A Project Proposal for "Health Challenge fund"

Project Title   : Bangladesh Health care service 3.0

Solves Challenge   : 2. **Medical outdoor patient appointment system using emerging technology.**

Team Name   : Team_ICE

Name of the Innovator : Khandakar Amir Hossain

Team members   :

i. Dr. Md. Zahidul Islam [adviser]
   Professor
   Dept. of Information and Communication Engineering
   Islamic University, Bangladesh

ii. Mustafa Alamin
    Undergraduate Student
    Dept. of Information and Communication Engineering
    Islamic University, Bangladesh

iii. Khandakar Amir Hossain
     Undergraduate Student
     Dept. of Information and Communication Engineering
     Islamic University, Bangladesh

iv. Monayem Islam Tamal
    Undergraduate Student
    Dept. of Information and Communication Engineering
    Islamic University, Bangladesh

Abstract :

In this new era of information technology the more digital data we have the more powerful we are . But this is not the end, the more efficient data processing power we have the more powerful we are. Big data, Artificial Intelligence(more specifically Machine Learning) will be the most buzzwords for our healthcare service to take decisions more accurately and effectively .

Now a days in our health care service patient appointment is running on traditional way , where First Come First Serve (FCFS) method is used to parse and separate patients in different categories manually . This process is very time consuming as much time for waiting is required to complete the process till doctor appointment.

Our main goal is to reduce this busy waiting situation, to ensure effective health care service and to keep track on health service data of patients for future follow-up autonomously.

Here we can use the most emerging technology - Artificial Intelligence (more specially Machine Learning) to take decision for patients autonomously . Which will help doctors to keep track on every patients and take proper action on them more accurately and effectively . Data driven automation will be a revolutionary step toward our health care service .

The director of the Brazilian National Health Service concluded that, "there is no healthcare without management, and there is no management without information."[1]

Our solution idea will meet all the criteria of the problem very well .

Idea in brief :

At first we will reduce the busy waiting situation of people for getting appointment with relevant doctors by providing a digital and easy process where waiting in a big line is no longer needed .

1. People will use their mobile phones[internet is essential] to communicate with the hospital and tell their initial problem and then hospital system will suggest and/or fix an appointment with relevant doctor he/she needed and will provide the room number of the doctor inside specified hospital . Besides this an amount of money will be deducted from user account as ticket fee / health care service charge . [Each user will have a unique health care account where his/her data will be showed and stored for future use]

2. In case of having analog phones to users where internet is not available he/she will have to dial *16263# (this is dummy) and choose his/her nearest hospital name and his/her problem . Then he/she will be notified with an SMS where doctor appointment will be sent and an amount of money will be deducted from user's talk time balance as ticket fee / health care service charge . [Each SIM number will be uniquely identified as user account]

3. In case of having no mobile phones to user at all the traditional method will be applied [very rare having no mobile phones at all] for healthcare service.

The next step is to help doctor in making decisions using the past history of the patients and the effect of medicine applied before .

1. Here we can use machine learning algorithms to build a proper healthcare model with previous data and make predictions for patients with respect to their current status . Which will help doctors to prescribe and/or take best action accordingly . [future implementation]

Implementation :

### I. Problem Analysis :

1.1 A healthcare data center for storage and processing of information is required.
1.2 A well structured data of hospitals , doctors , equipment's is required to take decisions autonomously .
1.3 Each hospital should be digitized with their management system .
1.4 Cooperation with bank's and mobile operators is required for transactions .
1.5 User friendly interface both for general users , nurses , doctors and data analysts .

II. Proposed Solution :

2.1 We will build a centralized healthcare web API which will process data and provide necessary information to users .
2.2 We will build a general format of hospital data storage system which will store patients data , doctor's data, equipment's data as backup and will send updates to centralized healthcare data center when required.
2.3 We will use different Banking gate way API 's of bank's and mobile operators to confirm transactions .
2.4 We will build (future development) some API 's to predict disease and medicine required for patients . Basically Some standard healthcare model using machine learning algorithms and prediction mechanism.
2.5 We will build a robust and friendly user interface for general users, nurses, doctor's and data analysts

III. Data flow diagram :
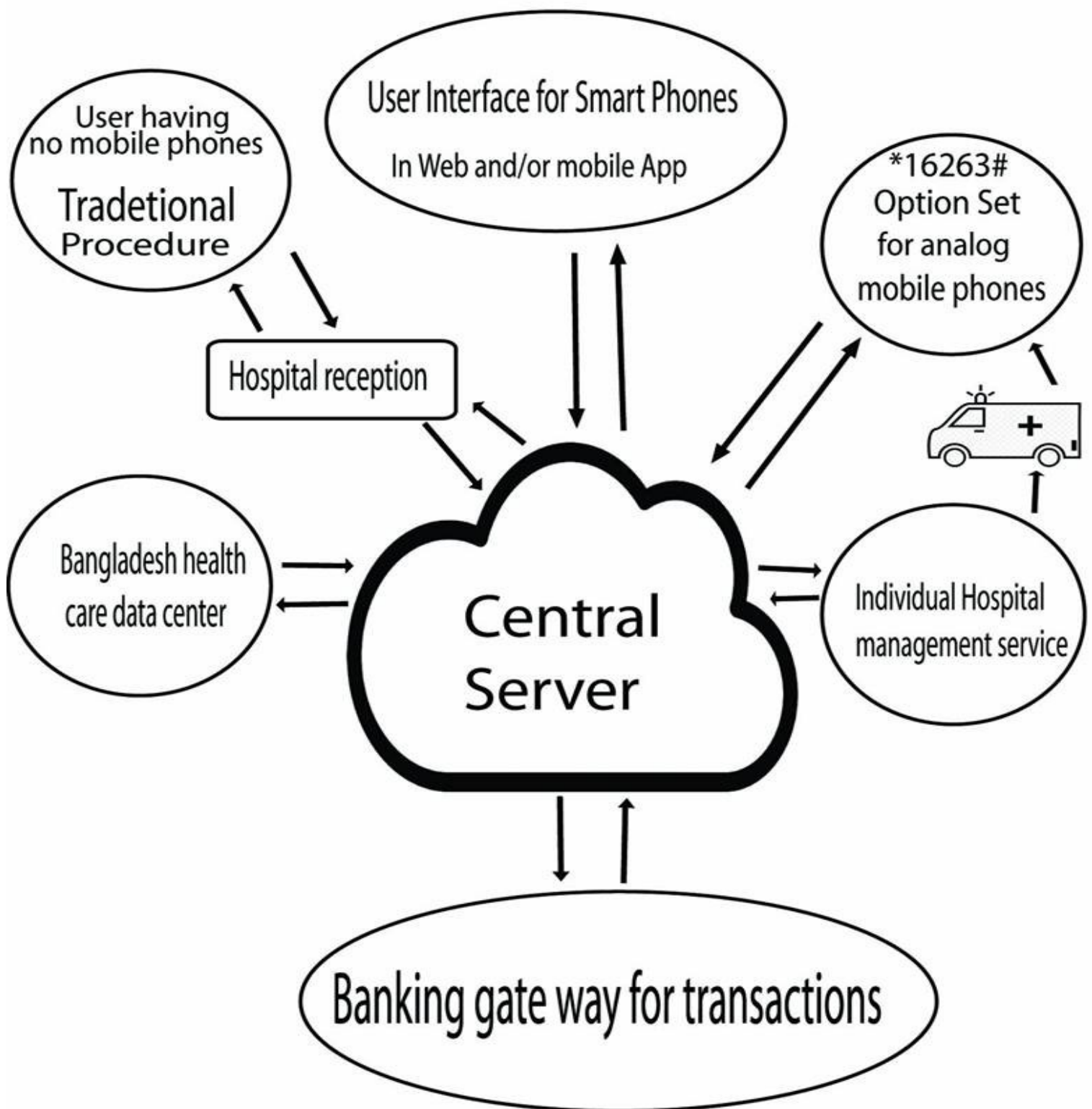
iv. Scope of proposed system :

This system can be easily merged with the existing one without creating any trouble or difficulties to the on going hospital management system. Besides this will increase productivity of both doctor's and nurses as they can observe patients through their digital data . Busy waiting problem gets totally solved with this and smart monitoring system provides more transparency to the healthcare system . Which will enhance the trust of common people on government hospital's . New optimization techniques and features can be added or merged with the system due to the object oriented concept of this project.

v. Gantt Chart :

Implementation Stages	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Data Collection and analysis	■	■										
1.1 Data register formats	■											
1.2 analysis of existing systems		■										
Data base model design			■									
Back-end Model design for Central web API				■								
User Interface Model design for API					■							
General Data storage format design						■						
Coding for web API							■	■	■			
6.1 Package and Class Implementation							■					
6.2 Main Module Implementation								■				
6.3 Web User Interface Implementation									■			
Debugging of API										■		
Testing API											■	
Deployment and user feedback												■

Gantt Chart for the project working time ,divided into weeks

vi. SWOT analysis :

 # Strengths:
   i.   Robust .
   ii. Autonomous decision making capacity .
   iii. Distributed data storage on individual hospitals ensures data redundancy.

 # Weaknesses:
   i.   Centralized data server can be collapsed due to very high rate of traffic.

 # Opportunities:
   i.   Predictive and prescriptive.
   ii.   Scale-able.
   iii. Actionable.
   iv.   Accurate.
   v.   Huge collection of patients data will help in building better healthcare model .
   vi.   Effectiveness of Medicine can be judged according to performance on patients.
   Vii. National healthcare can be monitored and any necessary step can be taken
          according to emergency situations

 # Threats:
   i.   Data Security

vii. Sustainability:
   This project will sustain for a long time until a new technology gets innovated to
   handle all necessary steps with better optimization techniques. As day by day
   everything is getting digitized and use of digital devices is growing exponentially for
   better lifestyle and comfortable life. So this system will get better and better after a
   series of development according to the demand of the situation .

viii. Next Challenge:

   i.   Big Data processing
   ii.   Disease analysis using Digital Image processing
   iii. Efficient data model building for better prediction
   iv.   Analysis of Medicine on human health and to produce better medicines