

# Portable Rostrum with Automated Height Controller Based on PIC Microcontroller

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**Abstract.** In this proposal, we plan to build the prototype portable rostrum with automated height controlled based on PIC Microcontroller. Rostrum is the platform on which a person stands to make a public speech or to say something to audience. An audience may be large or small group. PIC microcontroller which is the main controller or the brain to the electronic components is attached onto this rostrum. While the Ultrasonic distance sensor will be mounted above the user's head. Height sensor will be used as it is cheap, convenient for distance detection and easy to install with less power consumption. Once the height sensor detects and measures the user's height, it will send data to main controller to process it. Microcontroller manipulates the input data then delivers it to the servo motor as output. The servo motor which is connected to the customized mechanical slide rail will adjust the height of the microphone stand. All electronic devices and motors in this rostrum system are powered by wired and wireless power supply (Lithium Polymer battery).

## Introduction

Electricity consumption is very important at the present time; it is a power that is able to give pleasure to users in their daily life. The rostrum is equipment which is used globally and is very important to the success of an event, especially a formal ceremony. It is used to draw public attention to the speaker. However, the heights of most Rostrums are fixed. As is well known, the average human height by the whole world is far different. Thus, a Rostrum to be used globally must not have fixed height. A normal or disabled individual no longer need to move or adjust the microphone height before starting or during a speech. This rostrum is automatically controlled by the sensor works to detect distance which will be applied to determine the microphones position based on the user height. In addition, this rostrum also has a backup device if the sensor for height device fails. It has a wireless remote control device that can control the height microphone. The device is controlled manually by a technician on duty on the event day. Therefore, the project entitled "*Portable Rostrum with Automated Height Controller Based on PIC Microcontroller*" improves the existing rostrum in the global market. Portable rostrum is specially designed for the convenience of the users while giving a speech. It is a smart touch design with a strong aluminum frame, lightweight and foldable makes it handy and easy to carry.

The main objectives of this proposal are:

To produce rostrum with an automatic height control.

To build rostrum with backup device to control height if sensor malfunctions.

To design mechanical smart folded portable rostrum.

Use light weight and strong material for its frame.

Assemble electronic controller part into rostrum frame.

## **Problem Statement**

Nowadays, we can see the microphone adjustment on the rostrum is done manually and distracts user during speech. The existing rostrum models and design in the market, either fixed size or adjustable rostrums have not yet completely solved the problem to suit the various heights of speakers. Furthermore, the size and weight of the rostrums are burdensome transported.

## **Literature Review**

Based on Oxford Dictionaries, rostrum is a raised platform on which a person stands to make a public speech, receive an award or medal, play music, or conduct an orchestra. It is used as a place for the speaker to stand and give his or her speech. Some speakers use the podium to place notes or cue cards for their speech. This helps them to organize what they plan to say better. The rostrum can also be used to ease stage fright.

There are 3 types of rostrum in current market; the fixed rostrum, adjustable rostrum and multimedia rostrum.

**Fixed Rostrum.** Fixed rostrum usually comes in many building materials such as wood, metal and acrylic based. The very famous fixed rostrum is wood based which is usually easy to find in the current market. The market price for this rostrum ranging from RM1000 to RM2+++ depending on the design. Figure 1 below shows the fixed classic wood base rostrum.



**Figure 1: Wood Base Rostrum**

**Adjustable Rostrum.** Another type of rostrum that is available in Malaysia market is the adjustable type. This rostrum is designed for a wider range of target users. The main focus on this rostrum is the mechanical design itself, it is sleek, elegant & stylish. The price range for this rostrum is usually between RM3000 to 4+++ . This rostrum can be plugged in, unplugged and installed to suit user's needs. However, this rostrum does not have the full automatic microphone height control. Figure 2 shows the Adjustable Rostrum.



**Figure 2: Adjustable Rostrum**

**Multimedia Rostrum.** Multimedia rostrum was mainly designed for the electronic application utilization such as e-class, e-learning or e-classroom as shown in figure 3. It consists of complete computer set such as desktop, liquid crystal display, optical mouse, printer, scanner, projector and white screen. Public Address System (P.A) is also included in this rostrum with large speaker and microphone as audio presentation. The advantages to this rostrum are in the educational practice where knowledge, skills and understanding can be expressed very fast. The price of this multimedia rostrum is very expensive starting from RM5000 to RM20000 depending on the electronic appliances installed. The disadvantages of this rostrum are heavy and difficult to move.

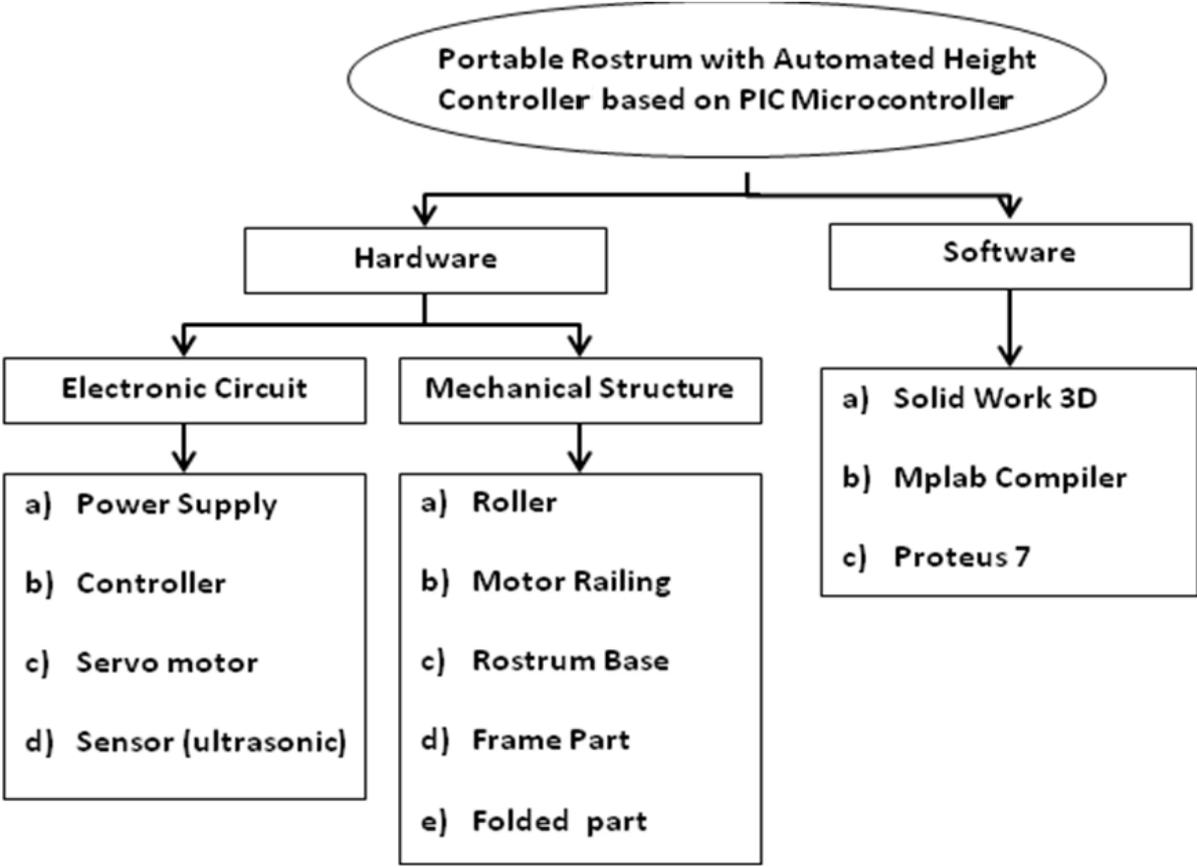


**Figure 3: Multimedia Rostrum**

### Methodology

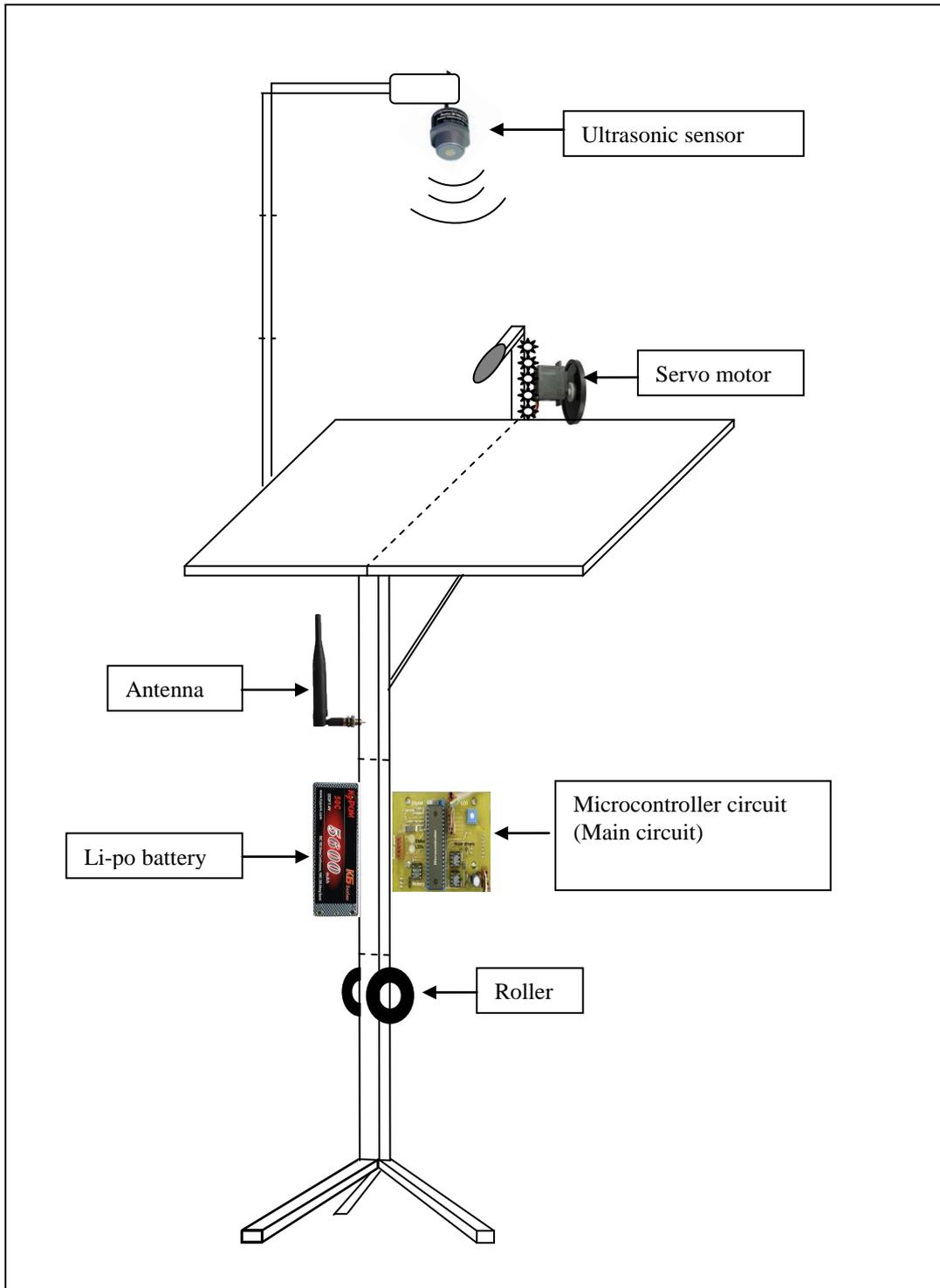
This project divided two major parts such hardware and software development. In hardware development it's divided into two sections. Section 1, is mechanical design, mechanical fabrication and mechanical assembly. Section 2, is an electronic circuit design which consists power supply circuit, sensor circuit, motor circuit and controller circuit. But all the hardware

activity can be analyzed first before proceeding with the development of this project. Meanwhile software development, it divided into two parts, part 1 is the mechanical software used to design smarter and folded rostrum frame or structure such as Solid Works<sup>®</sup> 3D CAD software delivers powerful design functionality with the intuitive Solid Works user interface to speed the design process and make the design instantly productive. Solid Works is powerful and user friendly software to design 3D mechanical structure. Part 2 is the electronic software that will be used is Proteus 7 to design all electronic circuits in this project. The main controller for the microcontroller will be used the Mplab software to compile all the programming part and simulate it. Below figure 4 shows the simplified methodology flow chart to build the rostrum.



**Figure 4: Flow Chart of Project Development**

## Project Graphical Design



**Figure 5: Portable Rostrum with Automated Height Controller Based on PIC Microcontroller**

### **Expected Result**

Hopefully, this idea or concept of "*Portable Rostrum with Automated Height Controller Based on PIC Microcontroller*" could be accepted by My Grants and meet the local government/private agencies demand. This portable rostrum is specially designed for the convenience of the users while giving a speech. It has a smart touch design with a strong aluminium frame and lightweight. Furthermore, it can be folded and easily transferred to anywhere by one person. Lastly meet the entire objectives of the project.

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