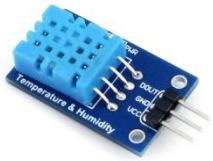
USB -- This is a common connection port for peripheral devices of all types (including your mouse and keyboard). Model A has one, and Model B has two. You can use a USB hub to expand the number of ports or plug your mouse into your keyboard if it has its own USB port.

HDMI -- This connector allows you to hook up a high-definition television or other compatible device using an HDMI cable.

Power -- This is a 5v Micro USB power connector into which you can plug your compatible power supply.

SD cardslot -- This is a full-sized SD card slot. An SD card with an operating system (OS) installed is required for booting the device. They are available for purchase from the manufacturers, but you can also download an OS and save it to the card yourself if you have a Linux machine and the wherewithal.

Ethernet -- This connector allows for wired network access and is only available on the Model B.

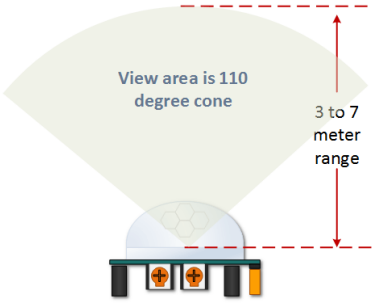


DHT11

The DHT11 is a basic, ultra low-cost digital temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin (no analoge input pins needed). Its fairly simple to use, but requires careful timing to grab data. The only real downside of this sensor is you can only get new data from it once every 2 seconds, so when using our library, sensor readings can be up to 2 seconds old.

MQ-135 SENSOR

MQ-135 Module sensor has lower conductivity in clean air. When the target combustible gas exist, the sensors conductivity is more higher along with the gas concentration rising. Convert change of conductivity to correspond output signal of gas concentration. MQ135 gas sensor has high sensitivity to Carbon di Oxide, Ammonia, Sulphide and Benzene steam, also sensitive to smoke and other harmful gases. It is with low cost and suitable for different applications such as harmful gases/smoke detection.



HC SR501 PIR SENSOR

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

Raspbian

Raspbian which is based on Linux Debian is used as an operating system for the proposed project which has a strong documentation. Raspbian comes pre-installed with plenty of software for education, programming and general use. It has Python, Scratch, Sonic Pi, Java, mathematica and more.The raspbian with PIXEL image contained in the ZIP archieve is over 4GB in size, which means that these archives use features which are not supported by older unzip tools on some platforms.

Android application using Thunkable

An Android app is a software application running on the Android platform. Because the Android platform is built for mobile devices, a typical Android app is designed for a smartphone or a tablet PC running on the Android OS.

Thunkable-

Mobile App Developer. Drag & Drop App Builder. Bleeding-edge Technology. Ability to Monetize Apps. Available for iOS. Services: Modern User Interfaces, Image & Voice AI, Maps + Location, Monetize, Internet of Things.

E.A.S.T

This application give API to access real time carbon gases and temperature reading form the iot device usually requires the password to authenticate user .It is simple to use and understand

THINGSPEAK

ThingSpeak is an Internet of Things (IoT) platform that lets you collect and store sensor data in the cloud and develop IoT applications. The ThingSpeak™ IoT platform provides apps that let you analyze and visualize your data in MATLAB®, and then act on the data. Sensor data can be sent to ThingSpeak from Arduino®, Raspberry Pi™, BeagleBone Black, and other hardware.

IFTTT

IFTTT is the free way to get all your apps and devices talking to each other. Not everything on the internet plays nice, so we're on a mission to build a more connected world.

5. SYSTEM DESIGN

5.1 Introduction

The most creative and challenging phase of the life cycle is system design. The term design describes a final system and the process by which it is developed. It refers to the technical specifications that will be applied in implementations of the candidate system. The design may be defined as "the process of applying various techniques and principles for the purpose of defining a device, a process or a system with sufficient details to permit its physical realization".

The designer's goal is how the output is to be produced and in what format. Samples of the output and input are also presented. Second input data and database files have to be designed to meet the requirements of the proposed output.

The processing phases are handled through the program Construction and Testing. Finally, details related to justification of the system and an estimate of the impact of the candidate system on the user and the organization are documented and evaluated by management as a step toward implementation.

The importance of software design can be stated in a single word "Quality". Design provides us with representations of software that can be assessed for quality. Design is the only way where we can accurately translate a customer's requirements into a complete software product or system. Without design we risk building an unstable system that might fail if small changes are made. It may as well be difficult to test, or could be one who's quality can't be tested. So it is an essential phase in the development of a software product.

5.2 High-level design

High Level Design defines complete scale architecture of the developing system required. In short it is an overall representation of a design required for our target developing system/application. It is usually done by higher level professionals/software architects

5.3 Low-level design

5.3.1 UML DIAGRAMS

The UML is a language for

- Visualizing
- Specifying
- Constructing
- Documenting

These are the artefacts of a software-intensive system.

A conceptual model of UML:
The three major elements of UML are

1. The UML's basic building blocks
2. The rules that dictate how those building blocks may be put together.
3. Some common mechanisms that apply throughout the UML.

Basic building blocks of the UML
The vocabulary of UML encompasses three kinds of building blocks:

1. Things
2. Relationships
3. Diagrams

Things are the abstractions that are first-class citizens in a model;

Relationships tie these things together;
Diagrams group the interesting collection of things.
Things in UML: There are four kinds of things in the UML

1. Structural things
2. Behavioural things.
3. Grouping things
4. Annotational things

These things are the basic object oriented building blocks of the UML.They are used to write well-formed models.

STRUCTURAL THINGS:

Structural things are the nouns of UML models. The structural things used in the project design are:

First, a **class** is a description of a set of objects that share the same attributes, operations, relationships and semantics.

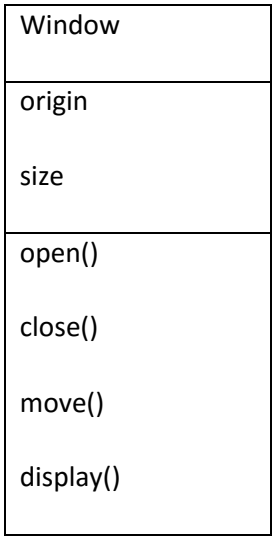


Fig: Classes

Second, a **use case** is a description of set of sequence of actions that a system performs that yields an observable result of value to particular actor.

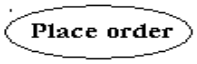


Fig: Use Cases

Third, a node is a physical element that exists at runtime and represents a computational resource, generally having at least some memory and often processing capability.

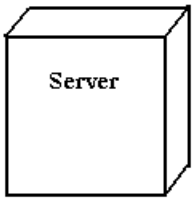


Fig: Nodes

Behavioral things are the dynamic parts of UML models. The behavioral thing used is:

Interaction:

An interaction is a behaviour that comprises a set of messages exchanged among a set of objects within a particular context to accomplish a specific purpose. An interaction involves a number of other elements, including messages, action sequences (the behaviour invoked by a message, and links (the connection between objects).

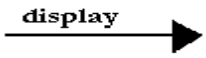


Fig: Messages

5.3.1 Relationships in UML

There are four kinds of relationships in the UML:

- Dependency
- Association
- Generalization
- Realization

A **dependency** is a semantic relationship between two things in which a change to one thing may affect the semantics of the other thing (the dependent thing).

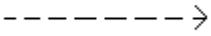


Fig: Dependencies

An **association** is a structural relationship that describes a set links, a link being a connection among objects. Aggregation is a special kind of association, representing a structural relationship between a whole and its parts.

Fig: Association

A **generalization** is a specialization/ generalization relationship in which objects of the specialized element (the child) are substitutable for objects of the generalized element(the parent).

Fig: Generalization

A **realization** is a semantic relationship between classifiers, where in one classifier specifies a contract that another classifier guarantees to carry out.

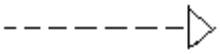


Fig: Realization

5.3.2 Class Diagram

An object is any person, place, thing, concept, event, screen, or report applicable to your system. Objects both know things (they have attributes) and they do things (they have methods).

A class is a representation of an object and, in many ways, it is simply a template from which objects are created. Classes form the main building blocks of an object-oriented application.

Responsibilities:
Classes are typically modeled as rectangles with three sections: the top section for the name of the class, the middle section for the attributes of the class, and the bottom section for the methods of the class. Attributes are the information stored about an object, while methods are the things an object or class do. You should think of methods as the object-oriented equivalent of functions and procedures.

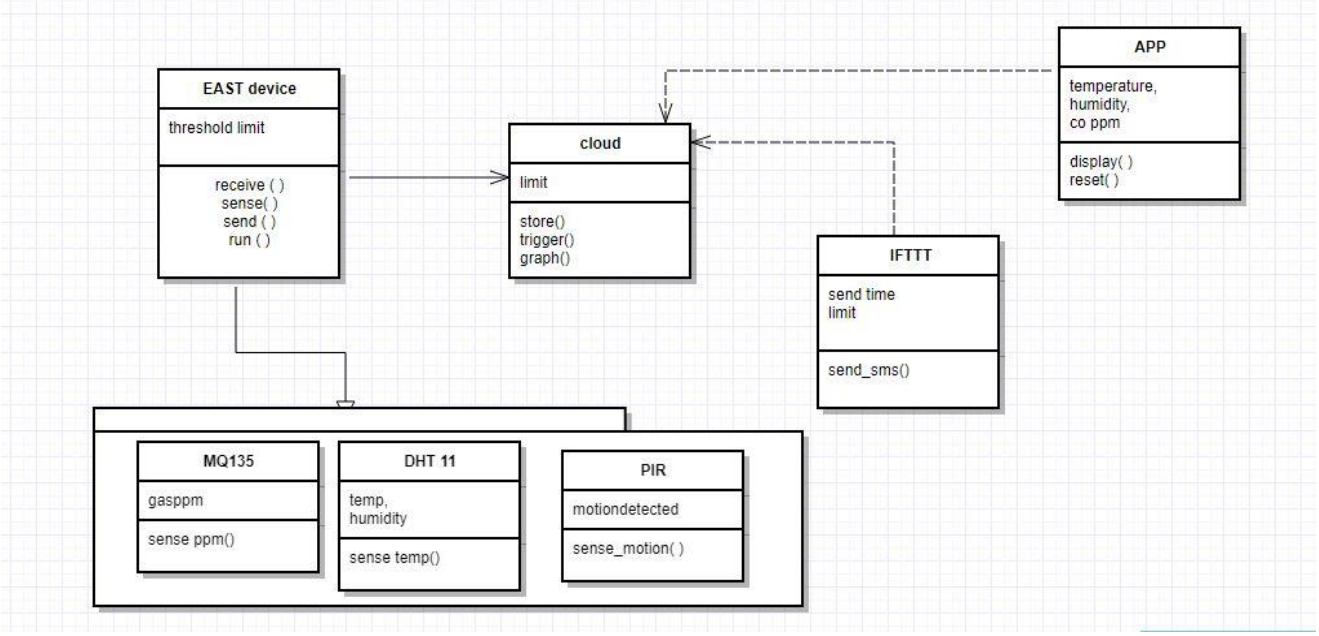


Fig 5.2 Class diagram

5.3.3 SequenceDiagram

UML sequence diagrams are used to represent the flow of messages, events and actions between the objects or components of a system. Time is represented in the vertical direction showing the sequence of interactions of the header elements, which are displayed horizontally at the top of the diagram.

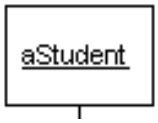
Sequence Diagrams are used primarily to design, document and validate the architecture, interfaces and logic of the system by describing the sequence of actions that need to be performed to complete a task or scenario. UML sequence diagrams are useful design tools because they provide a dynamic view of the system behavior which can be difficult to extract from static diagrams or specifications.

Actor

Represents an external person or entity that interacts with the system

Object

Represents an object in the system or one of its components

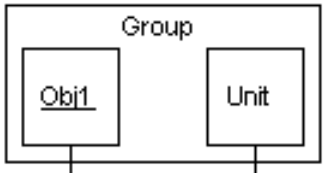


Separator

Represents an interface or boundary between subsystems, components or units (e.g., air interface, Internet, network)

Group

Groups related header elements into subsystems or components



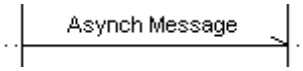
Sequence Diagram Body Elements

Action

Represents an action taken by an actor, object or unit

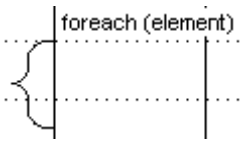
Asynchronous Message

An asynchronous message between header elements



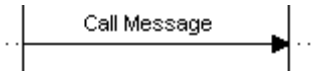
Block

A block representing a loop or conditional for a particular header element



Call Message

A call (procedure) message between header elements

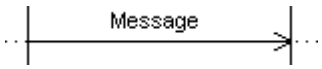


Create Message

A "create" message that creates a header element (represented by lifeline going from dashed to solid pattern)

Message

A simple message between header elements



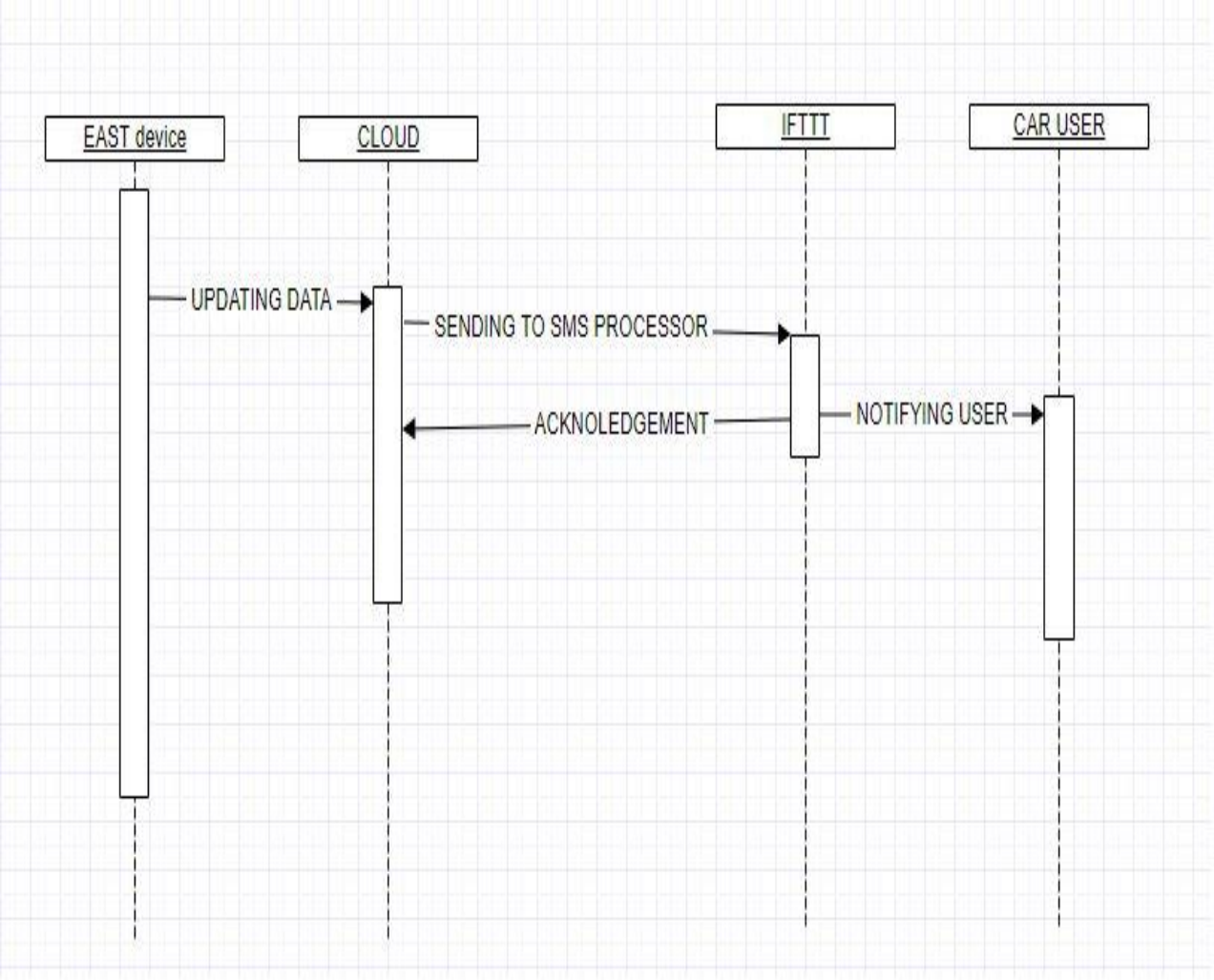


Fig 5.3 Sequence Diagram

6.CODING

We'll be using the Adafruit DHT11 Python library. You can download the library using Git, so if you don't have Git installed on your Pi already, enter this at the command prompt:

sudo apt-get install git-core

Note: If you get an error installing Git, run sudo apt-get update and try it again.

To install the Adafruit DHT11 library:

1. Enter this at the command prompt to download the library:
   git clone https://github.com/adafruit/Adafruit_Python_DHT.git
2. Change directories with
   cd Adafruit_Python_DHT
3. Now enter this:
   sudo apt-get install build-essential python-dev
4. Then install the library with:
   sudo python setup.py install

This Python program will output the temperature and humidity readings to an SSH terminal:

```
#!/usr/bin/python

# Copyright (c) 2014 Adafruit Industries

# Author: Tony DiCola

# Permission is hereby granted, free of charge, to any person obtaining a copy

# of this software and associated documentation files (the "Software"), to deal

# in the Software without restriction, including without limitation the rights

# to use, copy, modify, merge, publish, distribute, sublicense, and/or sell

# copies of the Software, and to permit persons to whom the Software is

# furnished to do so, subject to the following conditions:


# The above copyright notice and this permission notice shall be included in all

# copies or substantial portions of the Software.
```

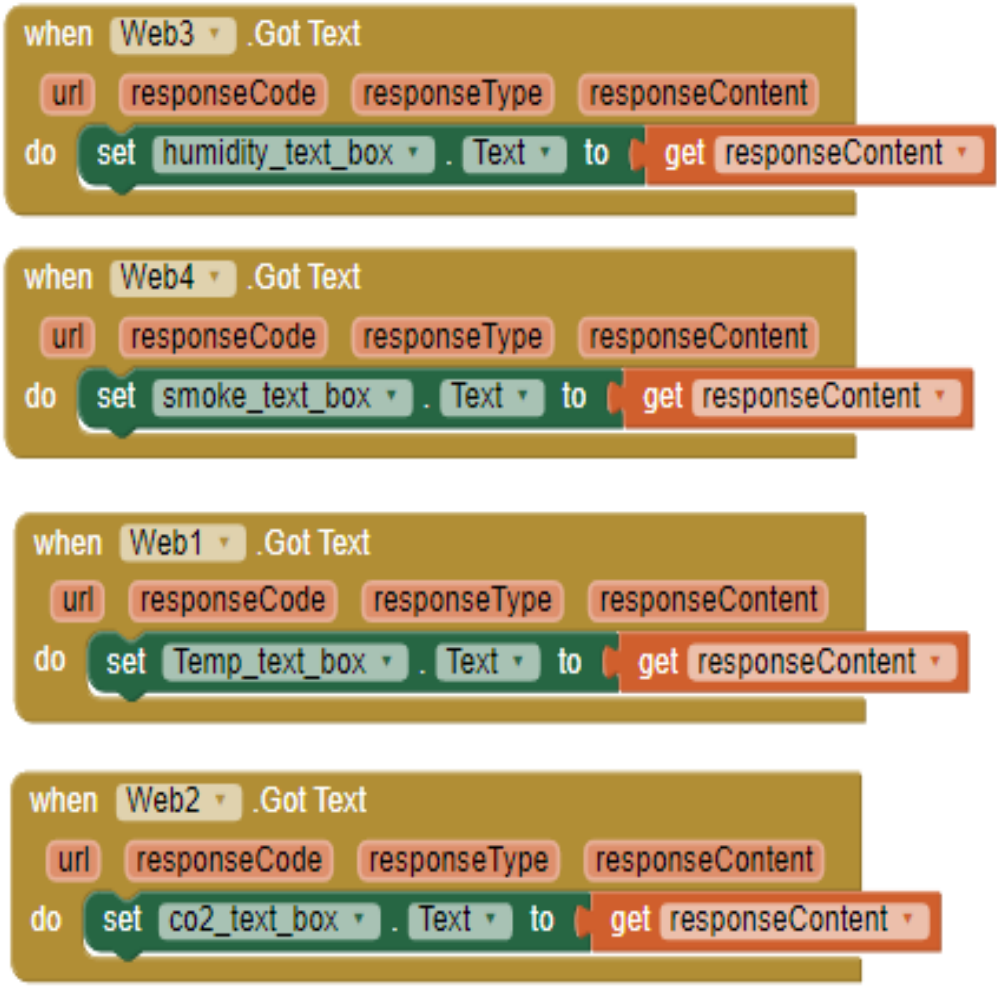
```
# THE SOFTWARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR

# IMPLIED, INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY,

# FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT. IN NO EVENT SHALL THE

# AUTHORS OR COPYRIGHT HOLDERS BE LIABLE FOR ANY CLAIM, DAMAGES OR OTHER

# LIABILITY, WHETHER IN AN ACTION OF CONTRACT, TORT OR OTHERWISE, ARISING FROM,

# OUT OF OR IN CONNECTION WITH THE SOFTWARE OR THE USE OR OTHER DEALINGS IN THE

# SOFTWARE.

import sys


import Adafruit_DHT



# Parse command line parameters.

sensor_args = { '11': Adafruit_DHT.DHT11,

                '22': Adafruit_DHT.DHT22,

                '2302': Adafruit_DHT.AM2302 }

if len(sys.argv) == 3 and sys.argv[1] in sensor_args:

   sensor = sensor_args[sys.argv[1]]

   pin = sys.argv[2]

else:

   print('usage: sudo ./Adafruit_DHT.py [11|22|2302] GPIOpin#')

   print('example: sudo ./Adafruit_DHT.py 2302 4 - Read from an AM2302 connected to GPIO #4')

   sys.exit(1)

# Try to grab a sensor reading.  Use the read_retry method which will retry up
```

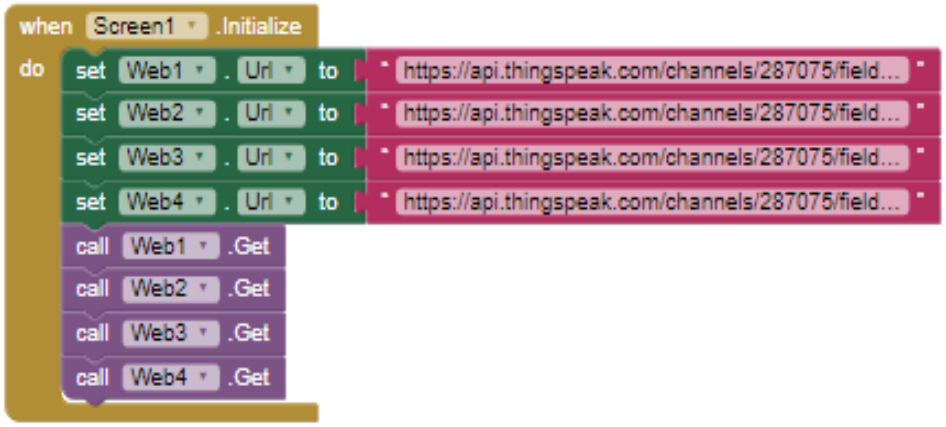
```
        # to 15 times to get a sensor reading (waiting 2 seconds between each
        retry).
        humidity, temperature = Adafruit_DHT.read_retry(sensor, pin)
        # Un-comment the line below to convert the temperature to Fahrenheit.
        # temperature = temperature * 9/5.0 + 32
        # Note that sometimes you won't get a reading and
        # the results will be null (because Linux can't
        # guarantee the timing of calls to read the sensor).
        # If this happens try again!
        if humidity is not None and temperature is not None:
            print('Temp={0:0.1f}*  Humidity={1:0.1f}%'.format(temperature,
        humidity))
        else:
            print('Failed to get reading. Try again!')
            sys.exit(1)


class MCP3008:
    def __init__(self, bus = 0, device = 0):
        self.bus, self.device = bus, device
        self.spi = SpiDev()
        self.open()
    def open(self):
        self.spi.open(self.bus, self.device)
    def read(self, channel = 0):
        adc = self.spi.xfer2([1, (8 + channel) << 4,
0])
        data = ((adc[1] & 3) << 8) + adc[2]
        return data


    def close(self):
```

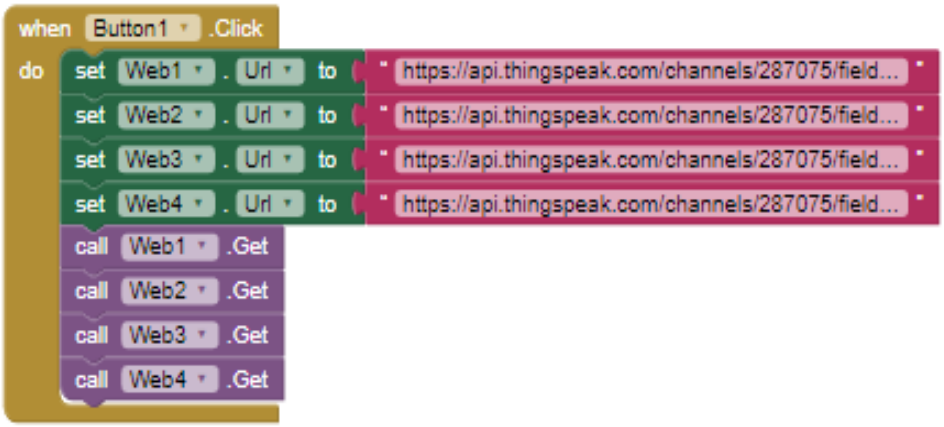
```
        self.spi.close()

from mq import *
        import sys, time

        try:
           print("Press CTRL+C to abort.")

           mq = MQ();
           while True:
              perc = mq.MQPercentage()
              sys.stdout.write("\r")
              sys.stdout.write("\033[K")
              sys.stdout.write("LPG: %g ppm, CO: %g ppm, Smoke: %g ppm" %
(perc["GAS_LPG"], perc["CO"], perc["SMOKE"]))
              sys.stdout.flush()
              time.sleep(0.1)

        except:
        import RPi.GPIO as GPIO
        import time
        import sys
        from pubnub import Pubnub

        #Setting up the keys for Pubnub
        publish_key = len(sys.argv) > 1 and sys.argv[1] or 'pub-c-156a6d5f-22bd-
4a13-848d-b5b4d4b36695'
        subscribe_key = len(sys.argv) > 2 and sys.argv[2] or 'sub-c-f762fb78-
2724-11e4-a4df-02ee2ddab7fe'

        ## -----------------------------------------------------------------
```

```
## Initiate Pubnub State
## ------------------------------------------------------------------
pubnub = Pubnub(publish_key=publish_key,
subscribe_key=subscribe_key)
channel = 'motionsensor'
message = {'motion': 1}
# Asynchronous usage
def callback(message):
  print(message)
GPIO.setmode(GPIO.BCM)
PIR_PIN = 4
GPIO.setup(PIR_PIN, GPIO.IN)

def MOTION(PIR_PIN):
  pubnub.publish(channel, message, callback=callback, error=callback)

print 'PIR Module Test (CTRL+C to exit)'
time.sleep(2)
print 'Ready'
try:
  GPIO.add_event_detect(PIR_PIN, GPIO.RISING, callback=MOTION)
  while 1:
    time.sleep(100)
except KeyboardInterrupt:
  print 'Quit'

GPIO.cleanup()
```

App code screenshot
(thunkables.com)




when Screen1 .Initialize
do
set Web1 . Url to "https://api.thingspeak.com/channels/287075/field...
set Web2 . Url to "https://api.thingspeak.com/channels/287075/field...
set Web3 . Url to "https://api.thingspeak.com/channels/287075/field...
set Web4 . Url to "https://api.thingspeak.com/channels/287075/field...
call Web1 .Get
call Web2 .Get
call Web3 .Get
call Web4 .Get


when Button1 .Click
do
set Web1 . Url to "https://api.thingspeak.com/channels/287075/field...
set Web2 . Url to "https://api.thingspeak.com/channels/287075/field...
set Web3 . Url to "https://api.thingspeak.com/channels/287075/field...
set Web4 . Url to "https://api.thingspeak.com/channels/287075/field...
call Web1 .Get
call Web2 .Get
call Web3 .Get
call Web4 .Get

7. WORKING DESCRIPTION

7.1 Principle of working:

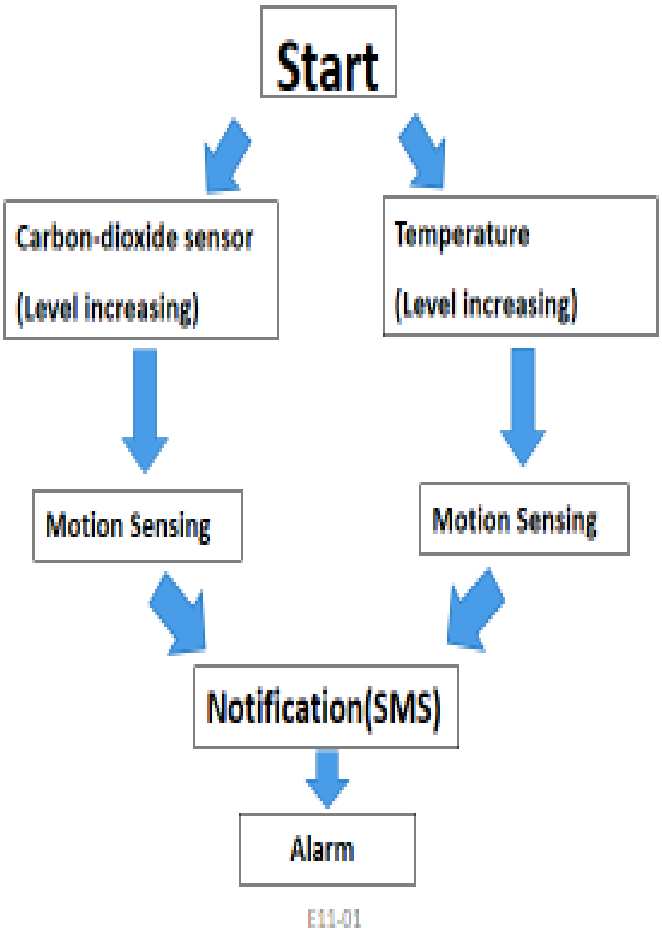
It is an IOT device which serves as both environment monitoring system as well as alerting system which alerts the user about any abnormal gas detections or temperature rise.

Temperature sensor and CO2 sensors are continuously running and monitoring the status of the car and also updating it to cloud for later reference. These readings are compared with PIR sensor output determining whether there is someone inside or not. If someone's presence is detected in car when the sensors are detecting something not normal then an immediate notification will be sent to the car owner alerting him and if he could not make it to the car in 10min an alarm will be set off alerting the nearby people.

7.2 Flow Chart

- Sequence of operation of the system

The following flow chart shows the sequence of operation of the system



E11-01

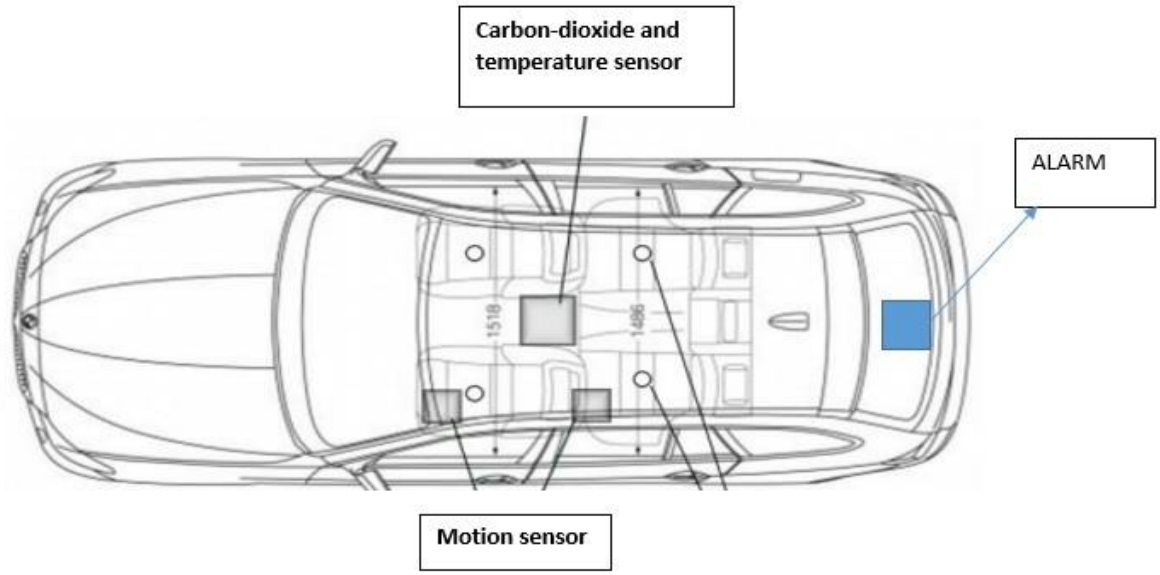


Fig System overview

6. MOTIVATION FOR THE PROJECT

Today we come across cases like death of a child due to suffocation in a locked car. In a recent case, where two sisters within 5 years of age playing got the car key and entered the car. Car got centrally locked when they closed the door. Unfortunately the two sisters didn't know how to open the door and got locked in with windows closed. Parents were unaware and were searching inside and outside the house. Several hours later they noticed the missing car key and ended up finding their children dead inside. Later they came to know that cause for the death was suffocation (The Hindu, 2017). Four children accidentally lock themselves inside car, two die of suffocation The idea of parking your car and taking a long nap or a quick siesta during your lunch break is a regular habit for many people.But with medical experts strongly advising against it, Dubai Police are warning the public about the dangers of sleeping in your car. Regardless of the car being old or new, experts at the General Administration for Criminal Security at Dubai Police said that in less than an hour one could die due to suffocation.Dr Babu Shershad from the First Medical Centre in Dubai told Gulf News that there are several factors that increase the risks of accidents and health problems when sleeping in a car. If the mechanical features of the car are not up to par, the possibility of a leakage of the car's exhaust into the vehicle's cabin while a person is sleeping can further increase the risk of suffocation as it would lower the oxygen level inside the car, said Dr Shershad

Two boys get locked in cab for 9 hours in Delhi, suffocate to death ,Hindustan Times, Oct 07, 2017

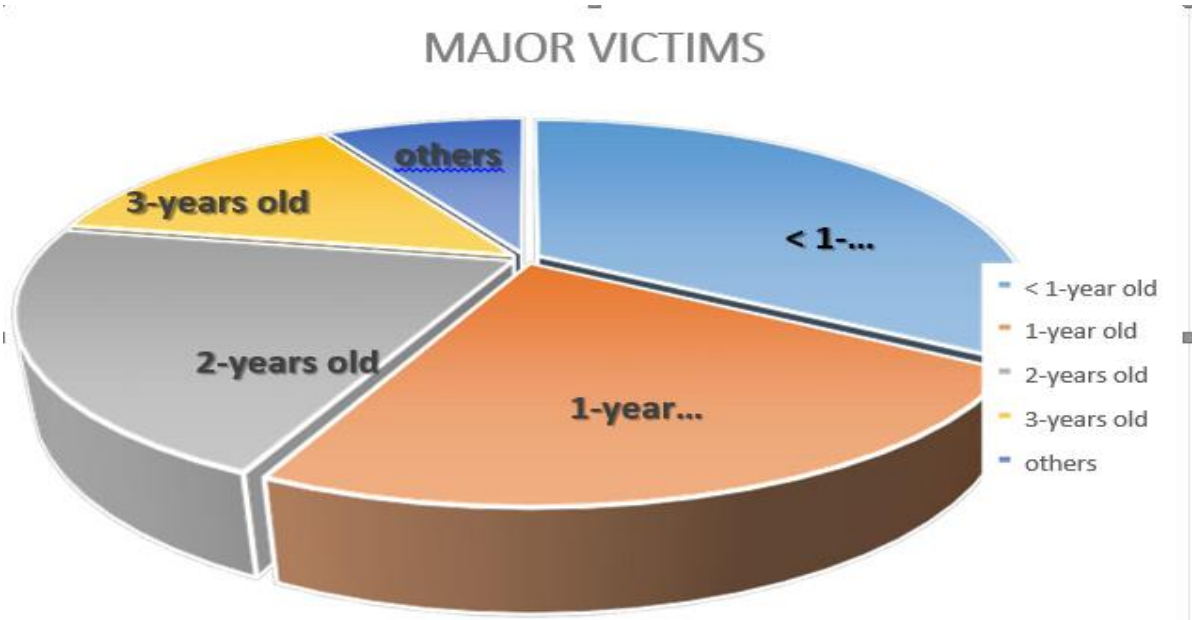
Two minor boys, aged four and six years, were killed after they got locked inside a parked car in outer Delhi's Das Garden area near Ranhola in west Delhi. Autopsy report confirmed that the boy, who were cousins, died of suffocation. Though it hasn't been determined how the two boys got into the car, primary inquiry suggests that they entered the car but couldn't come out as it was locked and died due to suffocation and heat

Suffocate to death inside car, Times of India,Oct 30, 2006.

CHENNAI: A software company owner and his two employees died inside a car after they rolled up the windows in a bid to stay off the swirling rainwater in the early hours of Sunday. Suffocation is said to have led to the incident

Five-year-old twin sisters suffocate to death inside locked car in Gurgaon
Hindustan Times, Jun 15, 2017

The door handle from inside the car was not functioning properly as a result the girls were not able to come out of it, police said. Two sisters, 5, died after they were reportedly locked inside a car on a hot afternoon at a village near Pataudi on the outskirts of Gurgaon. The girls — twins — went out to see puppies underneath the vehicle at around 4pm on Tuesday. According to police, their family found them unconscious at around 7.30pm and took them to a hospital, where the staff said they girls had already died.



The above is one of the alarming cases which are less known but a rising cause of deaths in India. In U.S this is one of the major case were children are left in cars parked in hot sun unknowingly by parents or guardians. On an average, 50 children die in hot cars each year from heat-related deaths after being trapped inside motor vehicles and 819 children have lost their lives since 1998 (Kids and car, 2016). Even the best of parents or caregivers can unknowingly leave a sleeping baby in a car; and the end result can be injury or even death. These problems are not limited to children but can also be equally dangerous to pets, disabled and physically challenged. Vehicles when parked in hot environment without overhead garages, with engine off, doors and windows closed and outside temperature above 33ºC, the inside temperature may rise above the comfort limit in a short time. This may lead discomfort to the driver or passengers if present inside and cause hyperthermia for a child or disabled.

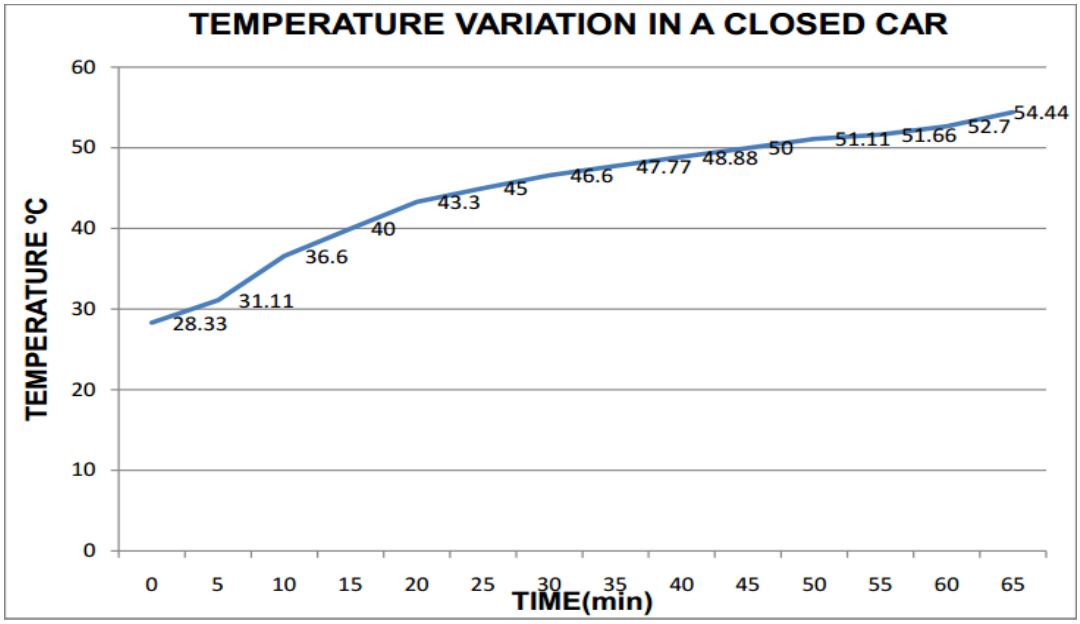
Death due to heat are also frequent, the following chart shows the temp vs. time

Estimated Vehicle Interior Air Temperature v. Elapsed Time

Elapsed time	Outside Air Temperature (F)					
	70º	75º	80º	85º	90º	95º
0 minutes	70º	75º	80º	85º	90º	95º
10 minutes	89º	94º	99º	104º	109º	114º
20 minutes	99º	104º	109º	114º	119º	124º
30 minutes	104º	109º	114º	119º	124º	129º
40 minutes	108º	113º	118º	123º	128º	133º
50 minutes	111º	116º	121º	126º	131º	136º
60 minutes	113º	118º	123º	128º	133º	138º
> 1 hour	115º	120º	125º	130º	135º	140º

9.Results and Screenshots

It gives in brief general idea of possible outcomes, experimental analysis result and advantages of the system. A prototype of car has been developed and our system has been implemented in it.



depicts that, when the car is closed, in the initial period, the temperature increases rapidly from the ambient temperature. With further passage of time, the temperature increases but at a slower rate. In 60 minutes, the temperature increased from 28 degree to 54 degree. This variation is thus harmful and fatal to the essential life.

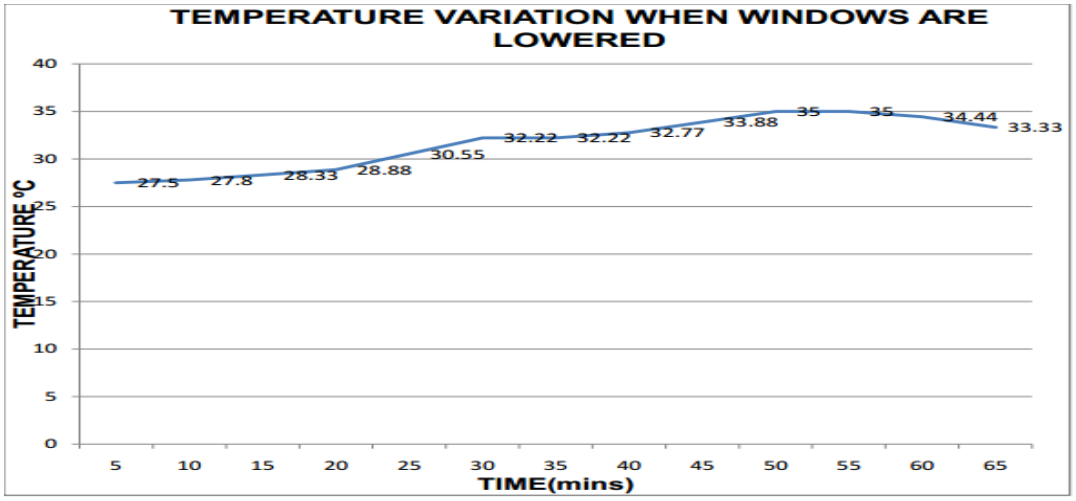
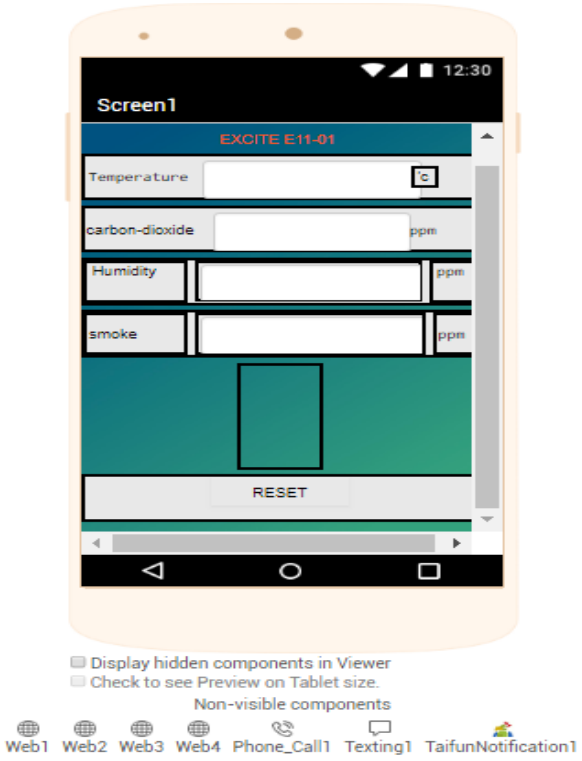
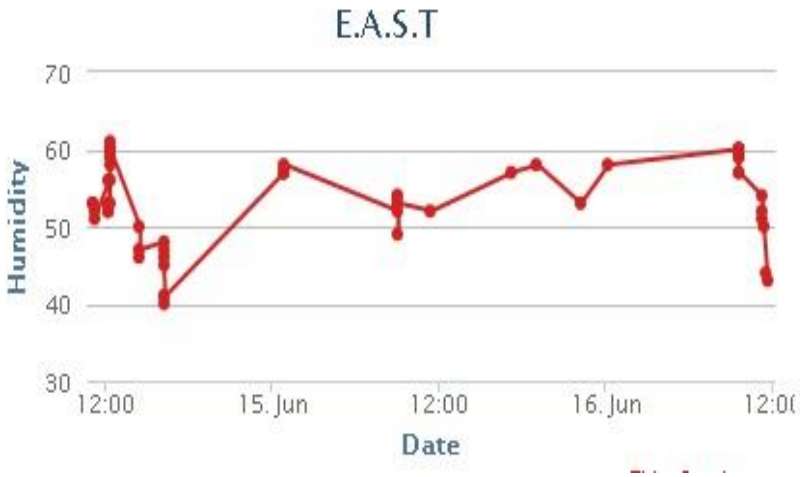


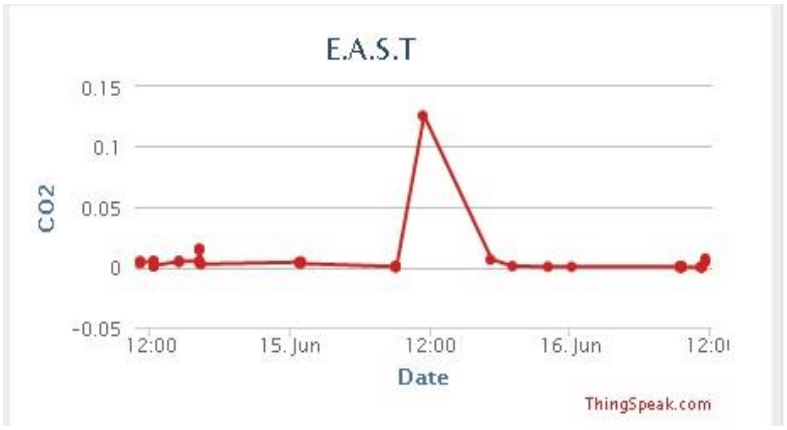
Figure 4.1; depicts that, with the windows lowered, the temperature increases at very low rate. In a period of 60 minutes, the temperature increased from 27.5 degree to 33.33 degree. This variation lies within the safe limit

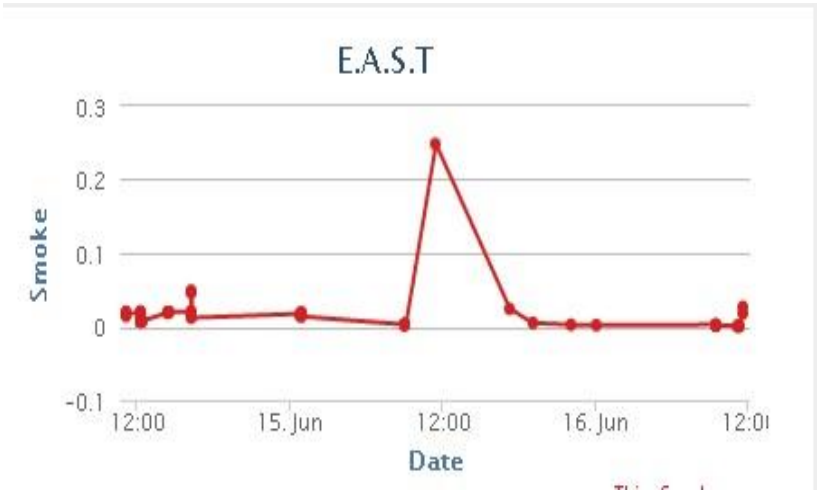
The following is the app interface

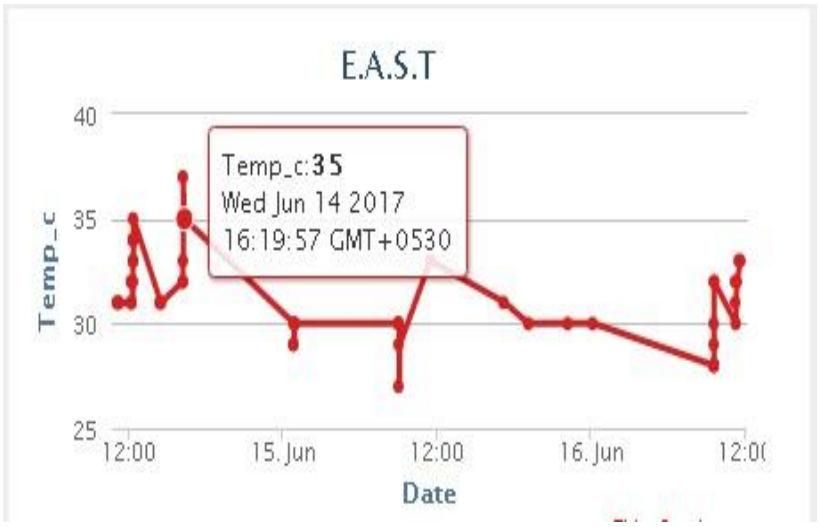


THE CLOUD RESULTS




E.A.S.T
0.15
0.1
0.05
0
-0.05
CO2
12:00
15. Jun
12:00
16. Jun
Date
ThingSpeak.com


E.A.S.T
0.3
0.2
0.1
0
-0.1
Smoke
12:00
15. Jun
12:00
16. Jun
Date


E.A.S.T
40
35
30
25
Temp_c
Temp_c:35
Wed Jun 14 2017
16:19:57 GMT+0530
12:00
15. Jun
12:00
16. Jun
Date

10. Bibliography

- Adafruit. 2016, PIR datasheet. Available from: http://learn.adafruit.com/downloads/pdf/pir-passive-infrared-proximity-motionsensor.pdf
- Atmel. 2016, ATMEGA328P. Available from: http://www.atmel.com/devices/ATMEGA328P.aspx
- Canine College, 2012. Temperature variation in car. Available from: < http://caninecollegemi.com/1758/pets-in-vehicles/temperature-inside-car-chart-2/>
- Dulin M.J., Seip R.,(2002). *WO2002087910A2*. USA: Google Patents.
- Electrical4U. 2015, Servomotor working. Available from:< http://www.electrical4u.com/servo-motor-servo-mechanism-theory-and-workingprinciple>
- Kids and car. 2016, Children death due heatstroke in car. Available from: http://www.kidsandcars.org/heatstroke.html
- Liu C. (2001). *US6263272*. USA: Google Patents.
- Liu j, (2000). *US6138068.* USA: Google Patents Muhamad and Rasidi**,** 2013. In-Car Suffocating Prevention Using Image Motion Detection. *Recent Advances in Circuits, System and Automatic Control, 145-150.*
- The Hindu.2015, suffocation death in car in India. Available from:<http://www.thehindu.com/news/cities/Delhi/two-kids-die-of-suffocation-in-alocked-car/article7636503.ece>.
- Quadri and Jose, 2013. Computational Analysis of Thermal Distribution Within Passenger Car Cabin. *International Journal on Theoretical and Applied Research in M0echanical Engineering IJTARME)* 2, 2319-3182
- http://gulfnews.com/news/uae/health/sleeping-in-the-cool-comfort-of-your-car-can-kill-you-1.1065303
- http://www.hindustantimes.com/delhi-news/two-minors-get-accidentally-locked-in-car-for-9-hours-in-outer-delhi-choke-to-death/story-ibGiM1MuzYs6znnPn7niHI.html
- http://www.hindustantimes.com/gurgaon/gurgaon-five-year-old-twin-sisters-suffocate-to-death-inside-locked-car/story-zhUphKsTH9Cainrn6aoBFL.html
- https://timesofindia.indiatimes.com/india/3-suffocate-to-death-inside-car/articleshow/223153.cms
- https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor/overview https://in.mathworks.com/help/thingspeak/?requestedDomain=www.mathworks.com
- https://ifttt.com/
- https://thingspeak.com/