

**DESIGN AND IMPLEMENTATION A FLEXIBLE BED FOR
PATIENT FACILITIES
(DRIVER CIRCUIT MODIFICATION)**

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BEKC

2009

“Saya akui bahawa saya telah membaca karya ini pada pandangan saya karya ini adalah memadai dari skop dan kualiti untuk tujuan penanugerahan ijazah Sarjana Muda Kejuruteraan Elektrik (Kawalan , Instrumentasi & Automasi).”

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**This Report Is Submitted In Partial Fulfillment of Requirements for the Degree of
Bachelor in Electrical Engineering (Control, Instrumentation & Automation)**

**Faculty of Electrical Engineering
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2009

“I hereby declared that this report is a result of my own work except for the excerpts that have been cited clearly in the references.”

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“Saya akui laporan ini adalah hasil kerja saya sendiri kecuali ringkasan dan petikan yang tiap-tiap satunya saya jelaskan sumbernya.”

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*Special dedicated to
My beloved parents and siblings, who have encouraged, guided and supported me
throughout my study life.*

*Mr. Hairol Nizam bin Mohd Shah and all my fellows' friends, thanks for guidance and
support.....*

*Nur Hidayah Binti Mazlan
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ABSTRAK

Ibarat katil-katil hospital, di mana bahagian yang sekurang-kurangnya beberapa dasar adalah digerakkan oleh satu motor elektrik, disediakan dengan satu litar kawalan untuk menentukan sesuai mengikut tenaga yang dibekalkan daripada punca kuasa ac / dc. Ciri-ciri tambahan, lokasi seperti tambahan litar kawalan menggunakan motor pelangkah dan kontur litar peralatan terpakai mungkin diambil untuk bekerja dengan automatik bagi menyesuaikan bahagian kepala. Pengatur menghadkan naik turun usul dasar bawah kawalan motor dasar, secara mekanik menggerakkan adalah secara automatik. Tumpuan projek ini mengenai bagaimana untuk memberi keselesaan dan kemudahan kepada pesakit untuk mengawal sendiri pergerakan bahagian kepala katil mengikut kesesuaian tanpa meminta bantuan daripada jururawat atau orang lain dengan menggunakan alat kawalan yang disediakan.

ABSTRACT

Beds, such as hospital beds, in which at least some portion of the bed is movably actuated by an electric motor, are provided with a control circuit to determine proper energization of the motor from ac/dc power source. Supplemental features, such as additional locations of the control circuit using stepper motor and contour circuit used gear may be employed to automatically adjust the head portion. In order to limit the up and down motion of the bed under the control of the bed motor, mechanically-actuated are employed. This project focus on how to make a patient pleasure at a bed where the patient can move the upper side at the patient head by press a joystick or button without need to ask someone to do the task.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter consists of explanations about the basic things about the project. It will discuss about the project objective, problem statement, scope, and thesis structure in order to complete the project. Also content the literature review related to this project from the inventor.

1.1 Background of Project

Many bed present uses in hospital nowadays are governed by using electric. The movement of fall or rose this bed is handled by using remote control or manually which enables patient adjusts their bed for their own comfortable. Bed used in hospital use hydraulic and also pneumatic system where it involves high cost. This project is implementing as to apply stepper motor to control the up and down movement of that bed replace present system used. This stepper motor get instruction from programmed engineers in PIC 16F84A.

Stepper motor using as the output for this project where the instruction is written using PIC 16F876A. To control this bed movement, joystick takes the place of something or someone to control systems that are used at bed's patient in the hospital. This project use system simple that was modified from system base of patient's bed movement used in most hospital. To program of instruction this stepper motor, use Microelectronika, Micro

C. Besides the circuit easy and simple, which instructions used also easy to understand and facilitate to repair the error. For the supply, rechargeable battery is use as it easy and costly.

While some types of such systems have been developed in the past, some quite successful, it have generally been relatively complicated in order to obtain the desired isolation between the selecting and power portions of the system, and hence relatively expensive and more prone to failure.

1.2 Problem statements

There are several problems occur that need some decision to choose on doing this project. Nowadays, bed using in the hospital are located next to the wall because it's plug in direct to the AC power supply and it can't be moveable. So, in that case, it gives inspired to try changing it by using rechargeable battery. Besides, the movement for every portion of the bed conducted by hydraulic system, and because of the situation trying to change it by using gear and bearing that we know more economical. Here are states the problems:

- Hard to control the head portion of the bed manually, by using software it will work automatically
- Nowadays, bed using in the hospital cannot be movable, so by using rechargeable battery it can be placed anywhere.
- Stepper motor is more flexible than using DC motor. The movement can be adjustable either up or down and fast or slow
- Using gear and stepper motor are more economical than using pneumatic system

1.3 Objectives of the Project

There are many objective of doing this project. In order to determine the purpose and the direction of this project, there are only one objective which is the main objective that needs to be accomplished in develops a flexible bed's patient which can change it direction up and down for head automatically by using PIC16F876A as its brain and stepper motor for its movement.

This project basically focuses those objectives:

- To modified and implementation stepper motor driver circuit
- To create the programming to give instruction to stepper motor according to the user command
- To analyze and able to use the PIC or Microprocessor programming
- To ensure the driver circuit is function correctly

1.4 Scopes of the Project

This project focus on how to make a patient pleasure at a bed where the patient can move the upper side at the patient head by press a joystick without need to ask someone to do the task. Focus for up and down portion control by using PIC programmer to stepper motor and the actuator used bolt screw and bearing. In this project, there are some limitation tasks that have call as scope of work. For this project, the scopes are:

- Develop program for microcontroller (PIC 16F876A) to control the up and down portion of the torso part of the head as the modification for the system using from the real in the market usage.
- Simulate the program (using Proteus Professional 7.1) for the hardware development while for software development is using the Microelectronika, Micro C.
- Built circuit for control circuit connected to the interfering system using joystick

- Interface between the controllers with the interfacing system at the prototype part and make sure the whole system will be functional as request when doing demonstration.

1.5 Literature Review

A literature review is an evaluation report of information found that related to the selected area of study. This review will describe the summaries, evaluate and clarify of this literature. It should give a theoretical base for the research and help to determine the nature for this research. This section will be discussing about the theory and concepts that is accordingly link to the project in details. Also, it will inform about the perspective and method that have been using in this project. It also discussed about previous researcher and work base on the previous invented. Through the literature review, it can identify and evaluate technical issues about this project reliability.

For this project, researches are done for the bed patient using in the hospital and in the market which are related to this project. This information is needed as referring notes and to make a comparison between the past project and this project. It will help user to upgrade the bed and make it different without disturb it functionality. What makes it different is the PIC that will be used in this project where this PIC have more input/output compare to the previous PIC that had been used by previous project. According to that, the best solution can be finding to develop this project and make sure it successfully. Besides that, this project will use another difference of controlling method and components that make it different from the previous project. The article and journal can be found on internet and reference book.

1.5.1 First Review: Articulated bed with customizable remote control

In an articulated bed having a motor for raising and lowering the bed, a control circuit operated by selected first preferred bed position and a recall button by which the user can command that handler routine in the control circuit return. Further, the control circuit can have a tracking memory for frequently storing a tracking variable indicating the current position of the bed or control which the user can command that the variable that can be set to equal the current tracking variable [1]. Thus, any time the bed is in a position preferred by the user, the user can push the button to store a user variable indicating the preferred bed position. In the figure 1.0 shows the side elevation of an articulated, motor driven bed. This is the simplified mechanical diagram showing a right side elevation of an embodiment of an articulated, motor driven according to the invention. Figure 1.1 shows a block diagram of an embodiment of a handheld, wireless remote control transmitter unit for controlling the bed in figure 1.0.

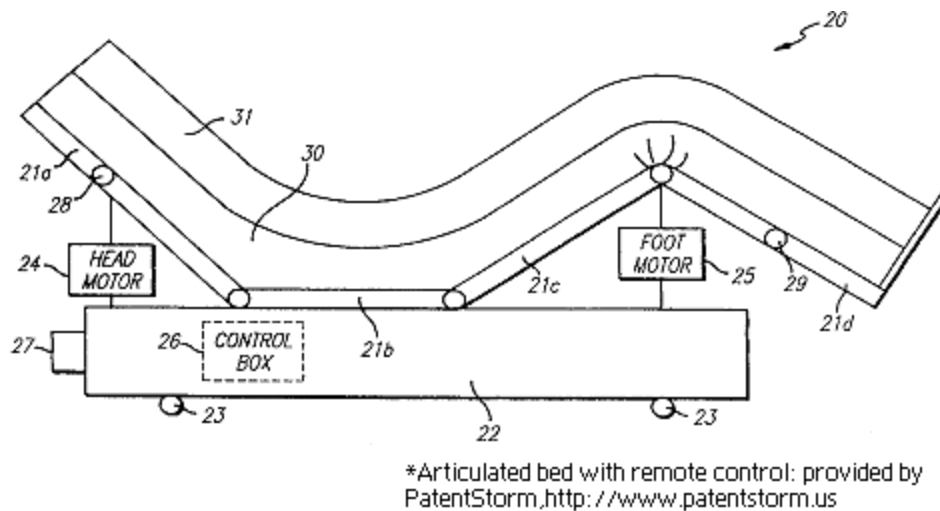


Figure 1.0: Simplified Mechanical Diagram of the Bed

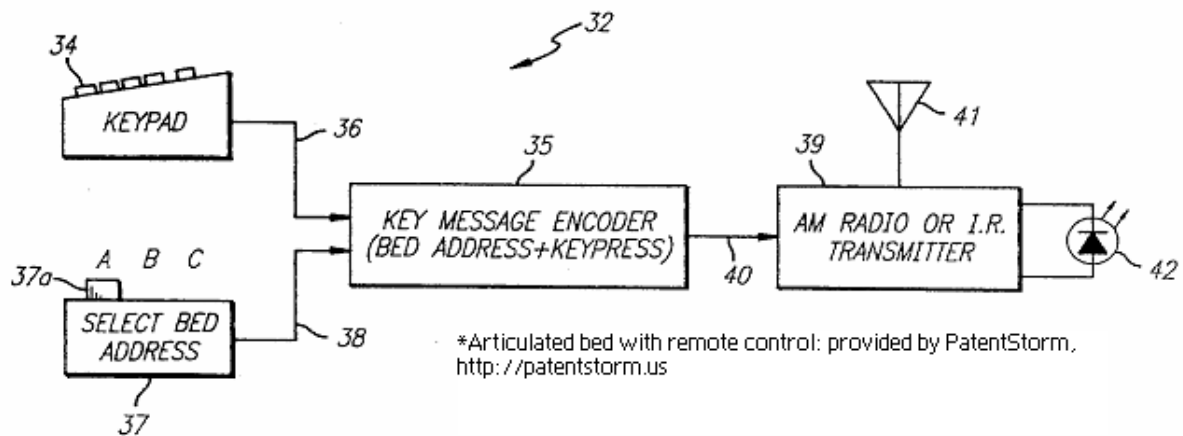


Figure 1.1: Block Diagram of the handheld with wireless remote controlled transmitter

1.5.2 Second Review: Adjustable bed

An adjustable bed having an upper frame mounted to translate with respect to a lower frame. A center support is connected to the upper frame and has a head support pivotally connected to one end thereof. A thigh support is pivotally connected to the other end of the center support and a foot support is connected to the other end of the thigh support. The upper frame is linked to the lower frame so that as the head support is pivoted up, the upper frame is translated toward the head end of the bed, thereby maintaining the head support at a relatively fixed position with respect to appliances and furniture adjacent the head end of the bed [2]. This shows in figure 1.2 that shows the view of embodiment of an adjustable bed while in figure 1.3 shows a view of a prior art bed end.

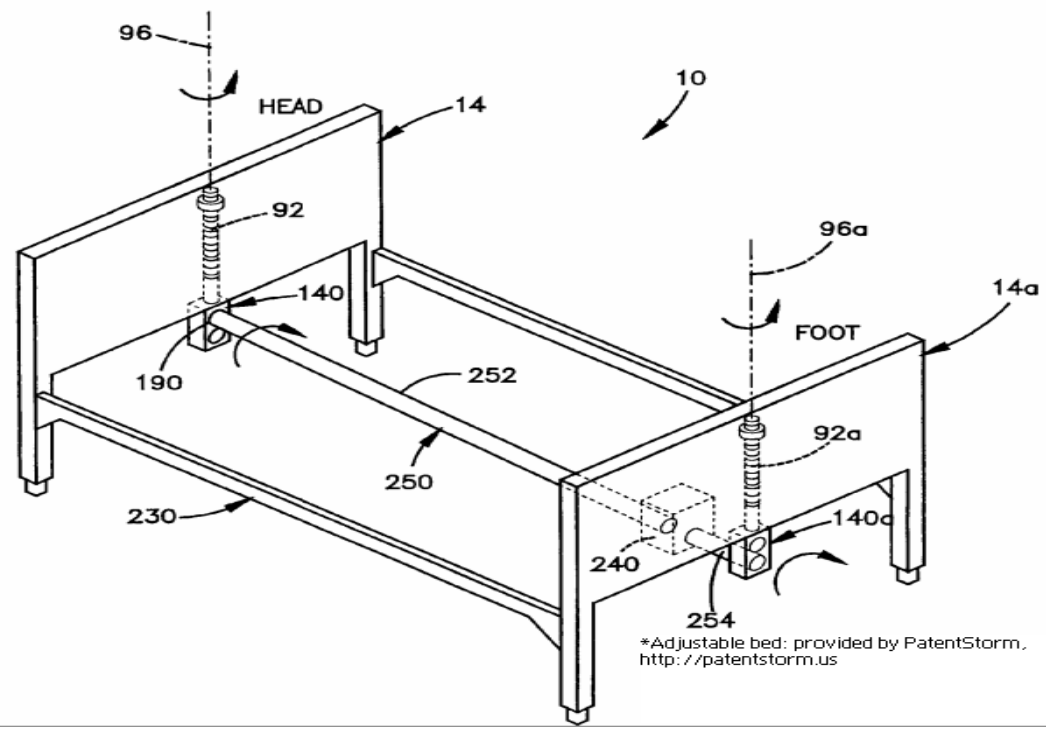


Figure 1.2: Schematic Perspective View of the Bed

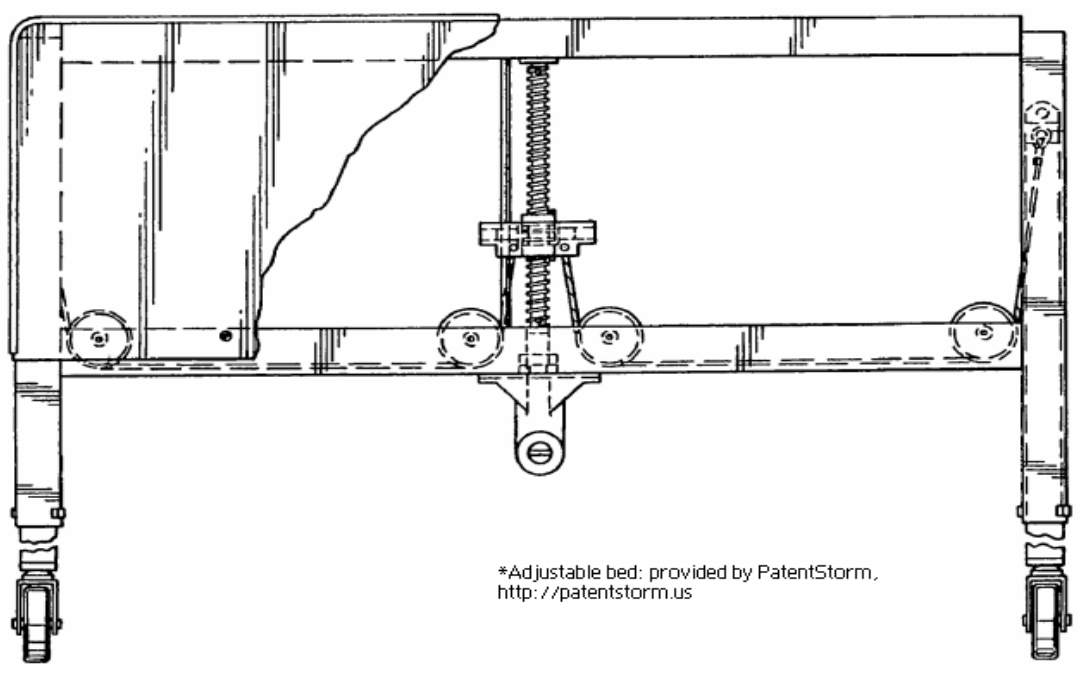


Figure 1.3: Front View of the Exact Location of the Crank