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ONLINE HEALTHCARE SUPPORT SYSTEM

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ABSTRACT
Healthcare is an issue of utmost importance in human life. Yet, peoples in third world countries like Bangladesh hardly gets proper healthcare support in times of need. This is due lack of resources, overpopulation and ease of access to healthcare facilities. To address this issue an online healthcare support system named **Medicate** has been proposed in this paper targeting patients in Bangladesh. Medicate will allow the patients to get appoints with doctors, emergency ambulance ordering services, emergency blood donor availability and many more medical help with just simple clicks from their computers/mobiles.

1 INTRODUCTION
Human resource for health (HRH) is one of the crucial preventive factors deciding the health condition of the people alongside socioeconomic and other environmental factors. Generally, there is a close association amid the concentration of qualified health workers and significant health outcomes such as primary health care access, and infant and maternal survival [1,2]. A densely populated third world country like Bangladesh has severe health care providers (HCP) shortage. In a study [3], HCP density was measured per 10 000 population in Bangladesh. There were about five physicians and two nurses per ten thousand population, the ratio of nurse to physician being only 0.4. According to World Health Organization (WHO), Bangladesh suffers from both a shortage of and geographic mal-distribution of HCP. WHO reports that there are an estimated 3.05 physicians per 10,000 population and 1.07 nurses per 10,000 populations [4].
Due above reasons people in Bangladesh often find it difficult to get adequate and timely healthcare facility such as getting an appointment with a doctor, emergency ambulance service, blood donor for critical patients and many more. If anybody gets sick and needs to visit a doctor for checkup, he or she needs to visit the hospital and waits until the doctor is available. The patient also waits in a queue while getting appointment. If the doctor cancels the appointment for some emergency reasons then the patient is not able to know about the cancelation of the appointment unless or until he or she visits the hospital. In short, there is serious lack of facilities and ease of access to health care professionals in times of need with lots unnecessary hassles. So, it is absolutely necessary to find an easy and effective solution to this crisis situation since healthcare is an sector that cannot be ignored. As the internet is now available for everyone therefore an online medical support system could be effective solution to overcome such problems and inconvenience for the patients.
The above reasons motivated this work where an online healthcare support system is proposed. In this system doctors are allowed to manage their booking slots online, patients can make their appointment to book empty slots too. This is the system of reservation for counseling by patient's name. This system manages different kinds of doctors at a time and patients can choose their expected one for booking. This system allows for booking emergency ambulance service for critical patients from anywhere, anytime and anyplace. The system also maintains a blood donor module which is allowed for blood donation registration as well as finding blood group for future use.
The rest of the paper is organized as follows: section 2 presents some related works. Section 3 presents the proposed system with section 4 offering implementation details. Section 5 concludes the paper.

2 RELATED WORKS

There are very few related systems that are available right now but not a large number and no one are totally similar. Many of the system have some limitations**.** Some of the related systems of our project are mentioned here. We have explored many websites which are related to medical health consciousness; first one that caught our attention is 'Doctorola.com' [5]. In their system user need to search for doctor or hospital from different location and get them for booking appointment. There is no user login option and personal profile so users are totally detached from getting extra facilities for future purpose. Another project is 'Doctorsbd.com' [6]. This site provides only doctors list. Users can only able to know their service location from here.

3 PROPOSED SYSTEM

Our proposed system consists of four major parts or entities or modules such as doctors, patients, admin (system), and blood donation module. The overall system workflow with all the modules is depicted in figure 1. But first we must present the requirement analysis that defines the software and hardware requirements of the system to be implemented.

3.1 SYSTEM REQUIREMENTS

Table 1 presents the software and hardware requirements of the system.

Table 1. Software and hardware requirements of the system**.**

Software Requirements:	Hardware Requirements:
• HTML • CSS • Bootstrap • PHP • Laravel framework • Phpstorm 2019.1 • Mysql	• Server • Internet Facility • Computers • Mobiles

3.2 SYSTEM DESIGN

As mentioned earlier the system consists of four modules namely doctors, patients, admin and blood donor. We define all these modules briefly below.

Doctors

Doctor's module is for doctors and physicians. This module allows the doctors to get registered, get appointment requests, access to this request, check previous medical history, able to get patient profile and select appointments.

Patients

Patients module is for patients' user. This module allows the patients to view doctors list, easily take doctor appointments, find when his/her expected doctor available, Able to see categorized doctors list, purchase medicine, hire ambulances and get blood from donors.

Blood Donation

This module connects the people with need of bloods with blood donors instantly.

Admin

Admin module is for system administration, monitoring and controlling. It allows the admin to add ambulance providers to the system, get ambulance calls, check and select calls, instant reply to patients or guardians. This module also controls and approves the other modules.

The overall workflow of the system is depicted in figure 1 below where how each module interacts with each other is presented.

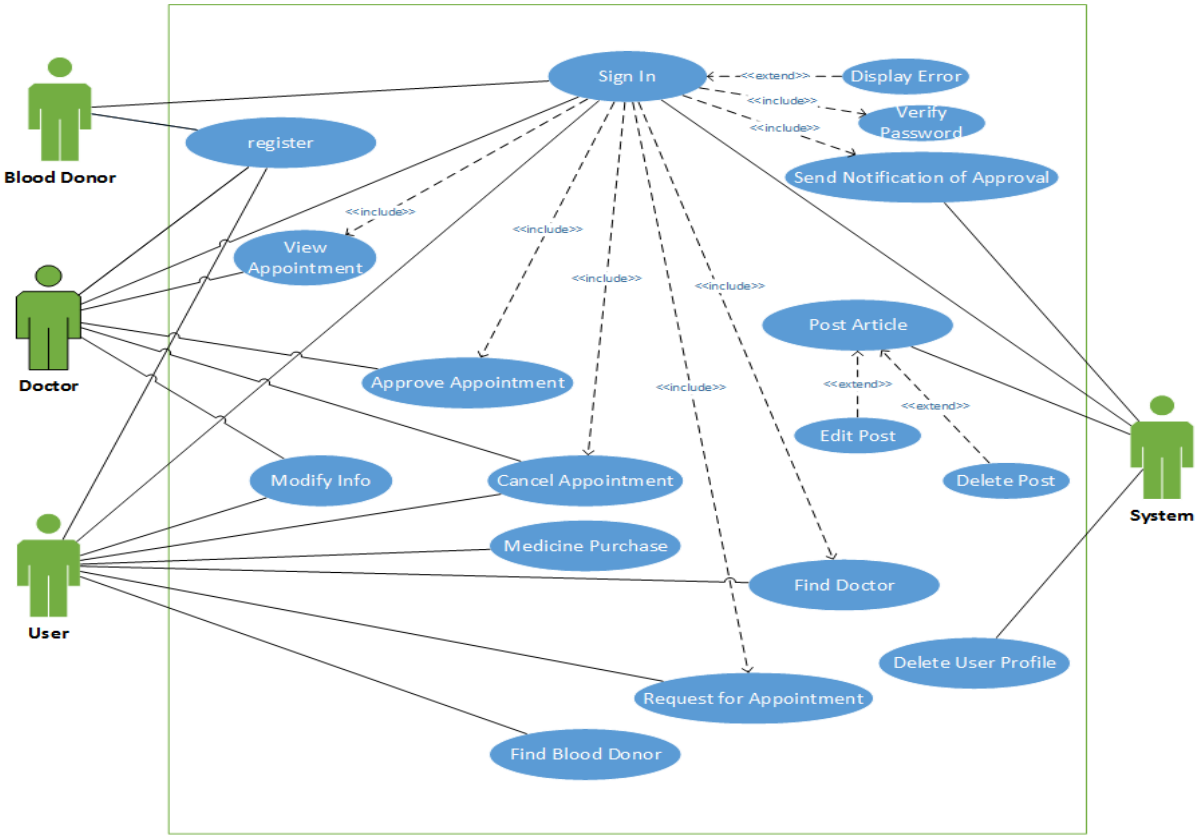

Figure 1: Overall Working Framework of the system

4 IMPLEMENTATION

The system was implemented in two parts frontend and backend. The frontend that deals with user interaction and interfaces with the backend. The frontend was developed with technologies such as HTML[7], CSS[8], JAVASCRIPT[9] and PHP[10]. The backend that deals with storage of data and was designed and developed with MYSQL [11] database along with PHP and Laravel framework [12]. Some of the user interaction samples for all entities are presented below.

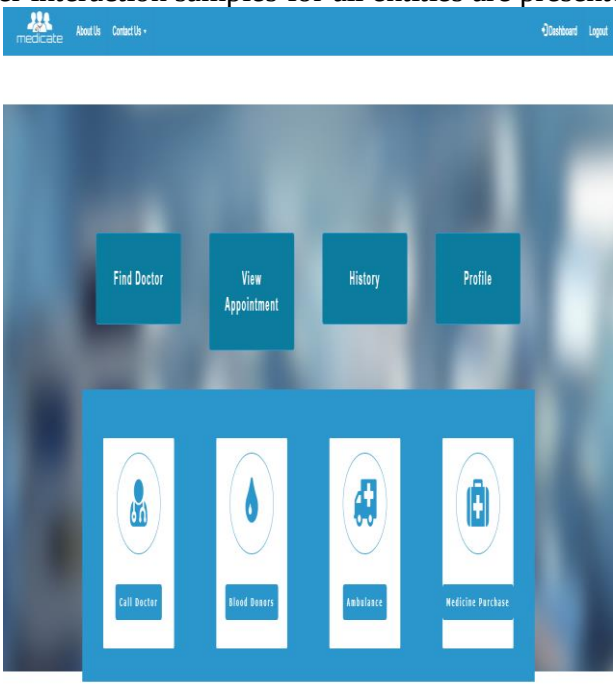

Figure 2(a): Patients Dashboard

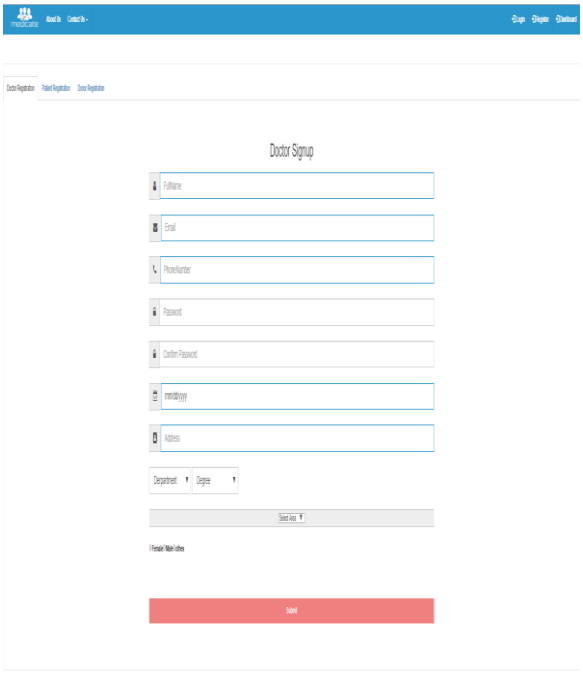

Figure 2(b): Registration process

In the system patients or doctor each needs to register with system as shown in figure 2(b). Patients are able to select which service they must avail from the dashboard as shown in figure 2(a).

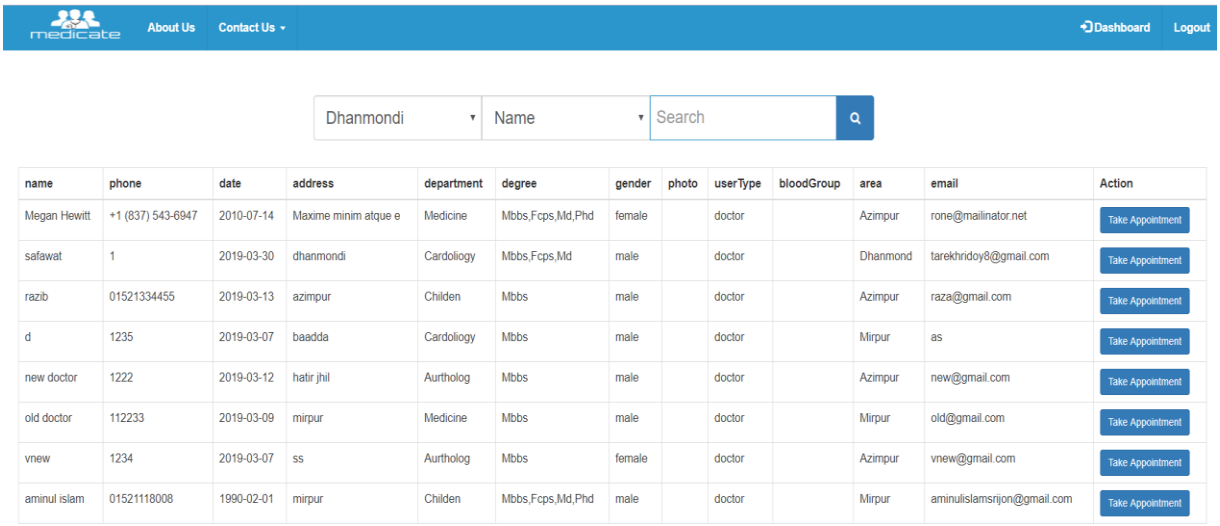

Figure 3: Searching and selection of doctors by patients or guardians

The patient can choose from available doctors for appointments and consultation as shown in figure 3.

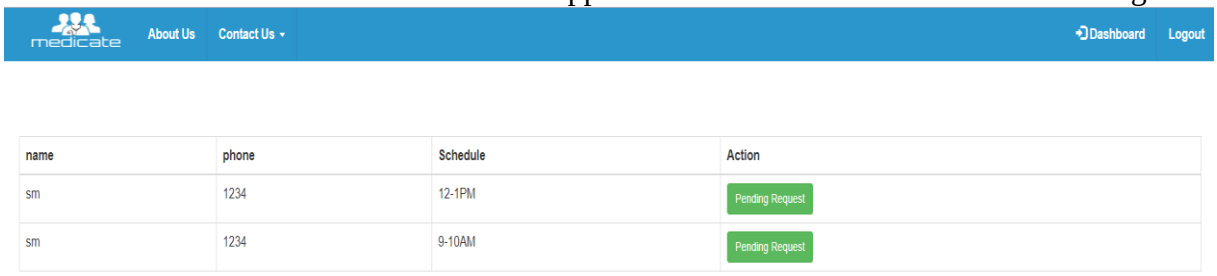

Figure 4: Appointment requests management by doctors

The doctors can select and approve their appointments easily in the system as depicted in figure 4.

Figure 5: Ambulance service

People can easily select and call emergency ambulances through the system instantly as shown in figure 5. To test the systems functionality we used some sample login and/or access tests and the results are presented in table 2 and 3.

Table 2: Registration and login test cases

SI	Test Case	Input	Expected Outcome	Actual Output	Result
1	Email check	Input without @	Invalid email	Invalid email. must have @	Passed
2	Valid phone number	Input numeric values	correct	Correct	Passed
3	Special character	Input names without special characters	No special characters	No special character is allowed	Passed

Table 3: User Input test cases

SI	Test Case	Input	Expected Outcome	Actual Output	Result
1	Display system pages	Tested on renowned browsers such chrome, mozila firefox, uc	Successfully displayed	Successfully rendered and displayed	Passed
2	Username/password check	wrong input	login failed	login failed wrong username/pasword	Passed
3	Special character	Input names without special characters	No special characters	No special character is allowed	Passed

5 CONCLUSIONS

An online automated healthcare system such as "Medicate" that was presented in this paper will greatly ease the process of getting medical support. In a densely populated country like Bangladesh with severe lack of resources such systems will be of great help in attaining basic medical care such as visiting a doctor, availing medicine, emergency ambulance service and many more. This proposed system helps patients to easily avail doctor's appointments, further consult with the doctor without the hassle of physical visit, avail ambulance service effortlessly, and avail blood donors in emergency cases. It allows the doctor to reach more patients easily since online system has no geographical boundary, select appointments of his/her choosing, can manage and monitor patients easily with records, can provide feedback to the patients instantly. Ambulance providers can easily organize their services through this system more efficiently. Finally, this system can greatly reduce the difficulties that people face with traditional systems.

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