CHAPTER ONE

INTRODUCTION

1.1 overview:

Lift or elevator, is a transport device that is very common to us nowadays. We use it every day to move goods or peoples vertically in a high building such as shopping center, working office, hotel and many more. It is a very useful device that moves people to the desired floor in the shortest time.

This project purpose is to design and implement a four floor smart elevator system, and dissertation documents the findings and results of a research on a microcontroller based elevator system. It provides information, which is useful to those who wish to carry out an elevator system research or project.

In this project, ATMEGA16 microcontroller is used as the primary controller. Besides, it is consist of various inputs and outputs circuits together with an elevator model. The ATMEGA16 microcontroller is used to coordinate the functions of various hardware circuits. Service request circuit, keypad and sensors are used as input. DC motor driver circuit, LCD (liquid crystal display) and various types of LED (light emitting diodes) displays are used as output.

The elevator model was constructed to simulate an actual elevator for four floors in the real life. It can be counted as the output hardware of the system. The software for the system was designed according to the real elevator traffic management algorithm. The combination of the hardware and software perform the simulate function of a basic elevator system.

1.2 History of Elevator

Elevators began as simple rope or chain hoists. An elevator is essentially a platform that is either pulled or pushed up by a mechanical means. A modern day elevator consists of a cab (also called a "cage" or "car") mounted on a platform within an enclosed space called a shaft or more correctly a hoist way. The first reference elevator was invented by Archimedes in 312. From some literacy source, elevator were developed as cable on a hemp rope and powered by hand or by through animals. This type of elevator was installed in the Sinai Monastory of Egypt. In the 17th century, the very small type elevators were placed in the building of England and France. In 1793, Lvan Kuliben created an elevator with the screw lifting mechanism for the winter place of Saint Petersburg. In 1816, an elevator was established in the main building of Sub-Moscow village called Arkhamgelskoye. In the middle 1800's, there were many types of curd elevators that carried freight. Most of them ran hydraulically. The first hydraulic elevators used a plunger below the car to raise or lower the elevator. A pump applied water pressure to a plunger, or steel column, inside a vertical cylinder. In 1852, Elisha Otis introduced the safety elevator, which prevented the fall of the cab, if the cable broke. In 1857 March 23rd, the first Otis passenger elevator was installed in New York City. The first electric elevator was built by Werner Von Siemens in 1880.

In 1874, J.W. Meaker patented a method which permitted elevator doors to open and close safely. In 1882, when hydraulic power was a well established technology, a company later named the London Hydraulic

Power Company was formed. In 1887, American Inventor Alexander Miles of Duluth, Minnesota patented an elevator with automatic doors that would close off the elevator shaft. In 1929, Clarence Conrad Crispen, with Inclinator Company of America created the first residential elevator. In 2000 a vacuum elevator was offered commercially in Argentina. (LLC 2006,2010). [1]

1.3 Types of elevators

There are three types of elevators in general used today. With modern equipment from a reputable manufacturer, the quality of ride should be about the same.

❖ **Hydraulic elevators**

Hydraulic elevators are moved by a hydraulic piston device, and are generally used in low-rise, low speed applications, including commercial buildings of four floors or less and residential buildings of six floors or less.

❖ **Traction Elevators**

Traction elevators are divided into two:

- Geared-traction elevators These are moved by hoist cables driven by a geared reduction unit, and are generally used in midrise, mid-speed applications, such as commercial buildings of nine floors or less and residential buildings of 18 floors or less.

- Gearless-traction elevators these are moved by hoist cables driven directly by a large-frame motor, and are generally used for high-rise, high-speed applications, such as commercial buildings over nine floors and residential buildings over 18 floors.

To specify elevators, you need to know the appropriate types to serve the varied needs of different buildings.

❖ **Climbing elevator:**

A climbing elevator is a self-ascending elevator with its own propulsion. The propulsion can be done by an electric or a combustion engine. Climbing elevators are used in guyed masts or towers, in order to make easy access to parts of these constructions, such as flight safety lamps for maintenance. An example would be the Moonlight towers in Austin, Texas, where the elevator holds only one person and equipment for maintenance.

1.4 Uses of Elevators

An elevator can be constructed to use as:

- Passenger service: A passenger elevator is designed to move people between a building's floors.
- Freight elevators: A freight elevator, or goods lift, is an elevator designed to carry goods, rather than passengers.
- Stage lifts: Stage and orchestra lifts are specialized lifts, typically powered by hydraulics, that are used to lift entire sections of a theater stage.

- Vehicle elevators: Vehicular elevators are used within buildings or areas with limited space (in lieu of ramps), typically to move cars into the parking garage or manufacturer's storage.
- Boat elevators: In some smaller canals, boats and small ships can pass between different levels of a canal with a boat lift rather than through a canal lock.
- Aircraft elevators: On aircraft carriers, elevators carry aircraft between the flight deck and the hangar deck for operations or repairs. These elevators are designed for much greater capacity than other elevators, up to 200,000 pounds (90 tones) of aircraft and equipment. Smaller elevators lift munitions to the flight deck from magazines deep inside the ship.
- Residential elevator: The residential elevator is often permitted to be of lower cost and complexity than full commercial elevators. They may have unique design characteristics suited for home furnishings, such as hinged wooden shaft-access doors rather than the typical metal sliding doors of commercial elevators.

1.5 On Elevator Industry

With the advent of computers, some companies have designed control systems to better use existing elevator hardware. One solution, made by Schindler, has a keypad on every floor, on which users enter their destination floors. The control system then efficiently routes elevators based on user input, and points users to the elevator that will reach their destination the fastest. Another method has an ID scanner at every floor, allowing the control system to gauge how many people are waiting at each floor.

1.6 Problem Statement

Most of the elevators used in hospitals in Sudan are normal lifts. These normal elevators are time consuming; because there is no intelligent algorithm used to sever the user. There is also a problem of the privacy floors. Some floors should prevent its access; such as intensive care unit (ICU) from the normal visitors using Access restriction such as RFID reader, code keypad, hotel room card, etc..

1.7 Proposed Solution

The proposed solution is to design a control circuit for the elevator to make the system intelligent. Different sensors for different parameters are used to optimize the serving algorithm.

1.8 Aim:

The main aim is to design an intelligent elevator which will be able to serve the users fairly. The security part is an important part in the system which will serve the floor access rights.

1.9 Objectives:

- To propose a control circuit for the hospital's smart elevator
- To design a level of security using key password
- To simulate the system for performance evaluation
- To implement the elevator design in hardware.

- To evaluate the system performance regarding the security and the serving waiting time.

1.10 Chapter Organization:

Chapter one: proposed introduction for project also objective and aims.

Chapter two: show the Related Works and basic component in project.

Chapter three: discuss system design and description of all sensor and control unit.

Chapter four: shown the result of simulation work and many scenarios.

Chapter five: proposed conclusion and recommendations.