

BlueMedo: Automation in Hospital Management through Bluetooth

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Abstract- This technical report describes a Bluetooth based autonomous hospital management system which provides adequate features to the doctors, nurses and patients' parties as well to share information among them without meeting each other in person.

We have designed the proposed system named "BLUEMEDO" in order to reduce human effort for the hospital management by introducing automation through this wireless system. As the system is wireless so it is quite easy to install and maintain within the hospital. We can even use this system with moving objects such as ambulance, medical stretcher etc. due to the high mobility of wireless technology.

Nurse first collects the information of the patients' health conditions (e.g.:B.P, Pulse rate, age etc.) and then it sends the data to the server. When the ambulance equipped with the proposed system comes within the vicinity of the hospital Bluetooth server the information gets exchanged within the ambulance and hospital server. The server then receives the prior information about the patients' health condition and the emergency unit of the hospital can get ready on the basis of the information they receive from the ambulance.

Index Terms- Wireless networking, Bluetooth, Server-Client, Wireless networking protocol, python programming

I. MOTIVATION

The motto of our project is to save time and reduce the human effort with better communication between doctor, nurse, management and other hospital stuffs with patient's party. In emergency cases sometimes due to time consumption of filling-up the hospital admission form and arranging other medical equipment by hospital authority even after arriving in the causes

the patient's death. So we can save a lot of time by our "BLUEMEDO" as we are saving the general form fill-up in the ambulance along with the case details and patient's condition such as blood group, incident details, and other important details while the ambulance comes into vicinity of the hospital server via Bluetooth communication system.

So from admission to discharge of a patient this "BLUEMEDO" software do every task with less human effort and in less time but very accurately. And on other hand Bluetooth is a low frequency wireless communication medium which doesn't harm any medical accessories or human beings.

II. INTRODUCTION

PYTHON

Python is a widely used general-purpose, high-level programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than would be possible in languages such as C. The language provides constructs intended to enable clear programs on both a small and large scale.

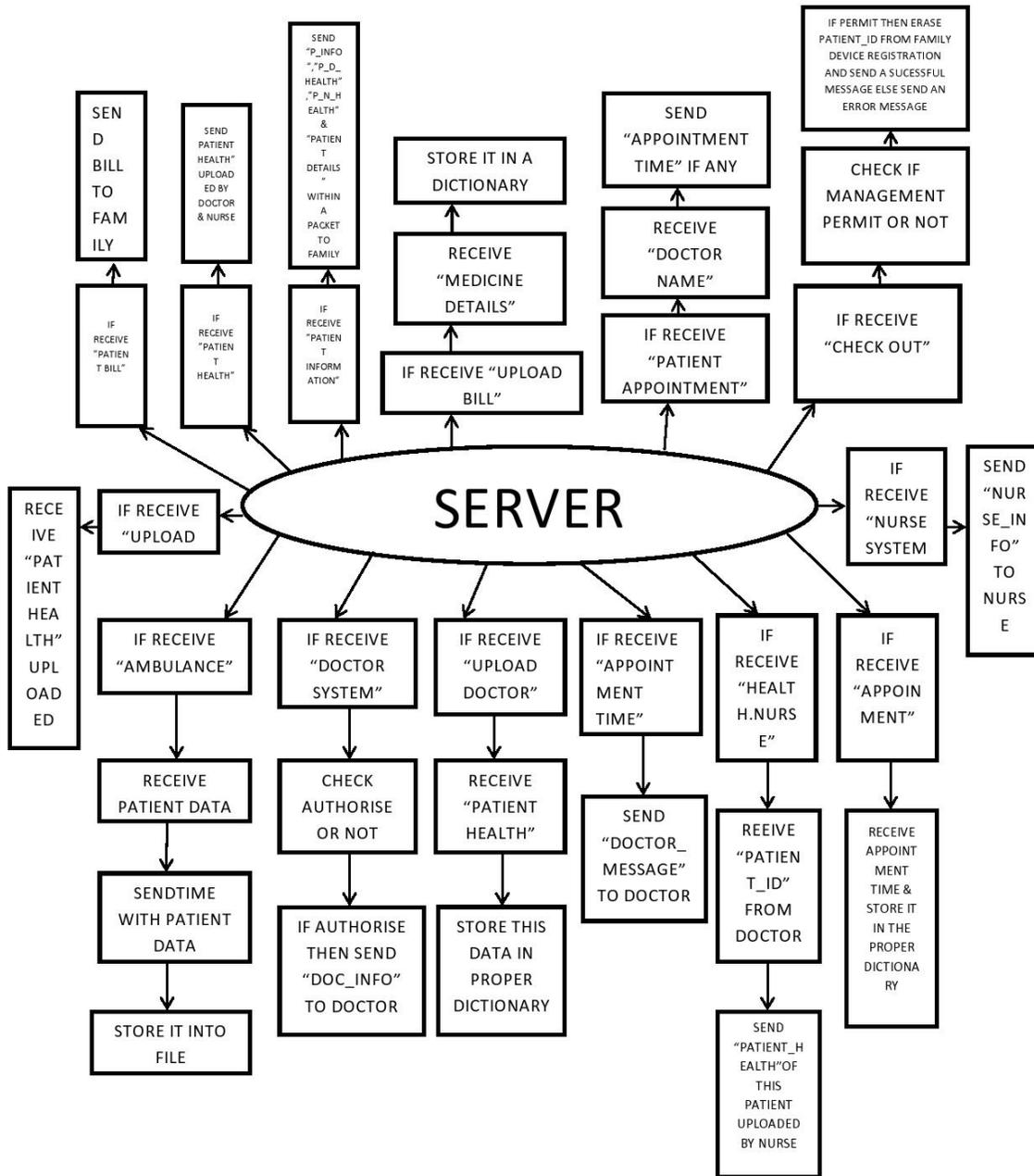
BLUETOOTH

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength microwave transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creating personal area networks (PANs). Created by telecom vendor Ericsson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

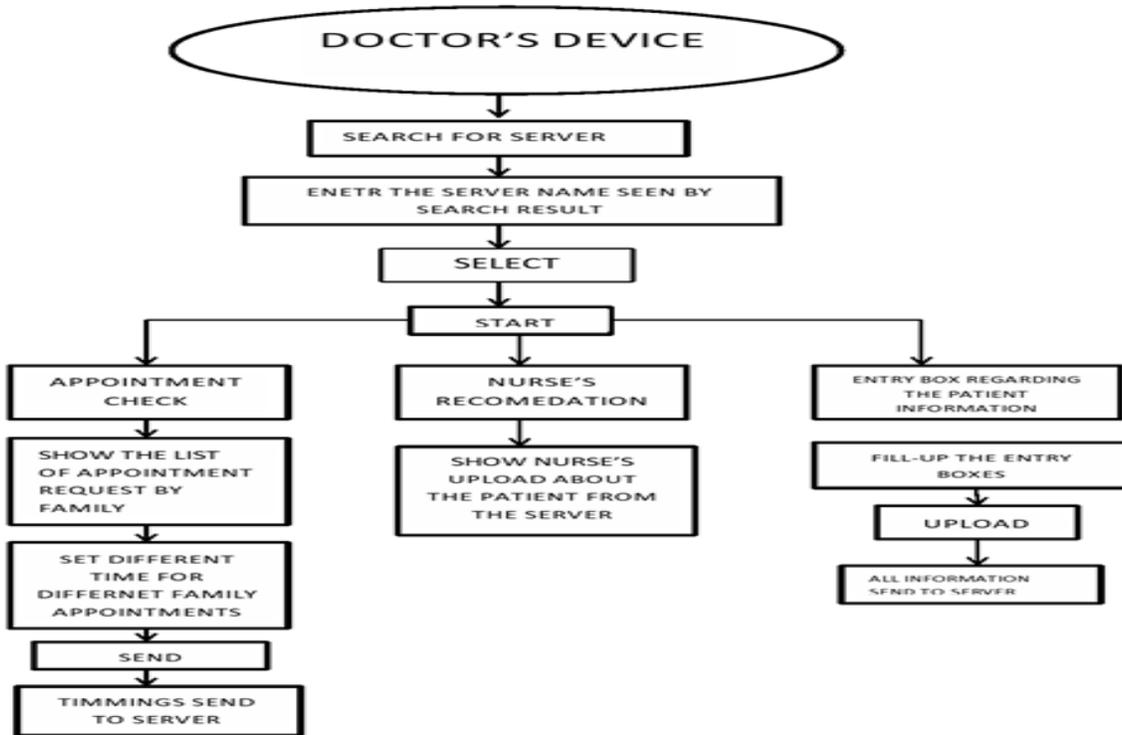
III. METHODOLOGY

FLOW CHART

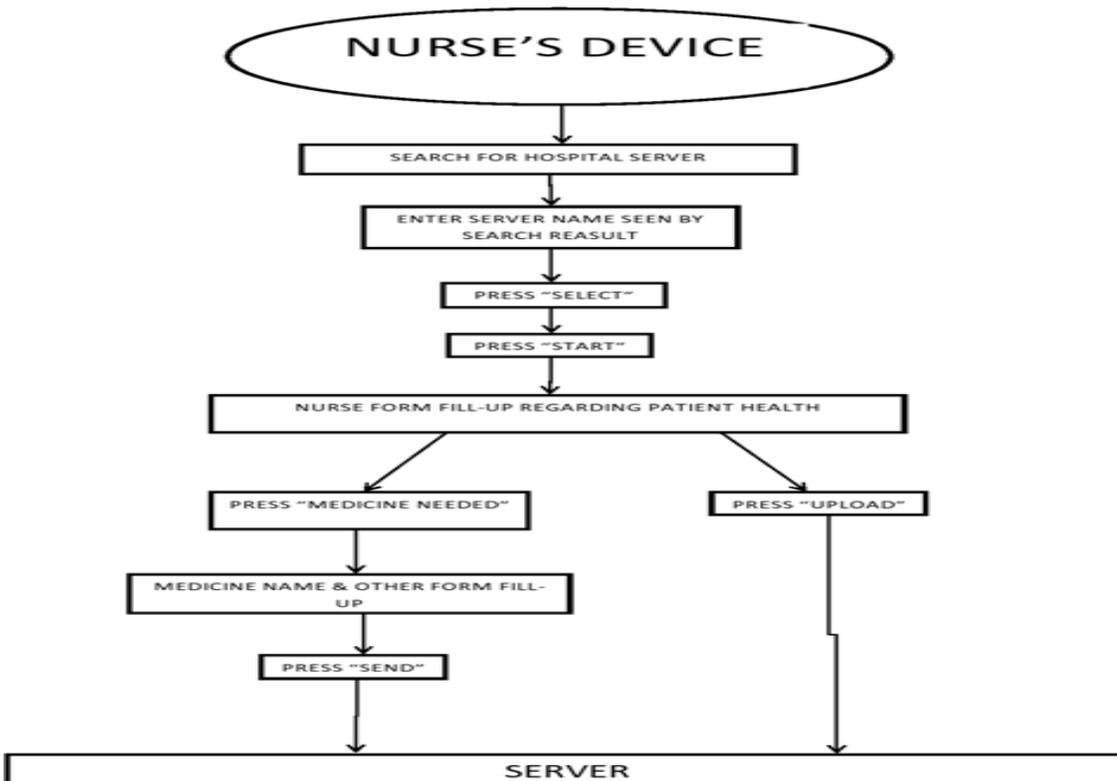
1. SERVER



2. DOCTOR DEVICE:



3. NURSE DEVICE:



STEP ALGORITHM-

1. SERVER:

STEP 1:-START the program.

STEP 2:-If SERVER receives "AMBULANCE" then server will be ready to receive ambulance record then add time with it and store it into a file.

STEP 3:-If SERVER receive "DOCTOR SYSTEM" then check for authorization if authorized then send doctor system update record to doctor.

STEP 4:-If SERVER receives "UPLOAD DOCTOR" then check for authorization if authorized then receive patient health and store data into the proper dictionary.

STEP 5:-if SERVER receive "APPOINTMENT TIME" then check for authorization if authorized then send patient-id (whose family want to take appointment) to doctor.

STEP 6:-If SERVER receives "HEALTH.NURSE" then check for authorization if authorized then send patient health of this patient uploaded by nurse to doctor

STEP 7:- if SERVER receives "APPOINMENT" then check for authorization if authorized then receive appointment time from doctor and store it into proper patient dictionary.

STEP 8:- if SERVER receives "PATIENT INFORMATION" then check for authorization if authorized then send family device update record and patient information within a packet to family.

STEP 9:- if server receives "PATIENT APPOINMENT" then check for authorization if authorized then receive doctor's name and send appointment time to family if any.

STEP 10:-if server receives "PATIENT HEALTH" then check for authorization if authorized then send patient health uploaded by doctor and nurse.

STEP 11:- if server receives "PATIENT BILL" then check for authorization if authorized then send bill to family.

STEP 12:- if server receives "CHECK OUT" then check for authorization if authorized then checks if management permit to check out or not. If permit then erase the patient-id from "FAMILY DEVICE REGISTRATION" and send an successful message otherwise send an error message.

STEP 13:- if server receive "NURSE SYSTEM" then check for authorization if authorized then send nurse system update record to nurse.

STEP 14:- if server receive "UPLOAD NURSE" then check for authorization if authorized then receive patient health uploaded by nurse and store it into proper patient dictionary.

STEP 15:- if server receive "UPLOAD BILL" then check for authorization if authorized then receive medicine details from nurse and store it in proper dictionary.

STEP 16:- server store all data into a .txt file.

STEP 17:- END

2. DOCTOR DEVICE:

STEP 1:-START the program.

STEP 2:-After execution of the program it will search for nearby B.T device, then enter the server name seen by search result in the entry box and press "SELECT" button, then a "START" button will appear. If the button is pressed entry box regarding patient's information will appear, after filling up the entry boxes by pressing the "UPLOAD" button the saved data's are send to server.

STEP 3:-By pressing "NURSE'S RECOMANDATION" button doctor can see the data's what nurse uploaded about the patient.

STEP 4:-By pressing "APPOINTMENT CHECK" button doctor can see if there are any appointment requests from any patient's family.

STEP 5:-Doctor will input the timings of the appointments.

STEP 6:-By pressing "SEND" button the timings will be sent to the server.

STEP 7:-END

3. NURSE DEVICE:

STEP 1:-START the program.

STEP 2:-After execution of the program it will search for nearby B.T servers, then enter the server name seen by search result in the entry box and press "SCELECT" button, then a "START" button will appear. If the button is pressed then it will ask for nurse for fill-ups, after form fill-up by pressing "UPLOAD" button data send to server

STEP 3:-If "MEDICINE NEEDED" button is pressed then a new window will appear containing entry boxes to enter medicine name other form fill-ups then by clicking the "SEND" button all data send to server

STEP 4:-END of the program.

DATA STRUCTURE AND RESULTS:

MANAGEMENT DEVICE (FOR UPDATE AND REGISTRATON):- For updating "DOCTOR DEVICE", "NURSE DEVICE" and "FAMILY DEVICE" and registry doctor's device and nurse's device, this device follow the data structure which are given bellow:

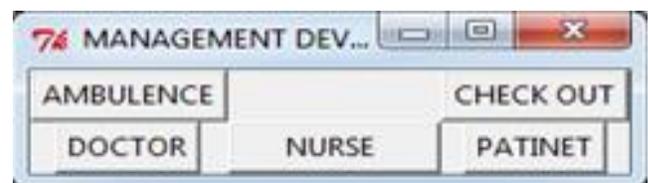


Fig1. MANAGEMENT DEVICE

It is the home window of "MANAGEMENT DEVICE". Five buttons are there, by which management can take full control of server. For updating their hospital's device like "DOCTOR DEVICE" or "NURSE DEVICE" or "FAMILY DEVICE" or for registration of doctors and nurse, management should follow some steps. These are:

Step2:

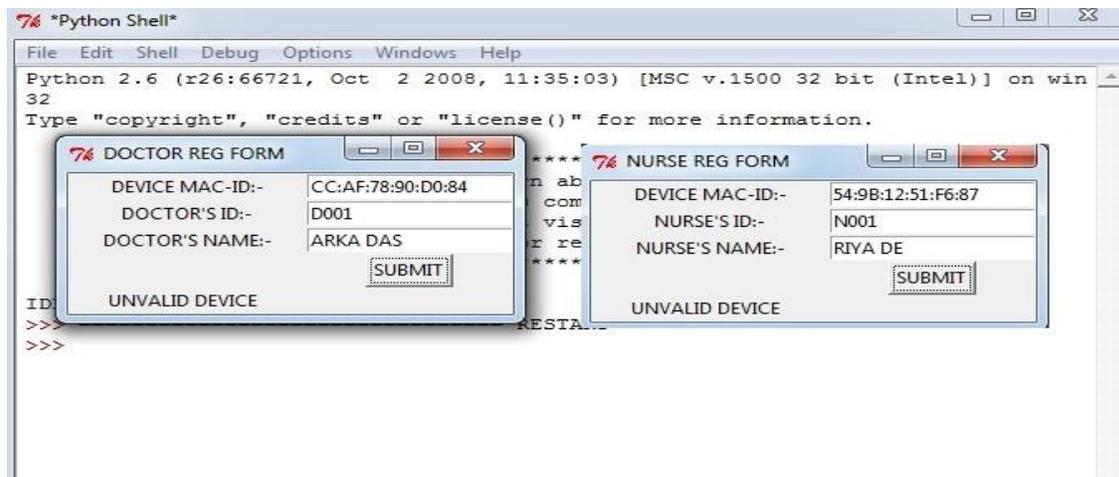


Fig: 2. DOCTOR-NURSE REGISTRATION PRECAUTION

Without registry “DOCTOR DEVICE” and “NURSE DEVICE”, if we want to registry any doctor or nurse with this device, system will show “UNVALID DEVICE”. For this reason first we need to registry any device as these two devices. Then we register these records. From next step this process are explain briefly.

Step 3:

For update “DOCTOR SYSTEM”, “DOCTOR”- button should be pressed at home window.

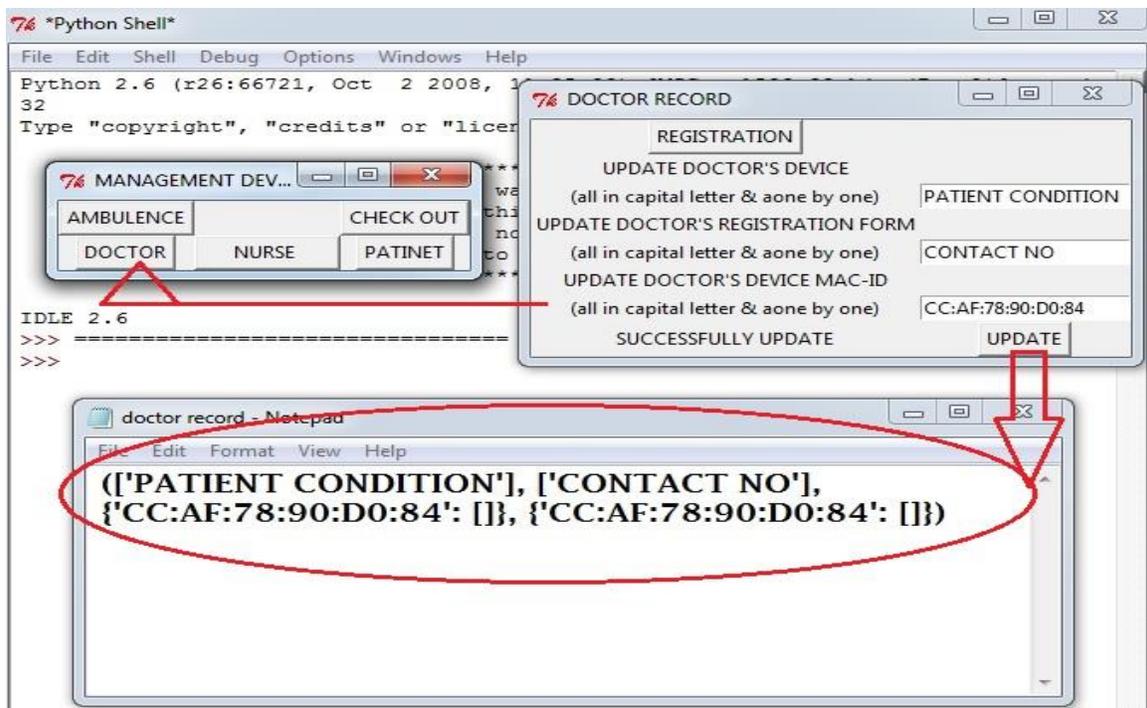


Fig: 3: DOCTOR SYSTEM UPDATE

Then open a new window according to Fig3 Then we fill up those entry boxes which we need to update. Then, if we press “UPDATE”-button then data will store it as List format for “DOCTOR DEVICE UPDATE” and “DOCTOR REGISTRATION FORM UPDATE” into a file. And for “UPDATE DOCTOR”S DEVICE MAC-ID”, two Dictionary are created. All List and Dictionary are store into a file as TUPLE format like Fig. 1.3.and the record of “DOCTOR DEVICE

UPDATE” also update “health uploaded by doctor in family device” part.

Step 4:

After that if, we need to registry doctor record, press “REGISTRATION”-button of “DOCTOR RECORD” window, and open a new window like Fig.1.4. In there, after fill up all entry box, if we press “SUBMIT”-button, then all data are store

into first Dictionary of two, which created previously. The keys of these data are the device's Mac-id. As shown in Fig4.

Step 5:

The update process for NURSE is same as Step 2 . Registration for NURSE is same as Step 3

Step 6:

To do anything about patient, press "PATIENT"-button on home window of "MANAGEMENT DEVICE". Then open a new window. And then management can update family device.

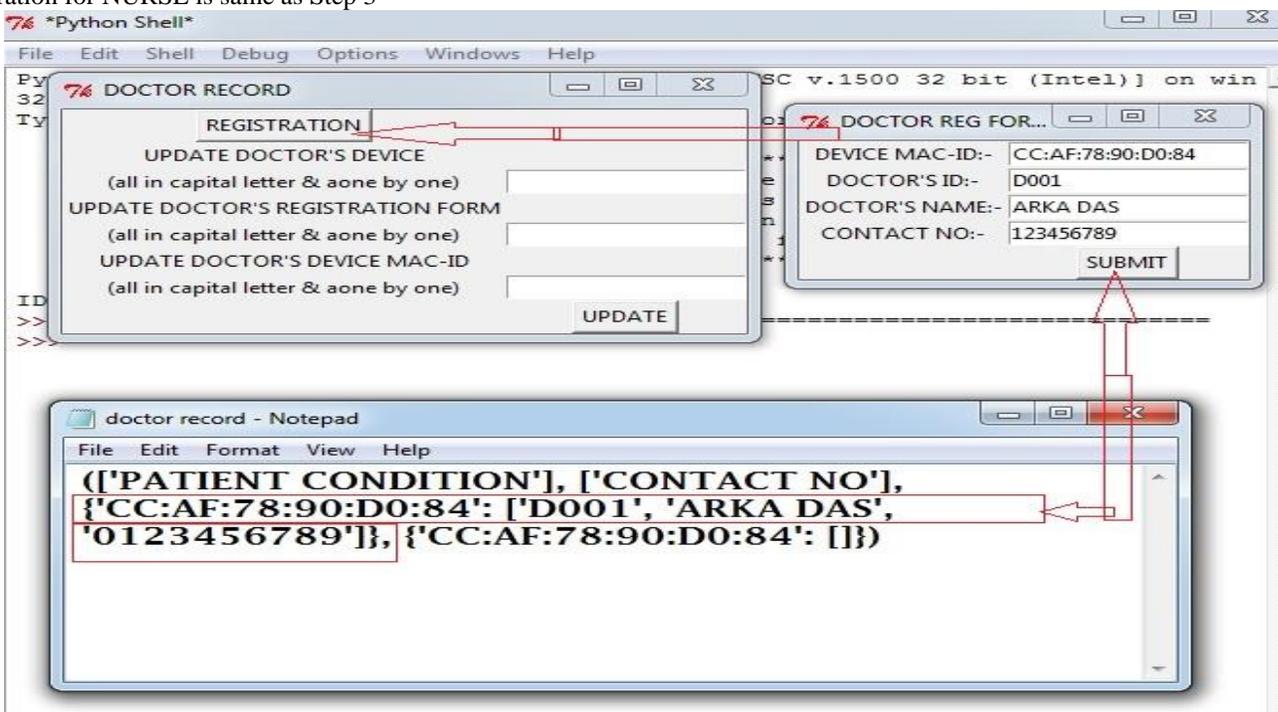


Fig. 4: DOCTOR REGISTRATION

BLUETOOTH COMMUNICATION IN MEDICAL TREATMENT:-

Step 1:

If we press "General form fill up"-button in home window of this device, then open a new window as shown in Fig: 3.1. After fill up all entry box, by pressing "SUBMIT"-button data are store it as List format as shown in Fig5.

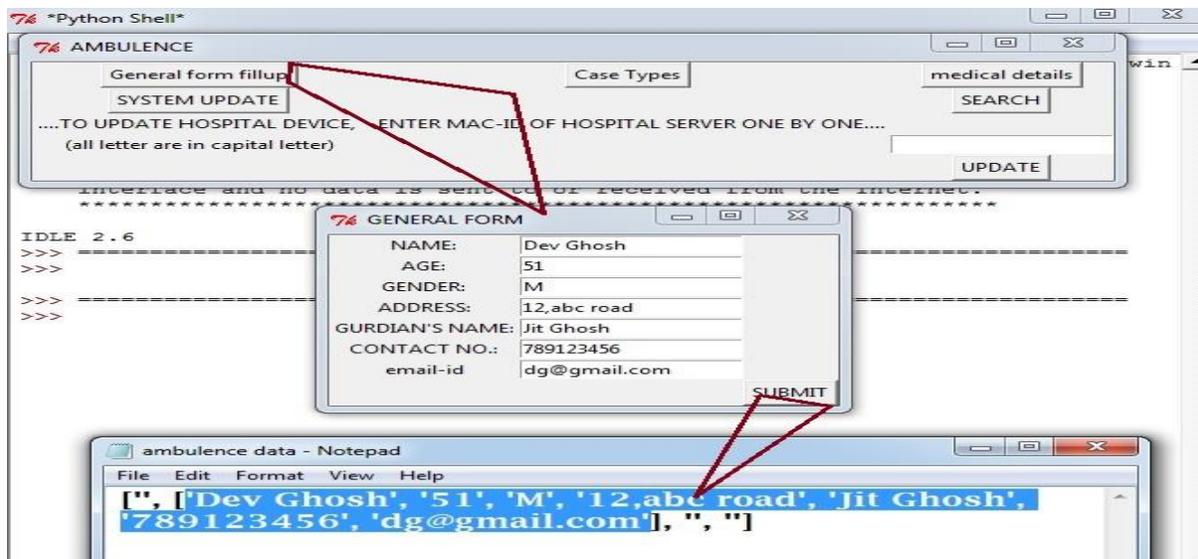


Fig5. GENERAL FORM

Step 2:

If we press "Case Types"-button in home window of this device, then open a new window as shown in Fig6. After that we

need to press anyone of two buttons in this window. And after that which button pressed, this button's name are store into file as shown in Fig6.

Step 3:

If we press “medical details”-button in home window of this device, then open a new window as shown in Fig7. After fill up all entry box, by pressing save button all data are store in a List

format as shown in Fig7. This window declares the medical condition of a patient.

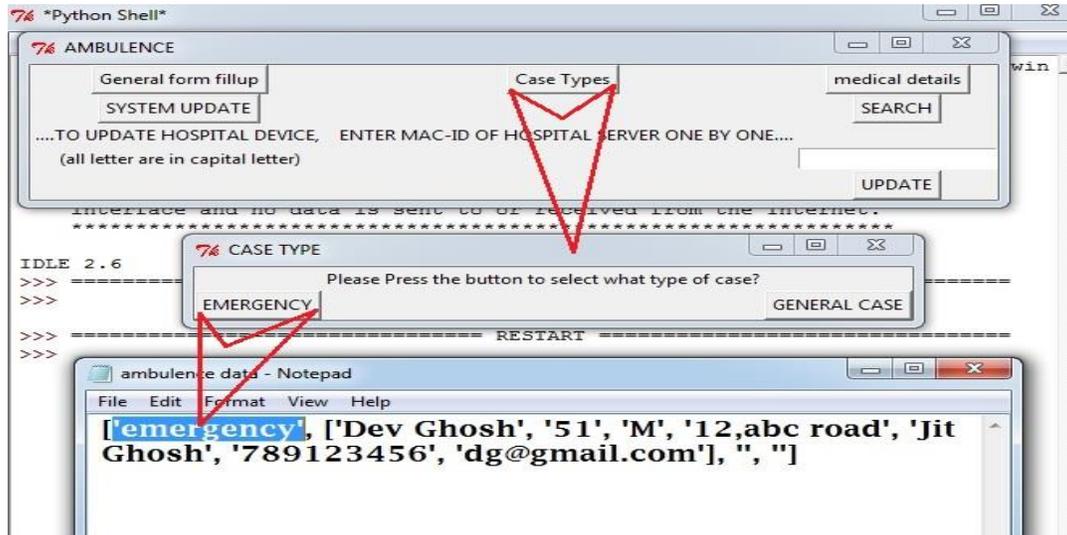


Fig.6 CASE TYPE

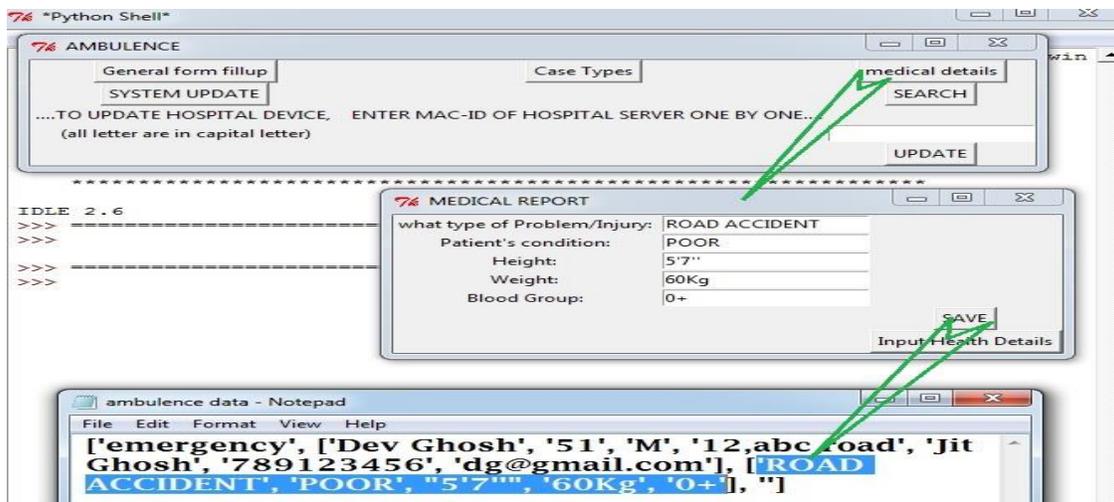


Fig7. MEDICAL DETAILS

Step 4:

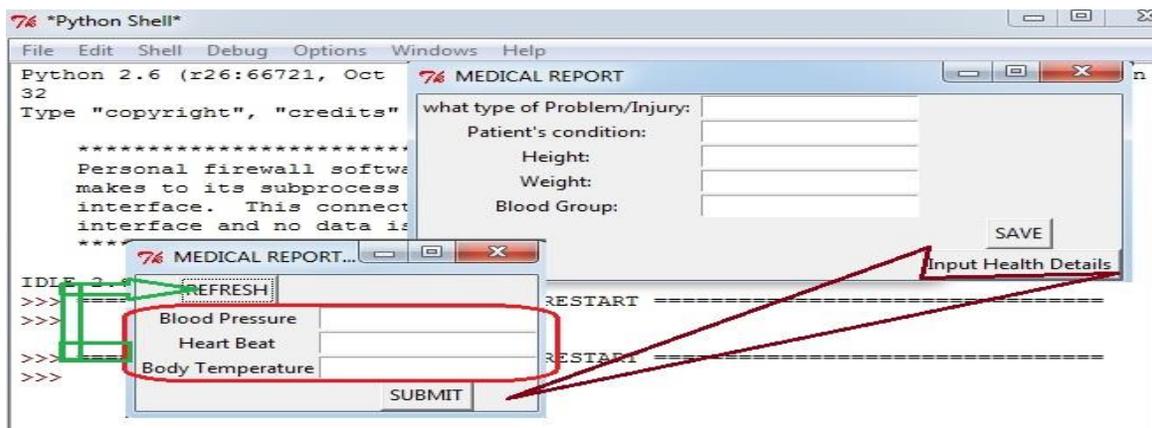


Fig8. MEDICAL REPORT PER 15 MIN

If we press the “Input Health Details”-button of “MEDICAL REPORT”-window then open “MEDICAL REPORT PER 15 MIN” window like Fig8. On this window if we press “REFRESH”-button then re-initialize all labels and entry box like Fig8.

Step 5:

Now management generate bill. This is after a few moments when patient admit, so nurse cannot upload any medicine. Thus medicine charge bill cannot generate. So for generating bill they need to press “BILL GENERATE”-button and open a new window where we write the patient-id and press “SUBMIT”-button and then the length of this window would be large, as shown in Fig9. An example is given in Fig10.

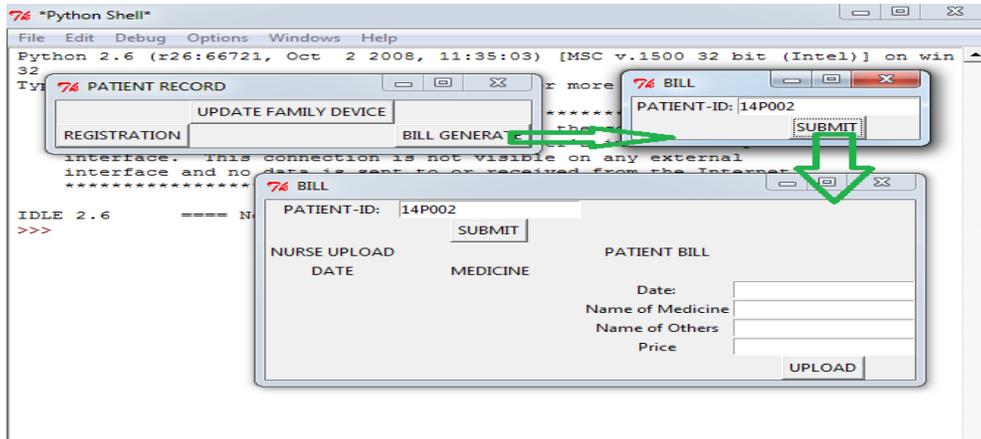


Fig9. OPEN BILL WINDOW BY MANAGEMENT

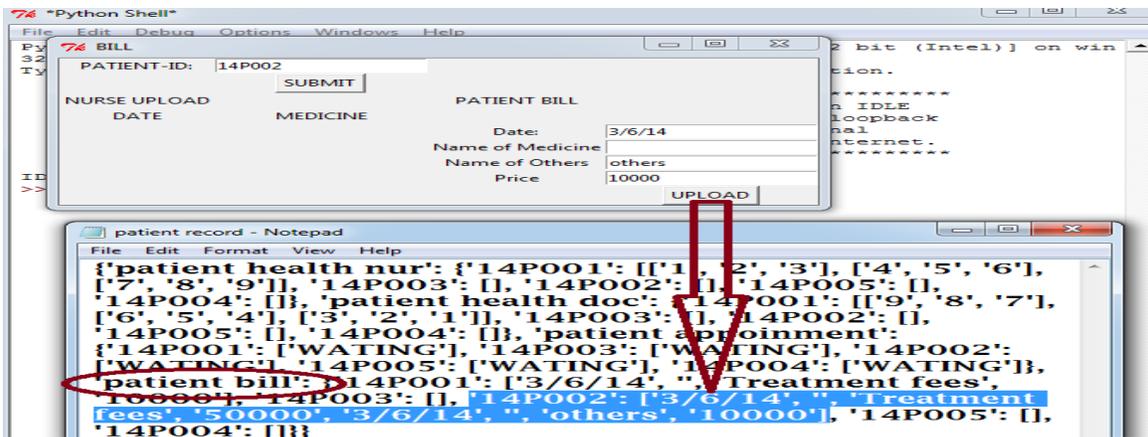


Fig10.BILL GENERATED BY MANAGEMENT

In Fig10, We can see all data about bill are store into a file as a Dictionary format of key “patient bill”.

Step 6:

Now if family want to check the bill of treatment up to this moment. Then they need to press “TOTAL BILL”-button and then open a new window which shows the bill of treatment. Here an example is given in Fig11.

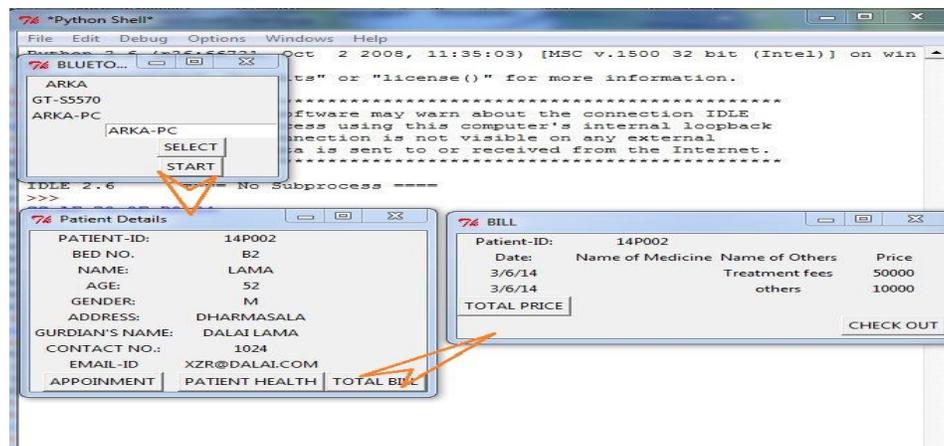


Fig11. BILL OF TREATMENT

IV. CONCLUSION AND FUTURE WORK

The methodology and result sections show that the system works as per our expectation. We haven't introduced security in this system, but in order to prevent outside attacks we need to import security features. We will include cryptography and use the encryption, decryption techniques during data transmission from one end to another.

REFERENCES

[1] Tah A., A deadline-driven epidemic data collection protocol suitable for tracking interpersonal rendezvous (January 1, 2010), ETD Collection for University of Texas, El Paso. Paper AAI1483985. <http://digitalcommons.utep.edu/dissertations/AAI1483985> (2013)

[2] <https://code.google.com/p/pybluez/wiki/Documentation> (2013)
[3] http://en.wikipedia.org/wiki/Data_Encryption_Standard (2013)
[4] <http://www.python.org/> (2013)
[5] Prakash Vaibhav V. and Kutnikar Ajay L., Green Intelli Campus Using Radio Frequency Technology, ISCA J. Engineering Sci., 1(1), 8-13 (2012)

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