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# Architecture Document for Capsule Reminder

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*Capsule reminder*

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## Document Revisions

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Date	Version	Description	Author

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**Important note:** The document is divided into two parts: **Part-A** and **Part-B**. Part-A shall be completed within 10 days of commencement and submitted to your Virtusa mentors. Part-B shall be completed and submitted at the end of the Jatayu initiative along with your solution. Part-A at first submission can be in draft. Early submission of Part-A can ensure that the mentors can determine if your team are on track and should there needs be course correction.

### **Template User Notes:**

*Help Info is provided (in blue italics) to describe what each section should contain. Sample Text is provided (in green) in some sections to assist the author in standard wording for common documentation. Macro Buttons (in blue bold italics) must be replaced to match the project, e.g. <Project Name>.*

*Note: Help Info and Sample Text are included to provide guidance to the author and should be deleted before publishing the document.*

## 1 Introduction – PART-A

### 1.1 Purpose

This document provides a comprehensive architectural overview of the [capsule reminder](#) system, using a number of different architectural views to depict different aspects of the system. It is intended to capture and convey the significant architectural decisions, which have been made on the system.

The Purpose of capsule reminder is to help elderly people in medication by giving a reminder through phone call and Beep sound. It helps you to remember when to take your medicine and manage pill usage. Capsule reminder is used to alert the people to take prescribed medicine by user. This helps the people who are unable to take capsules on time. Capsule reminder can also detect when it is opened, and therefore when the user is away during the time they were supposed to take their medication, they will be reminded of it when they return. This reminder can be in the form of a light, which also helps for deaf or hearing-impaired users. For each medication, you input how often you take it, and when you'd like to be reminded to take it. For example, you could type in that you take capsule for every two hours. An app can send an alert to remind you to take capsule after two hours.

### 1.2 Scope

Capsule reminder is connected health device which serves people 24×7. The main use of this is to guide people by using NodeMCUesp8266 through Wi-Fi calling. It is a stress free reminder system to take tablets in time. It is easy to store medicines. It gives alert messages which help to take medicines in time.

When our phone is far away from us or when it is not working or in silent mode, we have a timer in the device which alerts the patient with a buzzer. When Patient is unable to listen the buzzer then the person can see the notification in their phones and take the medicine.

It can't applicable to temporary medicine takers. It helps out people who had diseases which require daily based medication. For example if we consider diabetic patient then he needs to take prescribed medicine on daily basis. In some situations user may be busy with households or regular routines and he/she forgets to take pills. In these types of situations capsule reminder helps to remind the patient.

### 1.3 Definitions, Acronyms and Abbreviations

**NODE MCU – Node MCU** is a low-cost open source platform based on ESP8266 which can connect objects and let data transfer using the Wi-Fi protocol.

**IR SENSOR** - An **infrared (IR) sensor** is an electronic device that measures and detects **infrared** radiation in its surrounding environment.

**BUZZER** - A **buzzer** or beeper is an audio signaling device.

**Arduino IDE - Arduino** is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

### 1.4 References

- [https://en.wikipedia.org/wiki/Pill\\_reminder](https://en.wikipedia.org/wiki/Pill_reminder)
- <https://www.gp-medical.com.au/product/smart-pill-box-black/>
- <https://www.solutionanalysts.com/blog/technology-trends-to-impact-on-healthcare-appdevelopment-in-2018/>
- <https://images.app.goo.gl/Ygcb4gDC6qcEVxdF7>
- <https://www.arduino.cc/en/Guide/>

#### Video references :

[https://youtube.com/playlist?list=PLfPtpZzK2Z\\_Qy2ZbbzvWa58cKKOisMUZ1](https://youtube.com/playlist?list=PLfPtpZzK2Z_Qy2ZbbzvWa58cKKOisMUZ1)

#### Textbook references:

<https://www.handsonembedded.com/wp-content/uploads/2018/11/Hands-OnESP8266-Mastering-Basic-Peripherals.pdf>

## 2. Architectural Goals and Constraints - – PART-B

### 2.1 Reusability

We can reset the timer with prescribed time given for that medicine and reuse the pillbox. It can be used multiple times until dosage of medicine completes for that particular problem. The product can be used for long time. There are no constraints to reuse the product multiple times.

### 2.2 Scalability

To implement the capsule reminder we use the IOT technology. As the IOT technology is easy to implement we can produce large amount of units within less span of time. It is too simply we can bury the code in printed circuit board. Connections can be made simply as the connections are simple to attach with PCB. PCB just included with the WIFI calling and some port openings at regular intervals. IOT devices are cheaper, so cost of made also lesser. Finally these devices can be made in bulk and each unit can have the low cost.

### 2.3 Customizability

**Cost efficient:**

Our product cost is affordable compare to other product available in market.

**User friendly:**

User can set timer of medicine by himself.

**Highly reliable:**

Good in quality and performance; able to be trusted for patients & old age people.

**Provide comfort and health:**

Comfortable for old age people and provide healthy life for patients who are regularly take medicines.

**Accurate result:**

Alarm will ring at proper time which is set by user previously.

### 2.4 Extendibility

As it is a basic prototype of reminder, we can add some features that would increase the comfort nature to user. This project uses **ESP8266** technology we can add some ports at our requirement. Code can be altered at any time at our convenience there would be no complex. **IFTTT** is used to make a calling to the mobile through WIFI. Adding features like sensing pill count would also done. Even some IOT health devices can be added to it as of the usage. We can conclude this section saying the updating at any step would be no complex.

### ***2.5 Use of Existing Business Logic***

Some simple functions are used to develop the system. Mainly we used timer, WIFI calling, is based sensing. Now a days creation of timer can be simpler once we familiar with the app develop interface. Combining the timer with other functions made the project to satisfies the use case "**Connected Health**". This idea uses the very common popular ideas but the combination of them would made complex.

### ***2.6 Time to Market***

The goal of our project is to provide healthy and tension free life to those users who are taking regularly pills and to provide this product at affordable cost also. If the patient tries to postpone the time of taking medicine by suddenly opening and closing the medicine boxes to stop the sound. Compare to other devices available in market are capable to generate sound at one time and afterwards it stops. Thus, final result of our system provides fast curing of patient health by using our advantageous system. Our product is so useful that it can cure those patients illness and there will no need of taking care of these types of patients so caregiver has no tension about their health.

### ***2.7 Portability***

Since there is no battery, the product will be less weight, so it is easy to carry anywhere. It can be easily used and carried in travelling also due to its small size. They can carry them to their workplaces also. It is user-friendly.



## 2.8 Availability

If data is not secure and easily available, information security is affected we used certain API keys that are highly protected.

Code not only covers the all necessary functions of the system, but also eliminates the possibility of a false alarm.

Developing the software can be done in any environment i.e., we had many availabilities of resources. For example, we can develop application using the MIT app inventor or blynk app; we can develop source code using Arduino studio or c++.

Components used are basic and can be available everywhere.

Developing in scalable amount can also lead to distribute them in bulk.

Most People are suffering with some sort of illness it used as home need things.

## 3 Productization Assessment – PART-Bs

### 3.1 Re-Usable Components:

Most components are used commonly in many devices and their manufacturing process would become simpler. So, they can be modified in easy way. pill boxes are the availability of the automated alert system.

It was made up of basic IOT devices that can be used in many applications. If one of devices tends to the fault, then remaining devices can be unaffected such devices can be used again.

As the architecture designed is in such a way that each component codependent on each other so code can be divided, so that each module as their own function. Each module can draw and used at individual blocks, such blocks would be tested and corrections can be done to get an efficient output. Reminder system present in the project also used in any application where we required alert. And the IR sensing and Wi-Fi calling would play crucial role automation of several things, for example if we want receive an alert from device if IR value changes then it would make a call or SMS.

Main applications of this are

- Home, Hospitals, Offices and Travelling
- Promoting Gift for Medical Store, Hospitals, Superstores etc.

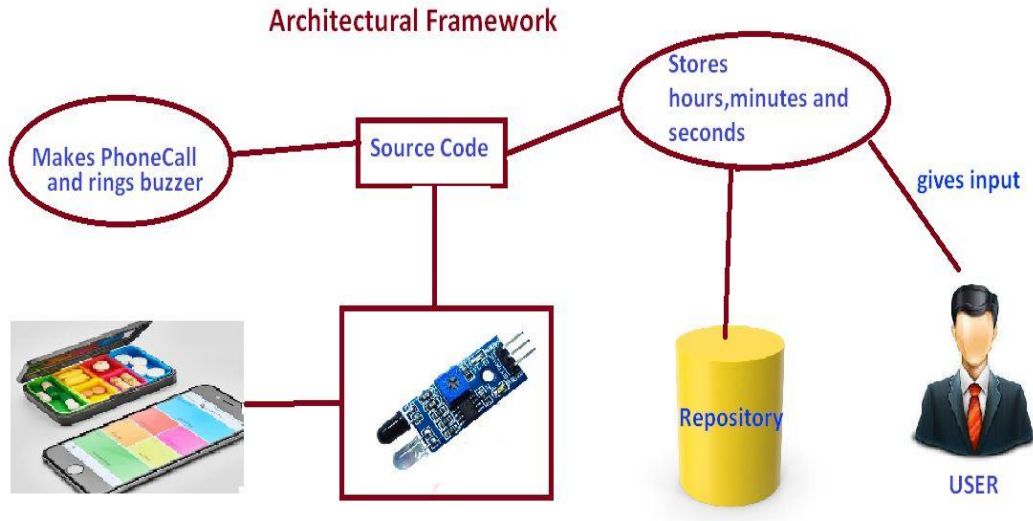
### 3.2 Analyze Architectural Frameworks in Repository

After timer set up, then timer ticks down and after decreases and tends to zero then it would send an signal through the HTTP port 80 and it will be directed server that was made using IFTTT namely using the application webhooks.

Then after it gives a phone call to our android. As timer ticks down to zero then our code opens the ports to the buzzer, LCD display and IR sensor. IR sensor and buzzer are related in such a way that if IR sensor is change its position then on

It would make stops the buzzer. We use the principle and if the lid box is opened then indication can be done IR sensor. Display sensor shows the content that would help to the user. Major, we concentrate to alert the patient, it is a general tendency that

Most of people give priority to phone call. Our ideation mainly uses this principle so this would become the advantage to take medicine effectively.



### 3.3 Identify and Analyze Open Source and COTS Products

#### OPEN SOURCE:

The term open source refers to something people can modify and share because its design is publicly accessible.

The open sources used in Project are:

#### 1.Arduino:

Arduino Software is an open-source software which makes it simple to write code easily. Pushing Code: Connecting to the board should be relatively straightforward via a USB Cable. The code needs to provide only two routines:

**1.setup()** :This routine runs only once when the board first boots.

**2.loop()**: This routine runs repeatedly in a loop while the arduino is switched on.

**2.IFTTT :**

*The IFTTT* It is great open-source software that is highly modular, flexible, testable, secure, well documented, and well written.

IFTTT derives its name from the programming conditional statement “if this, then that.”

It provides a software platform that connects apps, devices and services from different developers in order to trigger one or more automations involving those apps, devices and services.

**COTS:**

Commercial off-the-shelf or commercially available off-the-shelf (COTS) are the products that are ready-made hardware or software that already exists and are available for purchase by the general public.

COTS are the independent and replaceable part of system the fulfills a function

A advantage of using COTS is that the time needed to purchase this software or hardware is much shorter than the time it takes to develop it

we use IFTTT as COTS product it is an app which support automations.

In Project IFTTT involves in making a WIFI-Phone Call when it is time to take medicine.

**4 System Architecture – PART-A/B**

*This section describes the software architecture of the current system, and how it is represented. Out of the Logical, Use Case, Implementation, Process and Deployment views, it enumerates the views that are necessary, and for each view, explains the types of model elements it contains.*

<b>Models</b>	<b><i>UML diagram tool.</i></b>
<b>Diagrams</b>	<b><i>.uml format</i></b>

#### 4.1 Overview – PART-A

The application is comprised of several key architectural components that are independent functions related only via the defined interfaces.

Some people overlook to take care of health. It is designed to assist the patient who forgets to take medicine. The proposed system consists of an IOT enabled device and an android application. It mainly focuses on dementia patient. But it is beneficial for all. Patients will no longer have to worry about daily medication. The application will send a notification when it's time to take medicine. The mobile application is used for keeping the record in medicine details and reminding the schedule of medicine.

We have used the IOT enabled Arduino device for monitoring the whole system. The device can sense whether a patient has taken medicine or not with the help of the infrared (IR) sensor. We have tried to develop a system which will help patients to manage their health care properly.

#### 4.2 Logical/Functional View – PART-A

*This sub-section describes the system architecture at a high-level. The aim is to provide a logical architecture diagram to document the:*

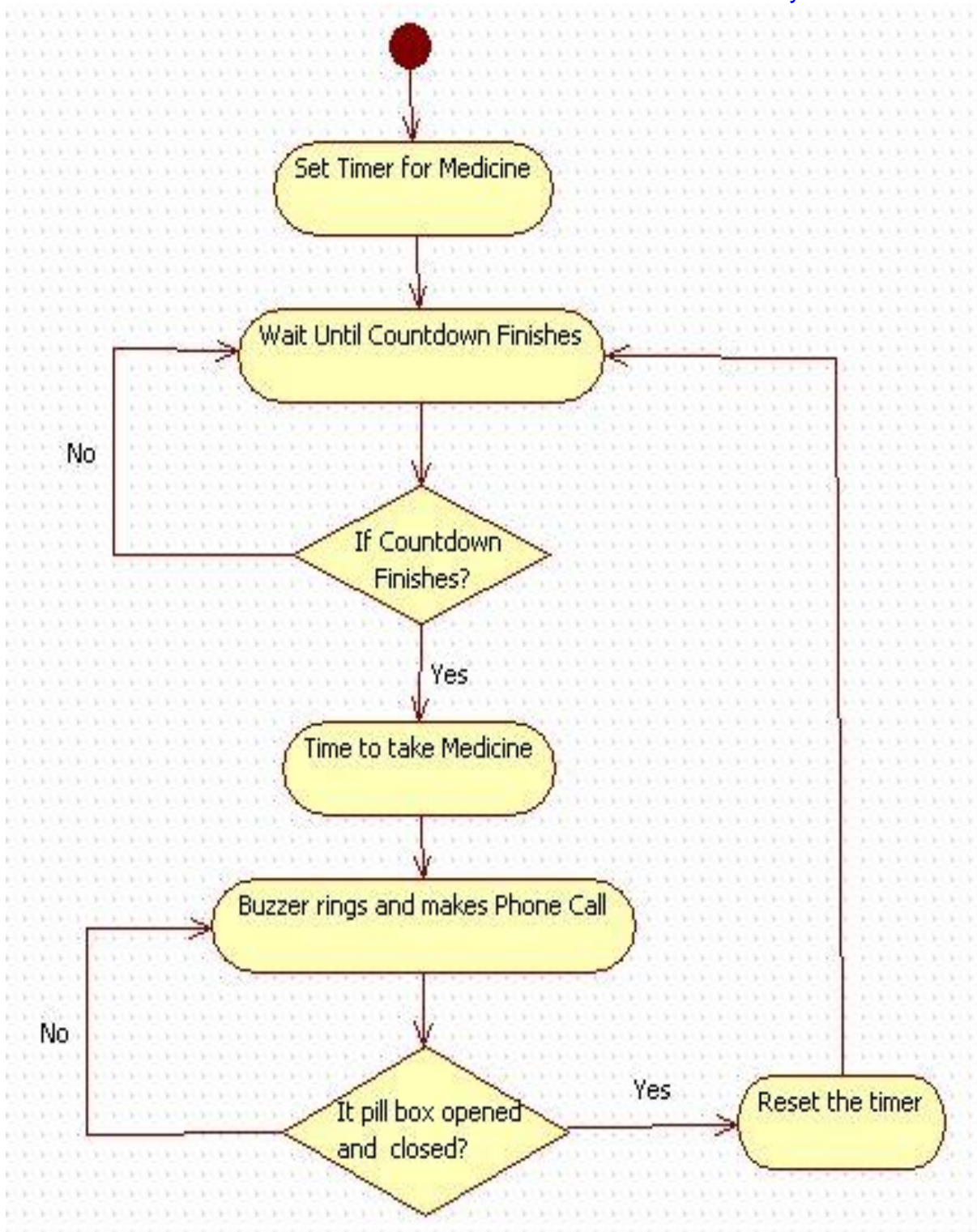
*4.2.1 Logical components of the layers and partitions of the application*

*4.2.2 Logical relationships between them*

The application is comprised of several key architectural components that are independent functions related only via the defined interfaces.

#### Description :-

- We use serial monitor to give the input and read from it.
- We can view the all the information on serial monitor like WIFI connected or not.
- We set the timer through the input of serial monitor then on it takes timer in HH.MM.SS.
- Capsule box remains in passive until the timer ticks to zero.
- After timer completes, a beep sound will be produced by the buzzer which is present in the capsule and a phone call will be made to the mobile.



### 4.3 Use Case View – PART-A

Use case diagram is created to visualize the interaction of our system with the outside world.

The components of use case diagram are:

**Use Case:** Scenarios of the system

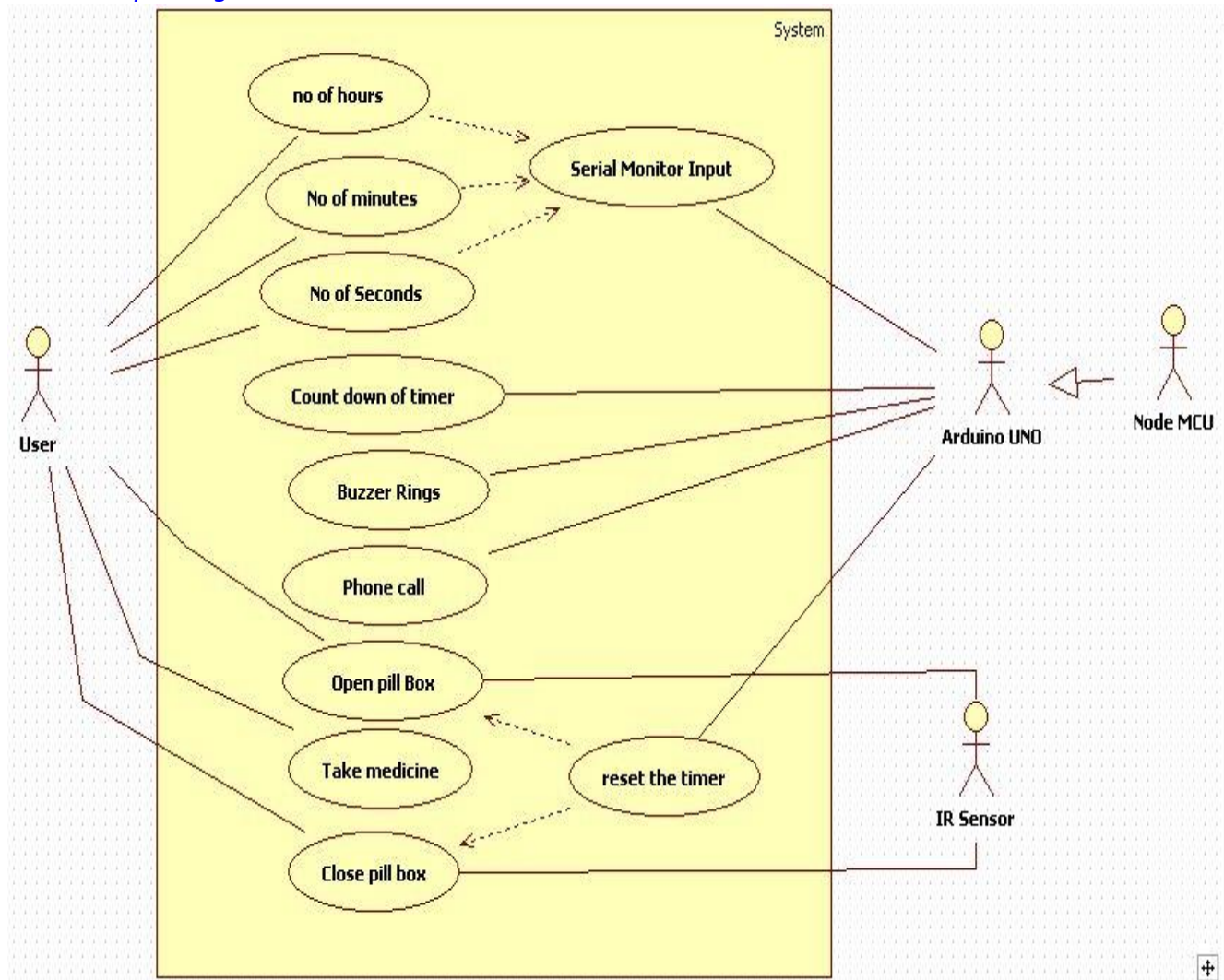
**Actor:** Someone or something who is interacting with the system

**Relationship:** Semantic link between use case and actor.

The forms of relationship are:

- 1) Association
- 2) Dependency
- 3) Generalization

*Example diagram:*





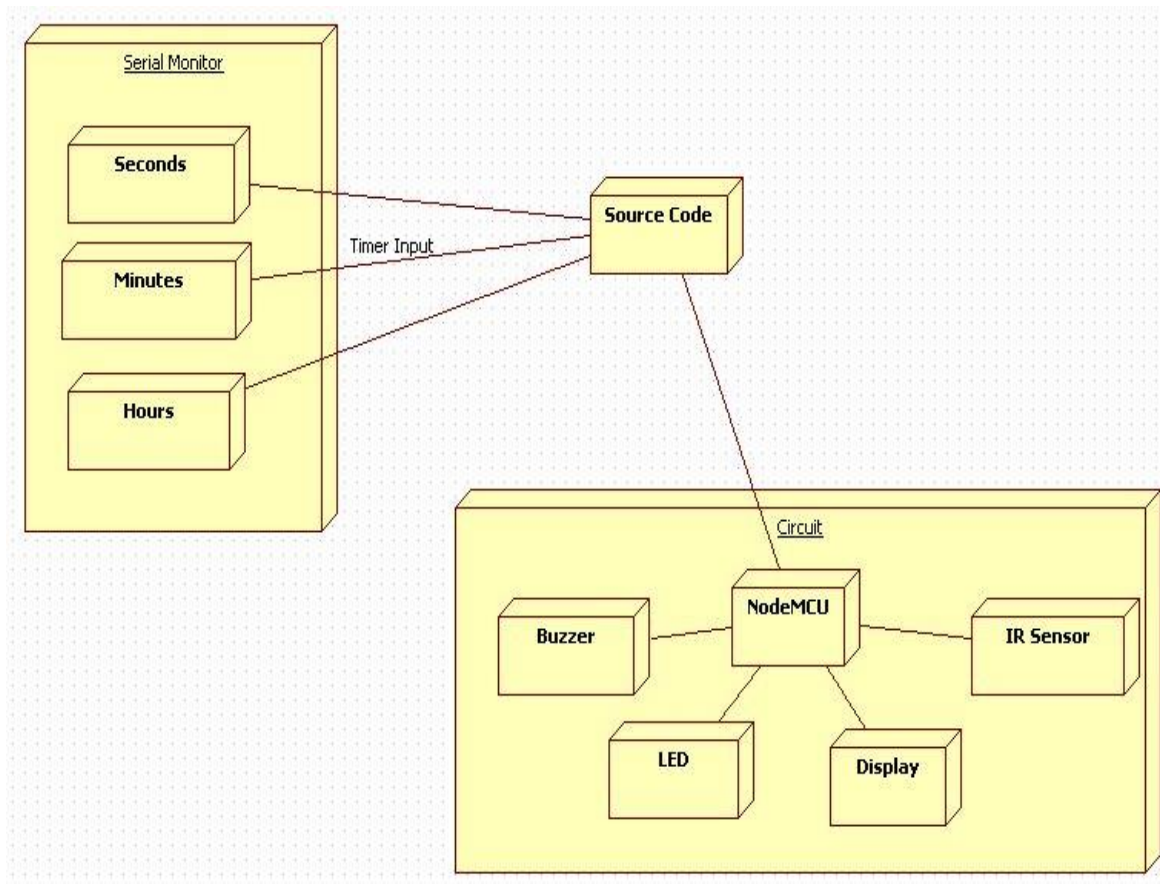
#### 4.4 Deployment View – PART-B

Deployment diagrams are used to visualize the topology of the physical components of a system where the software components are deployed

A Deployment Diagram shows the configuration of run-time processing nodes and the components that live on them.

Deployment diagrams address the static deployment view of architecture. They are related component diagrams in that a node typically encloses one or more components.

##### DIAGRAM:



## 5 Alternative Solutions Considered – PART-B

Even without using the phone call mechanism we can use just timer which can be done using the app developed. Without displaying the timer in the display board we can use the app interface that would show the timer. Here we used all the control over the Arduino code based, even by using web development frontend and backend we can use the timer concept.

Android development tool also used to develop the interface with code. To show this in simple we can use BLYNK interface and MIT app inventor interface. Even we can use mobile to display the timer in mobile phone and alarm ring through the phone by the app itself.

Many ways are there to make the phone call one we select is IFTTT





