

Emergency Care in Ambulance Transit using IOT

Submitted By,

Namdev Nayak
Manovikas D M
Sushmitha C S

Table of Contents

Table of Contents.....	2
1. Introduction.....	4
2. Overview.....	5
2.1 Problem Description.....	5
2.2 IOT.....	5
4. Solutions.....	8
5. Conclusion.....	9
6. References.....	10

List Of Figures

Fig.1: Overall functionality represented in block diagram.....	7
Fig.2: Modular representation.....	8
Fig.3: ECG/EKG machine.....	8

List Of Tables

Table.1: Patient information field in Database.....	9
Table.2: Hospital database list.....	9

Acronyms

IOT	Internet Of Things
ECG/ EKG	Electrocardiogram
BP	Blood Pressure
UIId	Unique Identifier
SCA	Sudden cardiac arrest

1. Introduction

Ambulance contains many types of equipment such as ECG, BP monitoring kit, Pulse Oximeter, Thermometer and so on. ECG (Electrocardiogram) machine is a device which acquires electrical signals of the heart, convert it to ECG readings using an algorithm and displays it in the form of a graph.

Cardiac arrest is a sudden loss of blood flow resulting from the failure of the heart to effectively pump. Symptoms include loss of consciousness and abnormal or absent breathing. Some individuals may experience chest pain, shortness of breath, or nausea before cardiac arrest. If not treated within minutes, it typically leads to death. Certain mandatory tests need to be done for the heart patients before the surgery. Sometimes, patient in his critical situation cannot be taken to the hospital and hence there are chances that the patient might experience a fatal death.

A product is replaced which is capable of reading the vital signs and converted into an analysis report. The calculated values are published into the web application, where a doctor can be monitored remotely. He will keep a track of patient's vital signs and simultaneously prepare for the future tests and diagnosis or surgery too. So, once the patient reaches the hospital, immediate treatments can be started. Every patient having heart issues has to go through a treadmill test continuously for a week. So, in this situation, there are cases where the patient might be diagnosed by an intern or a doctor who is not that expert in Cardiography. So, the hospitals can use this module to obtain the ECG readings and send them to the Cardiologist. They can monitor the patient's status and suggest what has to be done further.

2. Overview

2.1 Problem Description

As we all know that health care with remote medication technology is taking a digital transformation day by day. Ambulances are speeding up their vehicles for the emergency patients to reach the hospital in time. Due to traffic jam delays it is very difficult for the ambulance to reach the destination hospital in time.

Cardiac patients who are having critical issues have to be treated intermediately because every second of their life in that stage is important. So in order to reduce the time for treatment to be done once the patient reaches the hospital, we have come up with an idea where doctor can remotely monitor the patient's health status when the patient is on board and the doctor can work on the treatment that has to be given to the patient in order to take him out from the critical situation and save his/her life and even help the ambulance to avoid traffic jams and reach the destination hospital as soon as possible.

2.2 IOT

The internet of things, or IoT, is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

3. Solution

When the patient enters the ambulance, assistant in the ambulance will have a tablet or a dashboard where in he/she will enter the patient basic details and the hospital name(refer to table.1). Initially the ambulance has to traverse on the route, the assistant has entered.

Web dashboard will consist of different set of data like patients database, hospital database, doctors database and will be integrated with Google maps. In Patients database, Once the assistant in the ambulance has given the input of the patient a field will be created dynamically.

Ambulance driver will have an android application which will show the route of the destination hospital. Once he clicks on start button, Cloud computation and the predictive analysis will be automatically carried out to detect the nearby hospital. Once the near by hospital is detected by the server, It will be reflected in the ambulance drivers mobile application and a pop up message will be sent to the detected hospital dashboard. The whole set of patients data will be transferred to the detected hospitals dashboard with time of arrival of the ambulance.

Ex. There are three hospitals, H1, H2, H3.

Their dashboard will have the web address:

H1.dashboard.com

H2.dashboard.com

H3.dashboard.com

If the initial hospital selected by the assistant was H1 then the patients health data will be sent to H1.dashboard.com. After the predictive analysis once the nearby hospital is detected i.e) H2. Same set of data will be transferred to H2.dashboard.com

Based on the movement of the ambulance consecutive two traffic poles of the route will be turned into green light for the quick movement of the ambulance to reach the destination.

It is a known fact that ambulances will have many health equipments such as ECG/EKG(Fig.3), glucometer, sphygmomanometer, oxygen and airway devices and etc. Idea is pretty simple, there will be an IoT gateway to extract the digital values from these surgical equipment's. Push those digital data to cloud or web dashboard using IoT gateway.

When the patient is on board Doctor can monitor the patients health status continuously and if he observes any fluctuated readings in the dashboard then the doctor can ask his/her assistant to set up all the equipment's ready. So, Once the ambulance reaches the hospital, he/she can be started with immediate treatment without any delays.

Overall functionality is represented in the form of block diagram (Fig.1).

Modular representation is explained in *Fig.2*.

This system will help in taking a digital transformation in the areas of smart city and smart ambulances.

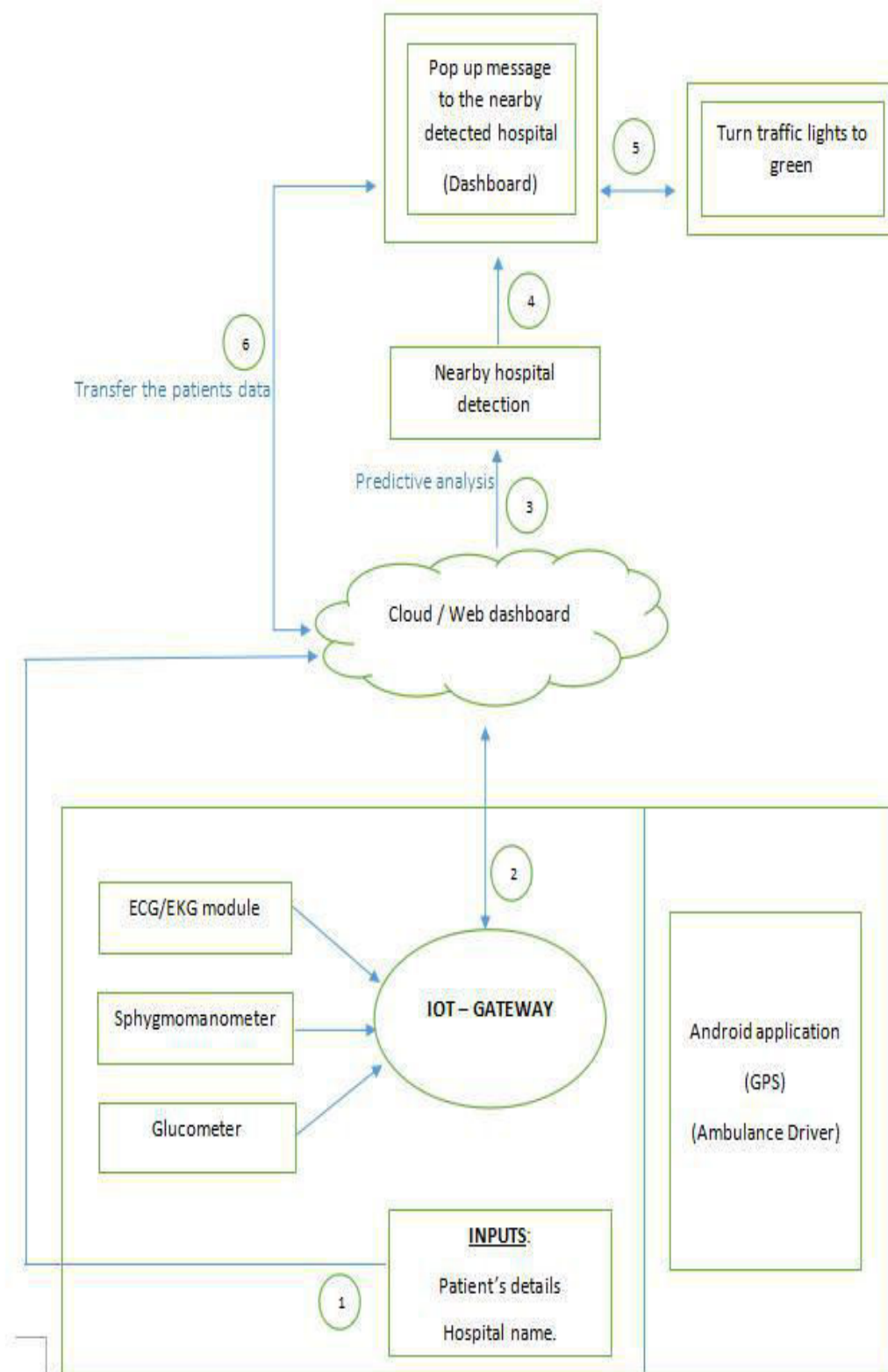


Fig.1: Overall functionality represented in block diagram

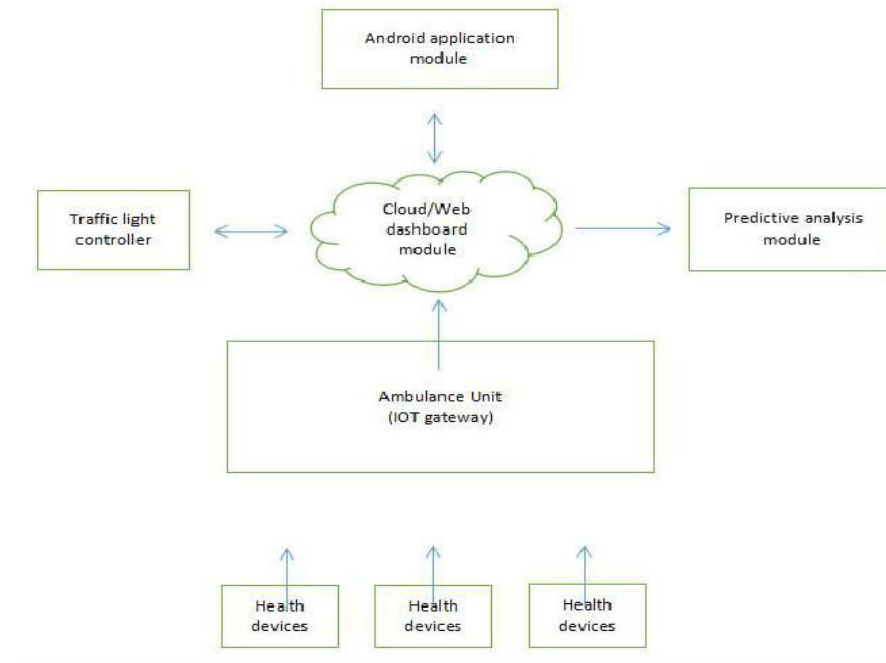


Fig.2: Modular representation



Fig.3: ECG/EKG machine

Patient	Age	Problem	Hospital	Vehicle
ABC	22	Accident	KMC	NNN
DEF	45	Cardiac arrest	appolo	QQQ
VVV	12	Low BP	KMC	CCC
KHD	56	Cardiac arrest	AJ	AAA
	-	-	-	-

Table.1: Patient information field in Database

Hospital	Web-address	Map(Lon,Lat)
H1	H1.dashboard.com	2.3545,12.354e
H2	H2.dashboard.com	12.3654,52.252 N

Table.2: Hospital database list

4. Conclusion

Life is the aspect of existence that processes, acts, reacts, evaluates, and evolves through growth. But, Sudden cardiac arrest occurs when the heart suddenly stops beating, which stops oxygen-rich blood from reaching the brain and other organs. It is the largest cause of natural death. A person can die from SCA in minutes if it is not treated right away. This paper presents a solution to the above problem statement in order to save the patients life when in critical emergency.

5. References

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