

CRANIAL CONTROL WHEEL CHAIR

Ahsanullah University of Science and Technology

2. ABSTRACT:

i) **Objective:** The aim is to create a smart electrical wheel chair for the disable people in Bangladesh as well as all over the world. As according to the **WORLD BANK STATISTIC**, Currently around **10%** of the world's population, or roughly 650 million people, live with a disability.

The World Bank estimates that 20 percent of the world's poorest people have some kind of disability. **So, our target is to build a wheel chair which will not only serve people who are suffering disability but also make it cost efficient and establish it industrially.**

ii) **Beneficiaries:** Our project is for those **disable people** who lost their hands and legs in an accident (i.e. road accident) or they are disable by born. **Our CRANIAL CONTROL WHEEL CHAIR can make self-dependent to those people who don't even have their both legs and hands.** It is because our wheel chair is controlled by the movement of our head. It'll let them move by their own without any support of other person.

iii) **Usage:** The main user of our Wheel chair is disable people.

3. BACKGROUND:

We've seen many people suffering with disability, some of our close relatives and even one of my friend lost his one leg and one hand in reckless road accident. So, we saw their life is very difficult. They become dependent and start thinking that they are burden to their family and society as they cannot work or move by their own. They start to lose their self-confidence. This is the main background that let us feel to do something for them so that they can live their life with dignity.

4. STATEMENT OF PROBLEM:

The statement of our problem is we're creating a wheel chair which doesn't need any hands or legs and even any physical support to move around nearby places. The user can control the wheel chair by their own without any hands or legs by using the head movement. Thus it'll make them self-dependent and comfortable.

5. RESEARCH:

The CRANIAL CONTROL WHEEL CHAIR's main method to solve the problem of those disable people who may don't have their both hands and legs and depend on wheel chair for their entire life. **It'll not only make their life independable but also its cost efficient, eco-friendly and user friendly.**

They can control the Wheel Chair by the movement of their head by rotating it, the CRANIAL CONTROL WHEEL CHAIR will move smartly to that direction where the user just placed their head.

They need to just move their head upward to move the wheel chair in forward direction, backward direction for moving their head backward. The wheel chair will move right and left regarding the head's right and left movement respectively.

Our method is better than other default methods because our method is more user friendly. In addition, our CRANIAL CONTROL WHEEL CHAIR costs 100USD, on the contrary an electronic remote control wheel chair cost minimum 1900USD (amazon, ebay etc.)

6. TECHNICAL REPORT:

Our Wheel Chair is divided in two segments. 1. Transmitter segment. 2. Receiver segment.

The whole system is wireless and moderated by Bluetooth.

Transmitter segment measures the angular movement of head and it sends the data to the receiver segment which is basically placed on the wheel chair. The receiver segment receives the data and provide the command to the motor through Arduino and motor driver. Finally the motor runs the wheel chair.

TRANSMITTER SEGMENT

- ◆ Power supply: 9V DC battery which will power the whole transmitter system which will be placed in the head of the user on a head band.
- ◆ MPU6050: the gyroscope sensor, it calculates the angular movement of head when the user moves it in a specific direction.
- ◆ Arduino nano: MPU6050 measures the rotation and sends the data to the arduino which is basically a micro-controller.
- ◆ Bluetooth: it is the main source of our wireless connection. Arduino sends the data to the transmitter Bluetooth (master) and this Bluetooth transmits the radio-wave signal to the Receiver segment.

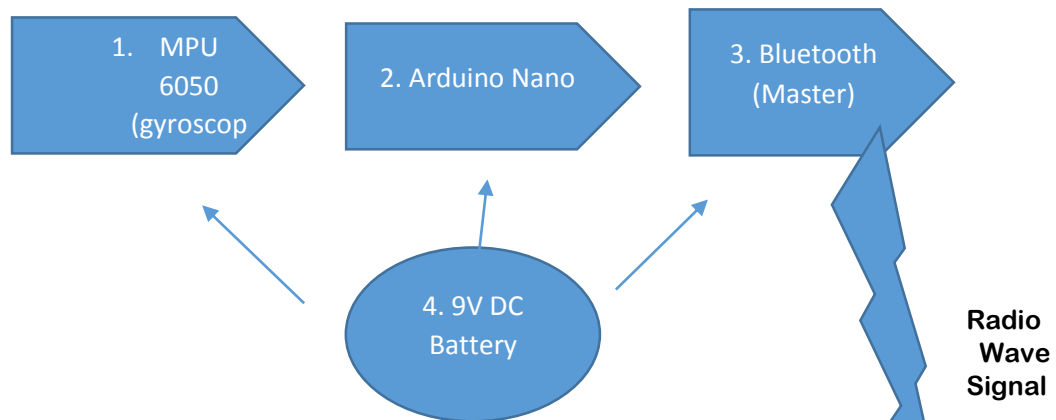
RECEIVER SEGMENT

- ◆ Li-po Battery: 12V, 1.5amp Li-po Battery is used for the prototype model to power up the receiver but we will use Li-po battery of 24V when we will make it industrially.
- ◆ Bluetooth: The Bluetooth (slave) receives the data from the transmitter and it sends it to Arduino
- ◆ Arduino: The micro-controller receives the data and run the code according to it and send the signal to Motor Driver.
- ◆ Motor Driver: The motor driver moderate two DC motor by the signal of Arduino.
 - ◆ Motor: Two DC motor of 12V thus take the power from the Li-po battery and generate the CRANIAL CONTROL WHEEL CHAIR by head movement.
- ◆ Others: A capacitor of 100 microfarad and a buck regulator have been use in the receiver for better electrical supply.

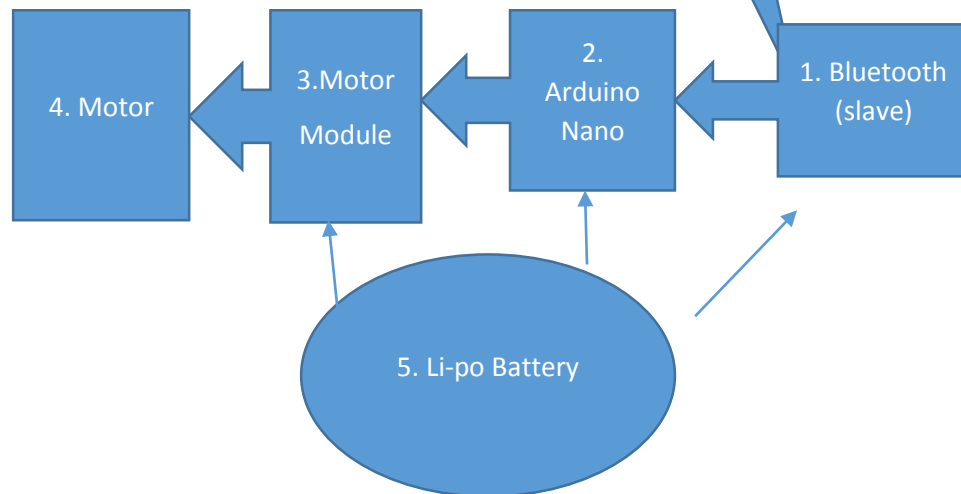
We had built the project successfully on a prototype and it's practically working very well.

FLOW CHART of CRANIAL CONTROL WHEEL CHAIR:

Transmitter:



Receiver:



POWER CONSUMPTION OF THE CRANIAL CONTROL WHEEL CHAIR:

Component Name	Power (watt)
Receiver	
Arduino (5V, 0.5A)	2.5
Bluetooth (5V, 0.05A)	0.25
Motor (12V, 0.5A)	6
Motor Module (12V,0.3A)	3.6
Buck (12-5V,0.5A)	3.5
Total Power Consumption	15.85
LiPo Battery (12V, 1.5A)	18 (supply)
Transmitter	
Arduino (5V, 0.5A)	2.5
Bluetooth (5V, 0.05A)	0.25
MPU6050 (3V, 0.0039)	0.0117
Total Power Consumption	2.76617
Li-ion Battery (7V, 3A)	21 (supply)

7. RESULTS:

We're thinking to make a positive impact against disable people and patients in Bangladesh and all over the world.

The significant output our project is to help the society, improve the living of sick and disable people, making themselves self-dependent, making them to lead their life by their own will and grow confidence in them and sometimes it'll also remove burden from some people who maintain the patients. Furthermore, our project may let them feel that they are not different from us and that's how our little effort will make us feel proud.

We faced many challenges as well as faced many problems while taking our project to reality. Which was 1. Making it cost efficient, 2. While managing the total power supply and entire electrical circuit, 3. Making it lightweight and lastly 4. Making it environment friendly.

We had come across all difficulties and we tried to solve every of it.

Thus, we have pros and cons of our project. We solved the cost efficiency by using good electronics but cheap in price. We will use high quality bamboo to create the base structure of the chair, it'll make it less in weight as well. We successfully handled the circuits and power

managements. On the other hand we could not make it water proof and still didn't give it an industrial true shape because of funding. It'll be a little painful to recharge the battery of receiver segment and change the battery of transmitter segment.

8. LINK OF GOOGLE DRIVE CONTAINING PROTOTYPE'S VIDEO AND IMAGE:

https://drive.google.com/open?id=18JnYzOPAIXs8_ENJQWWEb3zGP3MS09RE

9. APPLICATION:

♦ Bangladesh is country of poverty. **So, the main advantage of our Wheel Chair is it is cost efficient.** It only take 100 USD to produce it industrially and on the other hand it takes 2000 USD to buy electronic remote control wheel chair that needs a single hand to control it and we don't need any hand here.

This Wheel Chair is self-responsible. It makes the user's life feel comfortable, self-dependent, confident as they no longer need another person's help to move.

The Wheel Chair is eco-friendly and no harmful electronic devices are used in here while creating it.

CRANIAL CONTROL WHEEL CHAIR is easy to use. It is very much user friendly as it moves just the movement of our head.

We solved the cost efficiency by using good electronics but cheap in price. We will use high quality bamboo to create the base structure of the chair, it'll make it less in weight as well. We successfully handled the circuits and power managements.

10. FUTURE PROSPECTS, RESEARCH, FURTHER DEVELOPMENT:

We have some couple of future scopes of our project that we want to work in it,

♦ We are enhancing voice output system with the Wheel Chair. Thus the wheel chair can transmit output voice when walls or obstacles are ahead by using Sonar sensor which detects the distance of the object from it. In this way, a blind patient can also use it as well as a patient who doesn't have both hands and legs.

♦ Additional Camera can enhance the facilities of the system to an extent.

♦ The Wheel Chair can be portable so that the user can carry it anywhere.

♦ Solar Charging on the battery can remove efforts from charging the battery and it can increase the facility of the wheel chair as well as ensure comforts too.

11. BUSINESS PLAN:

We are planning to vast our project in future if we get good amount of funding from government or non-government organizations. Our business motto is to earn foreign currencies by exporting our wheel chair abroad and also making life better in here for our country people.