# Android Medical Health Unit (A-mhu) Structure

Sana Rizwan, Dr. Rizwan Rabbani Baig

**Abstract**— In the contemporary issues people need basic health facilities with immediate approach and retort, to accomplish these facilities on their door step; we are introducing electronic mobile health units for remote areas. Keeping in view the existing medical facilities are not able to cater the needs of all users swiftly we are just putting in our effort to improve time and optimize the performance of Mobile Health Unit. System will providing bridge connectivity between patient and alerting associated Ambulances or Mobile Health Unit about an accident or a patient who needs medical attention. MHU will provide various distinct facilities as features in versatile ways. All users who install MHU application will be able to contact Mobile Health Unit headquarters and report an emergency through application. Software working shall embed the following functionalities in it; the location of Mobile Health Unit shall be constantly monitored, record of Mobile Health Unit being dispatched to designated spot shall be maintained, if a hospital is not able to cater to the medical needs of the patient then the patient will be navigated accordingly to the nearest hospital location by checking in advance, the availability of doctors and simultaneously the hospital will be alerted of the patient's arrival with the respective departments alerted too. Moreover, MHU delivering medicine to doctors and registered patients in case of non-availability of medicines as well. The medicines will be provided from the nearest source by providing the Social Security Number history or doctor's prescription. After being assigned a Social Security Number the user will be able to avail the benefits of centralized system by tracking the activities performed with Mobile Health Unit and some other. Mobile Health Unit will facilitate by providing with alternative/shortest routes to reach a point of concern as early as possible. Apart from this, GPS Facility will help us in getting the coordinates of the patients and Google map API will help us to locate the coordinates on map both these facilities will embeddin this project.

**Index Terms**—GPS, Social Security, Optimization, GPRS, Health units, Heterogenous

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## 1 INTRODUCTION

System is required for the facilitation of those helpless people having injury, needful at home due to some special circumstances. Ballpark consensus has been taken with the fact that16 percent of injuries account for global burden of diseases, significantly it is amongst the leading reasons for mortality and morbidity globally, countries with middle and low income are greatly affected by this issue [1], [2]. It is a known fact that Pakistan is a developing country and has significantly low resources to provide medical facilities to its people. Many NGOs independently and with the collaboration of government have taken initiative for providing medical assistance to people in need but the project under discussion is to transform the ambulances in a way that significantly optimizes the response time of ambulances and will equip them to effectively cater multiple domains during rescue.

Majority of Ambulances in Pakistan usually act more like a transport vehicle where the ambulance is manned only by a driver who can only transport the patient to hospital, such ambulances can be usually found standing out of hospitals and drivers and relatives of patients arguing about the fare as if they are taxis, sometimes these ambulances respond to an accident by themselves upon hearing about an accident in hope of exploiting situation and to mint money [3]. It's very rarely encountered that ambulances have proper trained paramedics although this

trend is coming to big cities of Pakistan (in shape of rescue 1122[4], The Edhi Foundation, Aman Foundation [5] and etc.) but the rural areas and small cities are far away from such facilities. Even with the paramedics available in ambulances there is still a problem with these ambulances that they don't know the exact location of patients evacuation and then another problem is that they have no coordination between hospitals and doctors.

Software helps to embed some of the missing functionalities in ambulances electronically. Here the emphasis has been laid on addressing those issues whose presence can help ambulances to co-ordinate between hospitals, so necessary arrangements can be made prior to patient's arrivals. Idea for the project is e-MHU (Mobile Health Unit) with an aim to optimize the response time and transforming the ambulances by providing android powered tablets in ambulances with multiple functionalities which will be assisting them from patient evacuation to safely making the patient reach to the hospital. Provision of tablets will help MHU administrator to keep track of MHU's and display their location in control room via Google Maps. . The project will cater needs of multiple user domains including doctors, hospital staff, MHU administrator, MHU staff, and patients. MHU will be continuously tracked; the tracking system is a commonly used method nowadays where the coordinates of device can be acquired by the device's GPS or any third-

party application. All the MHU's shall be located and pinpointed on map after every five minutes and will be provided alternative/shortest routes for the MHU to reach point of concern timely.

To use this application the user needs to install the application in their android phone and register them for an account with a valid Computerized National Identity Card number. Emergencies can be reported to MHU Headquarter through an SMS too using this application.

The distinguishing feature of this service from other pre-existing Ambulance service provider is co-ordination between hospitals and MHU operators Once the patient is evacuated in the MHU/ Ambulance after assessing the condition of the patient by paramedic it shall be ascertained by him to which hospital the patient should be taken and later on the paramedic shall coordinate with hospital checking the availability of doctor and required medical facilities to cater to patient needs if the selected hospital does not meets the required criteria next hospital on list shall be looked into. The role of MHU is not limited in only transporting patients but will also provide medicines. Registered users and hospitals will be able to able to request for the medicines. For the registered users an SSN will be provided which will distinguish all the users and will provide a facility for the users to request for medicines, after SSN matches from the hospital prescription number database the user shall be provided with medicine by MHU. For the Hospitals, once a hospital makes requests for medicine an emergency flag is raised, on urgent basis the medicine is sent to the hospital by the nearest MHU. If, unfortunately the MHU in the closest proximity does not have the required medicine in the inventory then the other MHU's in proximity are searched and if they have the required medicines they are directed to deliver the medicine to the hospital. Centralized system has been established for registered users with which they are able to see all their records. The record contains history of used services, appointments with doctors, Record of hospital stay (Date of admission, date of discharge), records of medicines, requested medicines, etc.
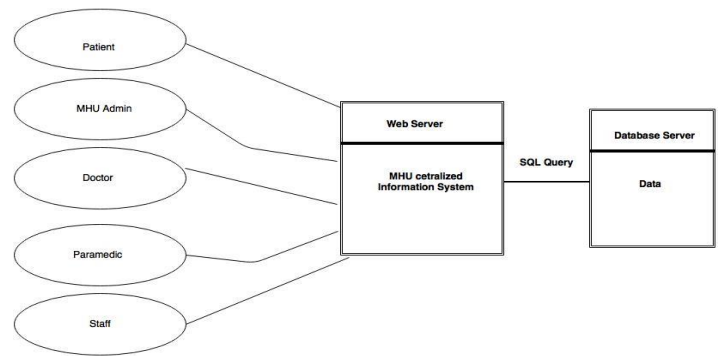


**Figure 1:** Structural System Architecture

## REVIEW OF LITERATURE

Different literatures on medical health facilities being provided to patients, vehicle tracking and monitoring system and use of this system in vehicles have been studied that fall under this projects category.

On global scale the contribution of 16 percent injuries adds up to the worldwide diseases burden [1]. It has been proved through evidence that the deaths and disabilities can be prevented with a timely medical attention provided to the patient simply by raising the standards of emergency medical services and embedding latest technologies. The EMS have long been neglected in most of the developing countries this list includes Pakistan too [6], [7].

| Problems faced in Health Care | % respond |
|---|---|
| Lack of transportation/ Ambulance Services | 45 % |
| Lack of coordination of Services | 6% |
| Lack of Resources/ Financial Problems | 12% |
| Basic need Avoided | 12% |

**TABLE # 2:** Problems faced by patients

Ambulance Services in Pakistan generally lack the facility of providing on spot medical assistance to the patients and the other dilemma is that not all the patients have access to the ambulance. There are multiple reasons that attributes to such a low percentage use of ambulance this includes that patient can visit the hospital by himself, the ambulance service is slow, lack of knowledge to find an ambulance and economic factor too i.e. high cost, lack of communication medium. General perception of people regarding ambulance is a general transport vehicle without all basic needs of ambulance but having a siren to move from rushing areas. Not many EMS are available in Pakistan due to high costs of implementation and running but fortunately Rescue 1122 has been able to deploy the system at low costs. Unfortunately, there is a lack of medical infrastructure in Pakistan even during bomb blasts and other major accidents a lack of a proper centralized system to

cater such mishaps is unavailable and the patients are taken and brought in to the nearby hospital in an unorderly manner without maintaining any record. **[8]**

By studying different research papers, the working of vehicle tracking system with the technological revolution now the use of mobile phone has not been just limited to receive and make calls but the use of mobiles has entered into a new domain, numerous services are being provided by cellular service providers in an attempt to highlight some of such services we are proposing the use of GPS in vehicle tracking and assisting the vehicles to find the shortest routes. with an increase in people buying vehicles the thefts of cars has also increased with this people can't stop buying cars and people who owns large fleets of transport want to keep track of their vehicles and secure their vehicles, the technology has answered to their worries in the shape of vehicle tracking and monitoring system allowing the user to monitor and track their vehicle anywhere anytime [9]. In all such system the use of GSM and GPS is there for tracking and monitoring.

The system functions in a way that after a message will sent by GPS satellite receive by terminal of GPS in Vehicle the coordinates are computed and converted into a message by using GSM controller these instructions are now sent to the monitoring centre using the GSM network. The researchers in Australia have installed the trackers in the ambulances In Queensland. More than 1000 ambulances have got tracking devices with an on-line linkage. The Software will known as Real time Operational Ambulance Management software or IROAM. The tracking information will be available for public with certain exceptions. In order to facilitate the users about ambulance status with the help of interactive map the movement of the ambulance will seen in real time. [10]

Generally, Pakistani's Hospitals have traditional record keeping methods for patient registration but eventually the hospitals are now adopting the electric record keeping methods. The health record of patients is either maintained by the patient himself in files, finding records and linking it with other records is quite cumbersome for hospital staff. Some hospitals worth mentioning here includes Shaukat Khanum, Aga Khan started using health information System and switched from conventional methods of record keeping to digitalization [11]. Shaukat Khanum also has an android app for their patient to track their test results [12]

In Pakistan we don't have a proper centralized on-line system for doctors where people can take appointments with doctors.

A recent initiative was taken by two students of LUMS (Lahore University of Management Sciences) making a bridge between dentist and patients They made "healthwire.pk" it is an online website where dentist and patients can connect with each other. Here the patients can find a dentist, doctors profile can be viewed which gives complete details about the doctor that includes location of clinic, education, professional expertise and the fee he charges and then book an appointment with the doctor and can also give a review of the doctor which will helpful for other patients the signing up process has been kept very simple [13].

Government and non government organizations are putting in efforts to eliminate the gap in health care facilities for all but the gap is very big. Even with advancement in technology we still lack behind to automate our processes and to increase efficiency. Ambulance's lack many things which if integrated in to them there will be high chances of saving patients life, the ambulance driver should be helped when on road to direct them to the point of evacuation and similarly they should be guided to hospital, And the paramedics in the ambulance should be able to have a list of hospitals that deal with a specific type of patient and can provide him the best medical care. Then the hospital a patient is being transported could be informed prior to the patients arrival. And the paramedic after communicating with the hospital can make sure that the patient being transported can be properly facilitated if there are lack of medical facilities to cater the patients' needs the paramedic should be able to choose and inform the next hospital after having the similar resources check with the new selected hospital. This is amongst something our ambulances lack.

## STATEMENT OF THE PROBLEM

The project e-MHU is a relatively new idea being developed. There are some similar applications working but none of them are fulfilling those particular health care needs in Pakistan which are missing. Pakistan being a developing country is lacking in the health care facility using electronic methods as compared to other developed countries. The main purpose of this project will be to provide the facility of health using electronic mode which is not used in Pakistan. Different facilities includes: hospitals data integration, portals for users to provide a way of communication between them, delivery of medicines, information sharing etc. All these facilities are not provided under the same umbrella by any organization in Pakistan.

## OBJECTIVES

To analyze the medical services being provided to the users electronically and to those areas where gaps/vacuum exists and in the light of these deficiencies observed trying to fill such shortcomings with the help of technology for better results can be achieved for the users and health care services already existing.

1. To transform an Ambulance in to a Medical Health Unit
2. Optimizing the response time for Medical health unit to respond to any emergency call.
3. Enabling the administrator to track the location of different MHU's carrying patients or delivering medicines.
4. Facilitating users to take appointments from doctors and tracking their medical records on-line.
5. Allowing users to report any on spot emergency with the help of a simple text message using application just by pressing one button.
6. Creation of a connection between hospitals and MHU's allowing hospitals to make prior arrangements for the patients that are being evacuated/transported using an MHU.
7. Making it possible for hospitals and patients to demand medicines and letting nearest available MHU's to deliver it.
8. Providing individual portals to each user to easily get the required information.
9. Making the data of Hospitals and Doctors visible on the website to easily check their availability and contact them when required.
10. Continuously tracking the status and location of MHU's and redirecting them to the nearest emergency area.
11. Storing and maintaining the records of all the entities related to this project.
12. Providing ease to the patients and giving them the best health facilities using electronic method

## HYPOTHESIS

Need of a Healthcare application that does already not exist in Pakistan. To facilitate all those people who will be using the service and creating awareness for people to wards the health care facilities and making health care facilities easier and manageable.

➔ An estimated population of Pakistan is more than 180 million, with this amount of population and Pakistan being a developing countries brings allied problems of health which are attributed to multiple reason which includes natural or artificial to deal with such problems there is an absence of centralized health care system where user can be able to see their medical histories and it can be continually updated.

➔ There is a need of an application that can be able to deal with the deficiency or vacuum created in health care system and can solve them electronically an application needs to built that can perform multiple tasks which includes:

* Navigation system for the Ambulance drivers that can help the driver to navigate and reach to the area of concern.

* Centrally controlled collaboration between hospitals and ambulances allowing the paramedic to gauge the condition of patient being transported to hospital and analyzing the facilities being provided to be sufficiently able to deal with the patient's medical needs.

* An easier approach for the patients to be able to register for appointments with the doctors electronically and later rate the doctor to help others know about doctor's competency.

* Making users able to order there medicines online against their prescription number and making the medicines being delivered to their homes and letting users to avoid hassle of buying medicines from the pharmacy store.

* Centralized system where the users complete medical record is established and can be viewed electronically.

## PROPOSED RESULTS

If an application is made to answer the problem highlighted above, it will achieve user satisfaction. Such application will be vital to facilitate user and save their time and organize data. In case of an emergency the patient will be able to be transported to the most resource full hospital in the list quickly.

## RESEARCH METHODOLOGY

Scarcity of resources to empower all drivers with route information on the go, an idea to simply enable ambulance drivers with smart phones to access maps. Facilitating users of the application to see the available ambulances near them and providing ease to request one. Letting users of application to buy medicines using this android app. This facility can be availed by multiple users. Once a patient is being carried to the hospital by the ambulance there is no facility for the paramedic to get to know beforehand that the patient being carried to the hospital can cater to the patient needs or not. Are there sufficient resources available for the patient to be treated? This

application allows the paramedic to get all such relevant information beforehand. There are multiple sites for taking appointments with the doctor which is only restricted to their specific hospitals and another website (healthwire.pk) a local initiative lets the users to take appointment from only dentist. Here this app let's all the users to make an appointment with doctors who are registered with this application.
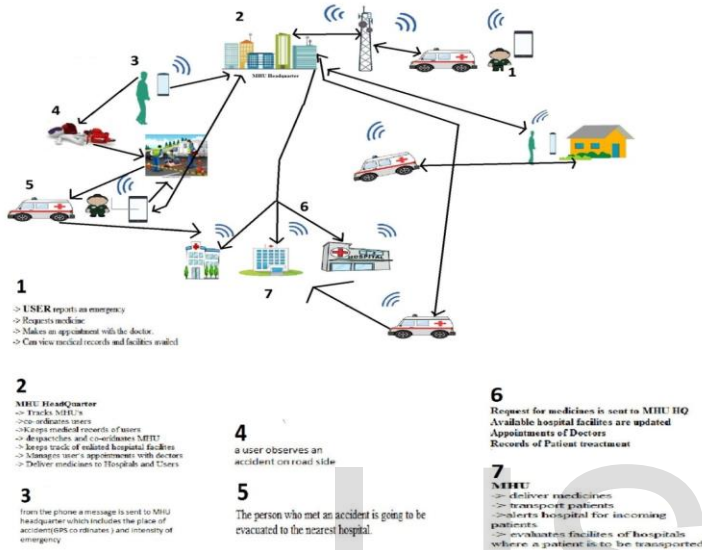


## RESULTS AND DISCUSSIONS
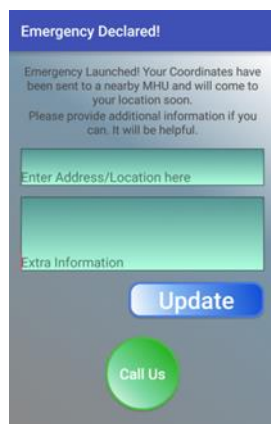


Emergency is declared. Users location, username and phone serial numbers are sent to server whether they are online or offline. GPS must be turned on for both cases.
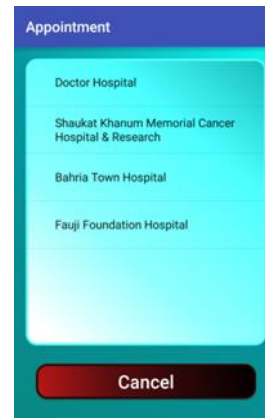


their Patient Console, should click on Appointment button. They will be shown a list of hospitals to choose from.

Step 1:
Choose Hospital
Step 2:
Choose Department
Step 3:
Choose Doctor/Specialist

Fill out form and then click submit. A request for appointment for the chosen day will be sent to the chosen doctor.
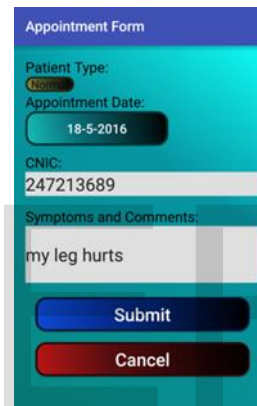


Ask a question from your assigned Doctor. Click on Doctor's Query button from the Patient console and then click on Ask Doctor. After that this form is open up. After inserting data into the fields, click the send button to send the query to the doctor.
Operator Console. It lists all emergencies.



As soon as an Ambulance is assigned an emergency, a map activity is shown which will navigate the Ambulance from its current position to the patient's location.

To make an appointment with a doctor, a user from
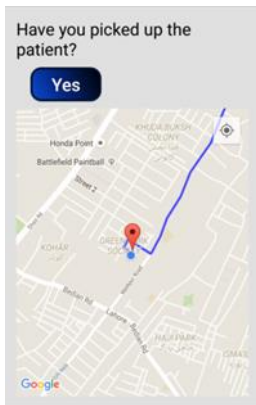
After reaching the patient and clicking on the yes button to acknowledge picking up a patient, the map will be updated to navigate the ambulance from its current location to the nearest available hospital.

## FINDINGS

Existing health care services in Pakistan have been evaluated and analyzed and their role were studied and a room for betterment for health care is argued upon

- There is an availability of online appointment system for dentist but not for other doctors by (healthwire.pk) and similarly some hospitals have developed their own appointment system but there is an absence of a centralized system where appointment of doctors at different hospitals could be taken.
- There are different websites to provide medicines online but un-availability of an android application and letting the users to maintain their inventory.

Interconnectivity amongst the different tasks should establish so the user can access all the services under the same application and all record their records are established under one application rather than switching to different forums/applications/websites. A centralized health care system holds a vital status and importance of such an application can't be denied so such an application should be pre installed for the users of a mobile phone. The Computerized National Identity Card Number should act as a distinguishing number for all the users and the users after getting CNIC number would be their Social Security Number (SSN) the user should be compelled to install such an application if their phone allows or else should keep their SSN and make sure to use them if needed in future.

## RECOMMENDATIONS/SUGGESTIONS

1. Implementation of the application in a small portion of area and basing on the results further enhancing the applications functionalities and removing bugs if any occurs,

2. Creating algorithms for making the application more efficient and the results turns out in a quicker manner and increasing the response time.

3. Creating awareness for the users about using this application and making users familiarize with the application by keeping in view enhancing the number of users and based on the feedback adding in more and more functionalities.

## CONCLUSION

Today's health services in rural areas of Pakistan are not sufficient as compare to urban areas. Due to the increase in cost of getting the health care facilities, it is out of the reach of people. IT is a tool of eliminating the gap between urban and rural people. It will be helping people of rural areas to get all the facilities that are available to people from urban people. Our project will be working as a bridge between patients and doctors. Data of hospitals will be collected and will be available to users to set an appointment with doctors of affiliated hospitals. Emergency patients from distant places will rescue to the nearest possible hospitals. Users will be able to order medicines online and track their medical history.

## LIMITATION

1. The application has not been tested in real time.

2. Presently not a large number people here are using Android based application services ,

3. Unavailability of data from ride hailing services could not let us have a clear picture of the user's interests towards such services

## SCOPE FOR FURTHER RESEARCH

The domain of the project will be expanded initially testing the project would be done with only three to four hospital and slowly and gradually more hospitals would be added in the domain. More doctors shall be added to the appointment system the patients would be able to benefit from more doctors and have ease while choosing the best doctor for their medical needs. Due to the prevailing security situation in Pakistan, off and on it happens that due to uncertainty during religious occasions our cellular services in the country usually goes down, our co-ordination be-

tween the MHU, and user's basis on the use of web for which we are using data sim's. Keeping in mind the challenge we could face our future plan is to use wireless system (walkie talkie) which will be purchased making us able to operate on a specified frequency, data services going down, won't hinder much of our services.

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