Android Based Smart Hospital Bed With Angle And Temperature Display

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Abstract — *The Hospital bed angle is supposed to be adjusted according to the convenience of patient, presently it is adjusted manually. The Adjustable Back Angle Controller will include an accessible handle alongside a hospital bed frame that allows the user to adjust the back angle of the bed. The patient who is laying over the bed him/herself cannot adjust the back angle, to do so care taker help is essential, moreover the job is hard & some force is required to rotate the handle. This is a painful activity; therefore an easy method must be employed in hospital beds for the convenience of patients as well as for the convenience of hospital staff. In this regard this project work is taken up, which is aimed to design & develop an automatic electro mechanical type of hospital bed, the main purpose of this bed is to change the back angle automatically according to the angle data entered in to the system through WIFI.*

Keywords- *Android based Smart Hospital Bed, Liquid Crystal Display (LCD), Wireless Fidelity (WI-FI), LM35 Temperature Sensor, Stepper Motor.*

I. INTRODUCTION

The present system of adjustable back angle of hospital bed controller device will be controlled with a force sensitive handle located on the most accessible side of the bed. The basic concept of adjusting the back angle will take the input force on the handle and adjust the speed proportional to the force applied to the handle, i.e. more force on the handle outputs a faster speed to raise or lower the back angle. This is purely mechanical concept, the recent technology contains hydraulic cylinders, and this concept works by adjusting the pressure to a hydraulic piston, the bed with this arrangement available presently is costing more when compared with normal mechanical beds with handle [1]. The current technology, which involves the subject of mechatronics, can set the bed angle to the desired level, simply by activating few keys. This is the latest trends in the technology that is implemented in hospital beds. As it is a motorized bed, human force is not required, the mechanism moves at constant speed, & movements can be restricted through a control circuit. The technology can be further enhanced, such that the set angle can be displayed. Therefore this project work is taken up, which is designed as user-friendly and making the operation less stressful.

II. LITERATURE SURVEY

In the survey we have gathered information that most of the beds are adjusted manually or sometimes with the help of a keyboard. In case of manual adjustment, it is tedious and time taking method. After few changes and advancement electric beds were introduced , which were operated with the help of a keyboard to enter the angle and is displayed through a 7-Segment Display. LED's are used in present technology. This project work is taken up, which is aimed to design & develop an automatic electro mechanical type of hospital bed, the main purpose of this bed is to change the back angle automatically according to the angle data entered in to the system through android app using WI-FI and to display the temperature of the body.It consists of a WI-FI module which is interfaced to the controller.The main function is performed by the stepper motor to adjust the bed angle.

III. PROPOSED ALGORITHM

- The proposed system is implemented to overcome various disadvantages and to provide more convenience for the patients. To provide an easy way to use, comfort and reliable bed back angle controller for patients suffering from a variety of disabilities.
- As it is a motorized bed, human force is not required, the mechanism moves at constant speed, & movements can be restricted through a control circuit. The technology can be further enhanced, such that the set angle can be displayed.
- Therefore this project work is taken up, which is designed as user-friendly and making the operation less stressful. In this regard this project work is taken up, which is aimed to design & develop an automatic electro mechanical type of hospital bed, the main purpose of this bed is to change the back angle automatically according to the angle data entered in to the system through android app using WI-FI and to display the temperature of the body.
- Firstly, the uart is initialized through Wi-Fi. The data is sent through Wi-Fi module , through which it is sent to the microcontroller. Once the data(angle) is fed into the controller, the bed starts to set its position in the desired direction

and is displayed on LCD screen. At the same time even the body temperature is sensed and displayed on the LCD screen.

3.1 Block Diagram:

In this System, it is proposed to design an embedded system which is used for adjusting the bed angle and to display the temperature of the body. The entire process is done with the help of a Wi-Fi module interfaced with the microcontroller. This project work is intended to explain the block diagram in step by step, i.e. block wise. By studying this block diagram carefully, one can easily understand the fundamentals of this project work. The complete block diagram provided in this chapter shows the technology that is aimed to control the back angle of Hospital bed through WIFI.
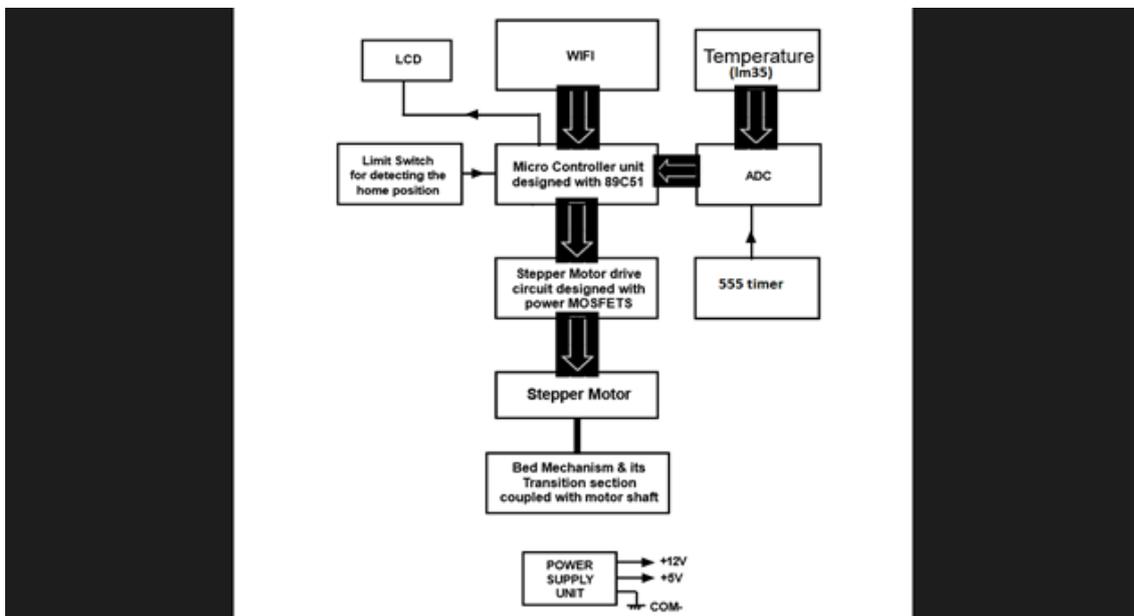
Fig 1: Block diagram of the project

Fig.1 shows the proposed block diagram which is based on the microcontroller ATMEL 89C51 with various inputs and outputs. Firstly, bed angle input is given by initialising the Wi-Fi module. After entering the bed angle, the mechanical bed structure rotates with the help of a stepper motor. The LCD screen displays the bed angle as well as the temperature. We can observe the movement of the bed and a reset button is present to set the bed angle to home position. The stepper motor rotates in both clockwise and anticlock wise with the help of a driver circuit. Once the angle is set, we can even reset it back to the home position with the help of a reset button. The limit switch arranged at bed bottom side is for identifying the home position, when the bed is flattened this switch will be activated automatically, there by the controller unit can get a signal such that the bed is in its home position. This switch is interfaced with microcontroller at input side & generates active low signal for the controller when it is activated. The display section is designed to display the bed angle that is set through mobile phone. The moving mechanism is constructed to move up to 70 degrees, hence the set angle through mobile should not exceed more then this value, and therefore this display section is designed with two digits. If the value set through keyboard exceeds more then 70 degrees, then the first digit of display will show 'Err', this indicates error. And it is displayed through LCD display. The role of microcontroller is very important in this project work, 89C51 is used here, this is quit popular IC generally used for all applications. The prime use of a microcontroller is to function like a minicomputer using a fixed program that is stored in ROM and that does not change over the lifetime of the system. The microcontroller design uses a much more limited set of instructions that are used to move code and data from internal memory to the ALU. Many instructions are coupled with pins on the IC package [8].

3.2 Software used:

For this project, a software used is known as "Keil µVision5 IDE". The µVision5 IDE from Keil Software combines project management; make facilities, source code editing, program debugging, and complete simulation in one powerful environment. µVision5 helps you get programs working faster than ever while providing an easy to use development platform. The editor and debugger are integrated into a single application and provide the seamless embedded project development environment. It is very easy to work with Keil if you know how to write the programs in "C" or assembly language [5].

IV.   RESULT ANALYSIS

The results obtained in this project were analyzed and are shown in the hardware section.

4.1 Hardware Result:
The proposed prototype model of our project is shown in the fig 2 given below,
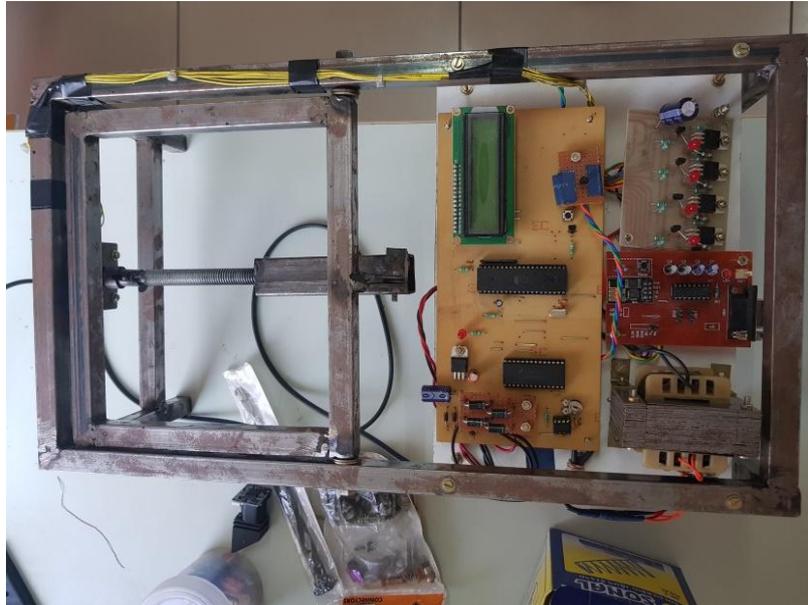
Fig 2: Proposed prototype model

The results of the bed angle and temperature display on the LCD screen are shown below,
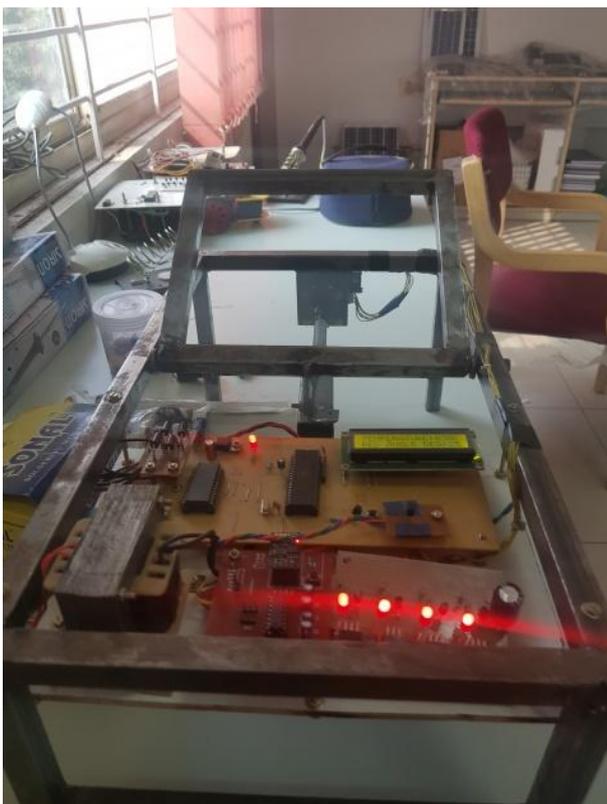
Fig 3: The bed is in ON state with a bed angle 25degree   *Fig 4: Side View of thel bed with an angle 30degree*

As shown in the fig.3 and fig.4 we can observe the working of the mechanical structure when data is entered through Wi-Fi. Two different angles are shown in the above figures.

V.   CONCLUSION AND FUTURE SCOPE

The project work "Android based smart Hospital bed with Angle and temperature display " designed and developed successfully, for the demonstration purpose prototype module is constructed & results are found to be satisfactorily. While designing and developing this proto type module, we have consulted few experts those who are having knowledge in Mechatronics, these professionals working at different organizations belongs to Hyderabad helped us while fabricating the hospital bed. Since it is a prototype module, much amount is not invested, the whole machine is constructed with locally available components, especially the mechanical components used in this project work are procured from mechanical fabricators, and they are not up to the requirement, lot of modifications must be carried out in design & is essential to make it as real working system. Hence, the bed is to be enhanced further for obtaining better results. The demo module measures 100 X 30 centimeters approximately & it is designed as freely movable, for this purpose four free running wheels are mounted at bottom side of the bed.

Further improvements must be carried over to enhance the control structure. The mechanical design must be improved by using suitable gears and bearings. Likewise many modifications can be carried over in the future work. Another important aspect is to avoid the friction in the mechanical movements[9].

Also, heart rate can also be added as an advancement for this project. In future it can be implemented easily even in our houses. Addition to the temperature measurement even blood pressure of the patient can also be checked and monitored. This is an easy and convenient way as it reduces time and doesn't need the help of a nurse or servants.

REFERENCES

While designing and fabrication of this project work, we gathered information from websites & consulted experts in various fields. The information is gathered from yahoo.com search Engine. Regarding micro controllers plenty of books are available, the following are the references made during design, development and fabrication of the project work.

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