

**DESIGN AND IMPLEMENTATION A FLEXIBLE BED FOR
PATIENT FACILITIES
(PROTOTYPE AND INTERFACING)**

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**DESIGN AND IMPLEMENTATION A FLEXIBLE BED FOR A PATIENT
FACILITIES (PROTOTYPE AND INTERFACING)**

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**A report submitted in partial fulfillment of the requirements for the degree of
Bachelor in Electrical Engineering (Control, Instrumentation and Automation)**

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MAY 2009

“ I hereby declared that I have read through this report and found that it has comply the partial fulfillment for awarding the degree of Bachelor of Electrical Engineering(Control, Instrumentation and Automation)

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

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Date : 8 MAY 2009

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 friends,

Thanks for guidance and support..

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ABSTRACT

This project will cover about designing and implementation flexible bed for facilities. It focus on how the flexible can give the comfortable for patient especially for hospitals beds. This flexible bed is using the stepper motor, bearing, ball screw, and other additional devices. Two type of movement in this project, there are the movement of head portion going up and movement of head portion going down. This project is used the control panel which has four button All the four button use to control the movement of the head portion automatically. The prototype also will be design and built up to complete the operation of this project.

ABSTRAK

Projek ini meliputi rekaan dan pelaksanaan sebuah fleksibel katil untuk kemudahan. Ia member penumpuan kepada katil serbaguna yang member keselesaan pesakit terutama bagi katil-katil di hospital. Peralatan dan komponen yang digunakan dalam projek ini adalah motor, berbola skru, dan beberapa peralatan tambahan. Dua jenis pergerakan dalam projek ini iaitu terdapat pergerakan pada bahagian kepala keatas dan bahagian kepala kebawah. Projek ini menggunakan sebuah panel kawalan yang mempunyai empat butang. Semua butang ini digunakan untuk mengawal setiap pergerakan yang berlaku pada bahagian kepala katil secara automatic. Prototaip juga perlu direka dan dibina uuntuk menyiapkan projek ini.

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CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

1.0 Background of the Project

Technology is a broad that deals with a species usage and ability to control or adapt to its environment. The technology has changed our life become easier. As we know, current beds in hospitals are function manually by human to move the motion of head. Now by using the technology, it has applied as a flexible bed for patient by control it automatically.

This project is to design and implementation a flexible bed for patient facilities by interfacing and prototype. It focuses on how to make a patient pleasure at a bed where the patient can move the upper side at the patient head. The flexible articulated bed is including a bed foundation having a body of the bed, and electrical motor to move the motion of the head portion. There are other equipment which is used in this project such as ball screw, bearing and other additional equipment.

According to this project, the design of the project system is important before start the hardware part. The system need to be created and placed at the suitable of the bed. When the motor operate, the nut will move through the ball screw. The movement will be control by two bearing which are place at both of end point of the ball screw. The head edge of the head portion will automatically adjust up and down motion by pressing the controller. It is important to specify the suitable types of nut and bearing to accomplish through the ball screw. The prototype will be design and built up to complete the operation of this project. The figure of Figure 1.0 shows the whole view of the project.

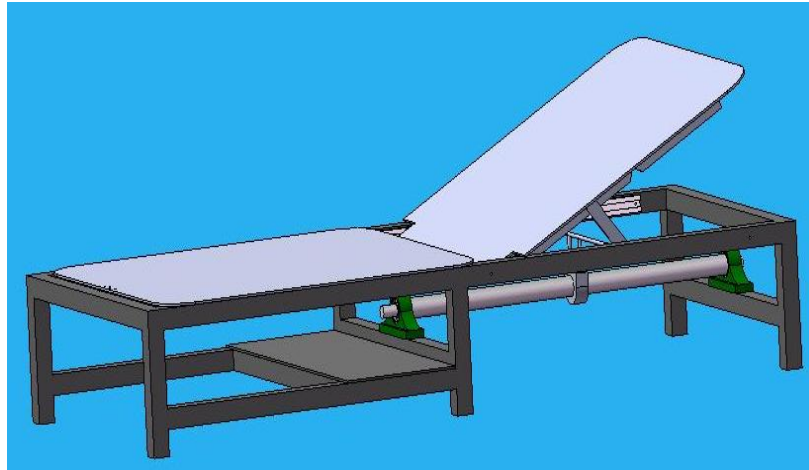


Figure 1.0 Whole View of the project

1.1 Problem Statement

- i Only certain hospital using the flexible bed because of the expensive cost.
- ii Usage of hydraulic devices is more expensive than using stepper motor, ball screw, nut and bearing.
- iii Current beds at hospitals are not flexible and need to be place near the socket.
- iv Hard to control the head portion of the bed manually.

1.2 Objectives of Project

Few objectives to be achieved for the project are listed as follows:

- i To design and build the flexible bed using stepper motor.
- ii To upgrade the standard of people life with easy way to use the flexible bed by using ball screw, nut, coupling and bearing.
- iii The patient can control the panel function to make easier and operate automatically.
- v To control the movement of up and down of the head portion.

vi To interface the prototype of the bed patient and the panel controller

1.3 Scope of the project

By referring the problem statement, some scope must be accomplished for the improvement to be achieved. The focus of the project is to study on the method of current hospitals beds. This is by referring the information on the changing method of the equipment. Other useful information is including the specific nut, bearing, suitable joystick as a control panel and also the voltage to operate the stepper motor. The information gathered from the studies is analyzed so that suggestion of using the ball screw, bearing, nut, stepper motor and other additional equipments are achieved. The scopes of the project are:

1. The focus of the project is to study on the method which is need to change the method of equipment.
2. Design to operate the motor to support the load by using the Solid Work programmed.
3. Interface the system design with the circuit development and controller.
4. To make sure the whole system will be function after interface the prototype and stepper motor controller.

1.4 Outline of Report

This report consists of 5 chapters where each chapter filled with detail of scope and description. The first chapter is introduction and literature review. This chapter discuss about the factors that lead to the development of this project. Besides, it also focuses to the objectives of the project, problem statement and scopes of the project. For the literature review is discuss about the theory of components using and comparison between previous projects.

For the chapter two is about the method and material. This chapter describe in details about the way of any project is conducted. For this project the methodology

includes of project development for every phases development for every phases starting from the development of hardware until troubleshooting to complete the system. It also includes the description of the materials that used in this project. For chapter three is results and analysis where these chapters are explain about the analysis, functionality of the complete system. Besides, it consists about the project planning that has been set from the beginning of the project and the discussion of the problems and constraints that occur during the project development. For the chapter 4, is discussion of results which is describing the project result briefly. Then for the last chapter that is chapter 5 is consist the summary and conclusion. This chapter is concluding the overall of the project and including the recommendation of the project.

1.5 Overview of literature review

Literature review is an activity for researcher to research about the project of paper work that has been done and related to improve the project. It will explain and discuss about the source or article that related to the project. It is consist of the products that have been appeared in the current market. This chapter is also contained the theory of the components and equipments that is used in the project. Paper work or journal that related with flexible bed should be review, as it can help in the future if problem occur.

In other word literature review has been done to make sure:

- i It can give the reader to overview the project that has been suggested from the project that already been done by the inventor.
- ii The process of methodology that has been use for the project, can be implemented to the project that has been suggested.
- iii The information is not in the last project, can be added into this project to make the innovation.

1.6 Previous Project

Nowadays, we already have a lot of technologies of the flexible bed for facilities. There are some researches about the types of adjustable or flexible beds to be used as guideline in developed the flexible bed. Here, got few last technologies that people use for their flexible bed facilities.

1.6.1 First Review : A Drive Unit for Adjustable Beds

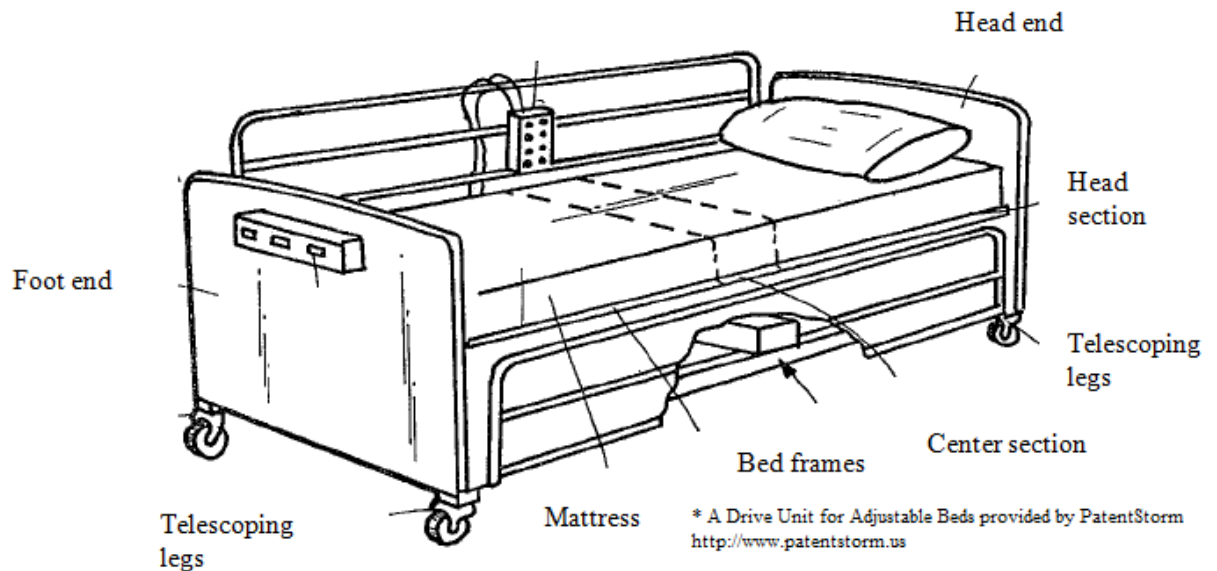


Figure 1.1: Perspective View of a Drive Unit for Adjustable Bed.

This review is generally designates a drive unit for adjustable beds, such as hospital beds and the like, of the type which have movable head and foot sections, other adjustment functions, comprises a single, unidirectional, rotary motor, and a drive shaft for each adjustable bed function. [1] The illustrated bed includes a pivoting head section, a pivoting foot section, a center section and telescoping legs which can be extended and

retracted to vary the elevation and inclination of the bed frame and mattress. A pair of drive wheels are rotatable mounted on each of the drive shafts, and are rotated thereon in opposite directions by the motor. Pair of spring clutches are operable associated with each pair of drive wheels, and alternatively engage or connect selected drive wheels with their associated shafts to rotate the shafts. Thereby it will adjust the position and configuration of the bed. Figure 1.1 shows the perspective view of a unit for adjustable bed. [1]

1.6.2 Second Review : Dual Hydraulic Hospitals Bed

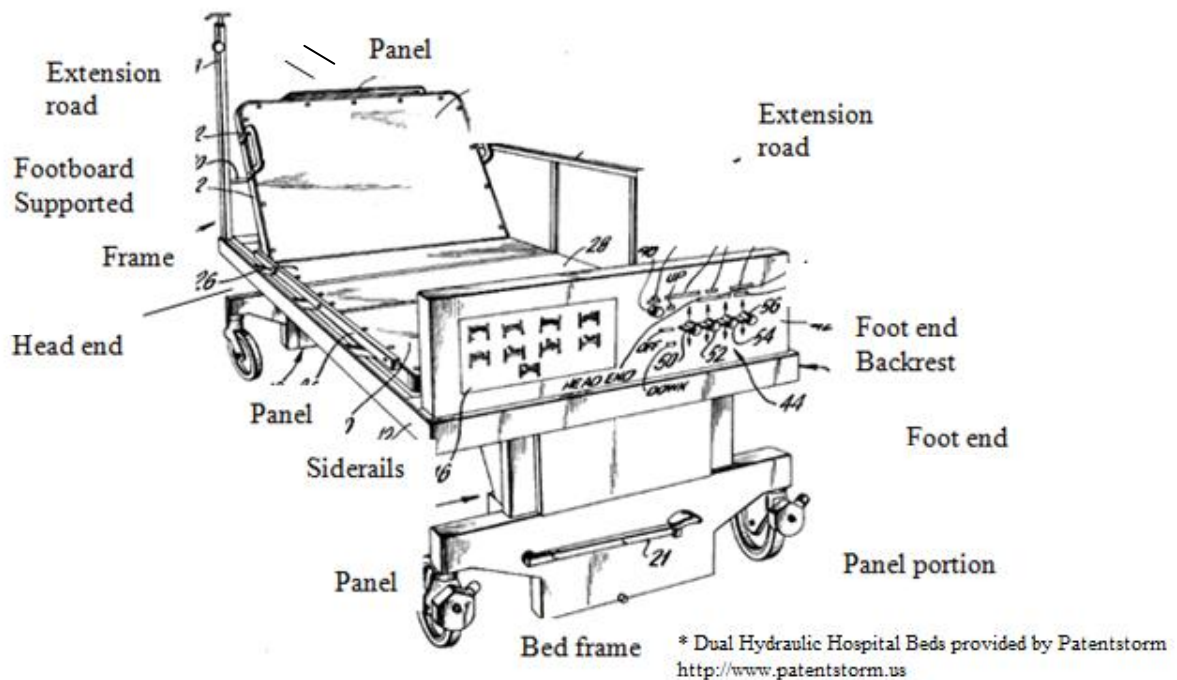


Figure 1.2: Perspective View Illustrating of Hospital Bed

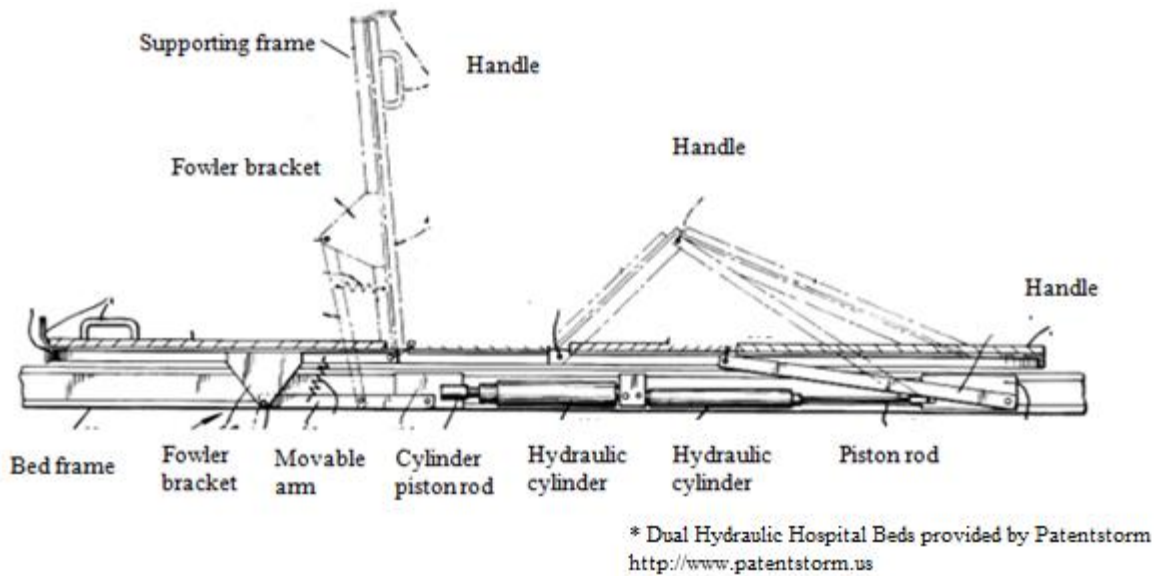


Figure 1.3: Partial Side Elevation View of One Side of the Bed Frame.

An improved dual hydraulic bed having hydraulically actuated support means for controlling the movement of the bed frame. A dual mode hydraulic pump actuates pump actuates the support and controls the movement of additional hydraulic. [1]. Figure 1.3 shows that the perspective view illustrating the improved hospital bed of the present invention in fowler position. This improved hospital bed includes a rigid rectangular bed frame supported at its head and end foot .The usage of additional hydraulic is to control the position of the bed and support frame, the position of the upper body and legs of a patient

The dual mode hydraulic pump is driven by a foot pedal or compressed air from a compressed air source, such as the compressed air wall outlets found in most hospital rooms. Figure 1.4 shows that there is a partial side elevational view of one side of the bed frame showing the hydraulics means for moving the upper body panel and leg panels out of their horizontal planar position. [1] For the control panel portion is includes an air select push button and controls in the form of the bed position control switches. There are 2 position switches to control the movement of the head and the movement foot end.

1.6.3 Third Review: Single Motor Fully Adjustable Bed

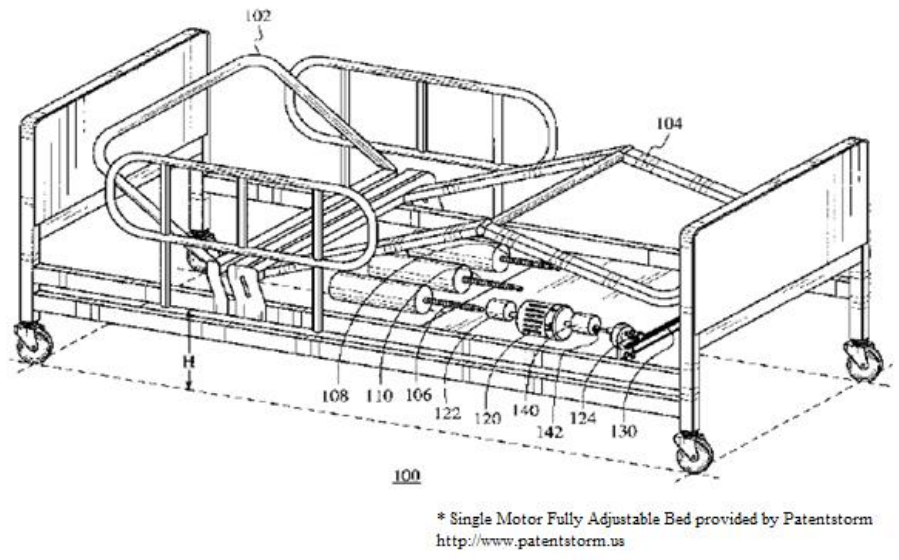


Figure 1.4: Isometric view of Fully Adjustable Bed

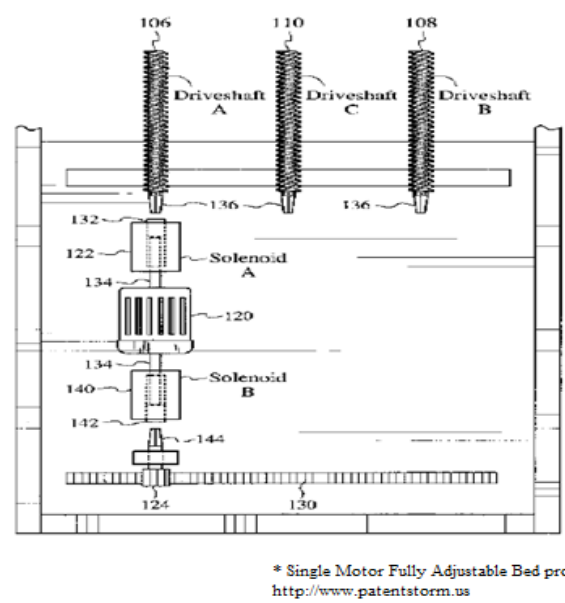


Figure 1.5: Schematic of an Embodiment of A Drive Assembly