

Neural Rehabilitator – Design and Fabrication for Motion of Four Limbs

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Abstract - This idea is called **Neural Rehabilitator**. The meaning of 'neural' is problem or disease related to nervous system and 'rehabilitator' is machine which helps to improve or to rehabilitate for giving signals to brain. This project is to be made for neurological disorder like cerebral palsy and many more disease related to it. Cerebral palsy causes things like overly toned muscles, poor reflexes, under-toned or floppy muscles, poor coordination, poor posture, and poor balance. All of these issues impact how a person moves and is able to get from one place to another. In neural rehabilitator there is repetitive passive motion which is done by four wires for 4 limbs of a human. Here wires are to be attached with legs and hands and repetitive motion is done by manual or in automatic way to all 4 limbs. By these technique reverse process is done in body and message is passing to brain which helps to improve nerve process and at long process for long time brain will learn to absorb signal and it can react to process which is done by human.

Key Words: Neurology, Rehabilitation, Cerebral Palsy, Human Limbs, Therapy Machine, Paralysis

1. INTRODUCTION

Cerebral palsy (CP) is a group of **permanent movement disorders**. There may be problems with sensation, vision, swallowing and speaking. In Neural Rehabilitator, there is repetitive passive motion which is done by ropes for **4 limbs** of a human. By technical reverse process message is passed to brain which helps to improve **nerve process**. Due to **continuous repetitive** action of 4 limbs for long time brain will learn to absorb signal and it can react to process.

1.1 Cerebral Palsy

Cerebral palsy is an abnormality of motor function (the ability to move and control movements) that is acquired at an early age, usually less than 1 year, and is due to a brain damage. The word "cerebral" means having to do with the brain. The word "palsy" means weakness or problems with body movement. CP is frequently the result of abnormalities that occur while a fetus (fertilized egg, unborn baby) is developing inside the womb. According to the **Centres for Disease Control and Prevention (CDC)**, it affects at least 1.5 to 4 out of every 1,000 children worldwide.

1.2 Common Signs of Cerebral Palsy

1. Delays in reaching motor skill milestones, such as rolling over, sitting up alone or crawling, Variations in muscle tone, such as being too floppy or too stiff.
2. Delays in speech development and difficulty speaking.
3. Difficulty walking, Favouring one side of the body, such as reaching with one hand.
4. Neurological problems, such as seizures, intellectual disabilities, and blindness.

1.3 Various Treatment for Cerebral Palsy

1. Assistive Aids
2. Medication
3. Surgery
4. Speech Therapy
5. Counselling
6. Physical Therapy

2. Neural Rehabilitator

2.1 Problem Summary

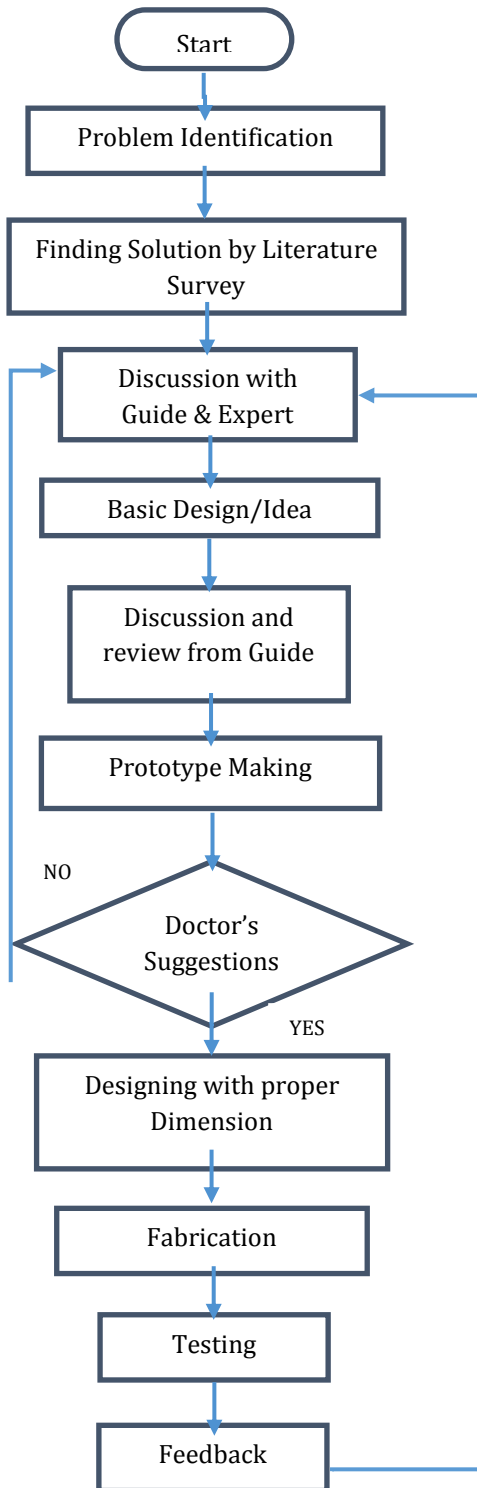
The reason behind this disorder is damaged neurological network of the patient's body. Such abnormalities may include accidents of brain development, genetic disorders, stroke due to abnormal blood vessels or blood clots, or infection of the brain. When a patient is suffering from CP, his legs are more bent than a normal person. Due to this reason the center of gravity of the patient will not remain at proper location which results in improper balance, improper walking and ultimately poor overall body posture. So to improve the walking style of CP patient we can use a therapy machine like Neural Reahabilitator.

2.2 Existing Design for Solution

The existing model is rigid and non-flexible. The height of the chair is not adjustable according to patient's comfort. The length between chair and front end is also not adjustable according to the patient's height. The most important thing is

that it is not flexible in terms of dis-assembling the whole setup.

2.3 Trial and Error Method



2.4 Modified Design

Neural Rehabilitator contains various type of components:

1. Base Frame
2. Sliding mechanism
3. Screw Jack
4. Flexible Chair
5. Upper Frame
6. Paddle mechanism
7. Pulleys and Gym rope
8. Hand support



FIG 1: Final Product Side View

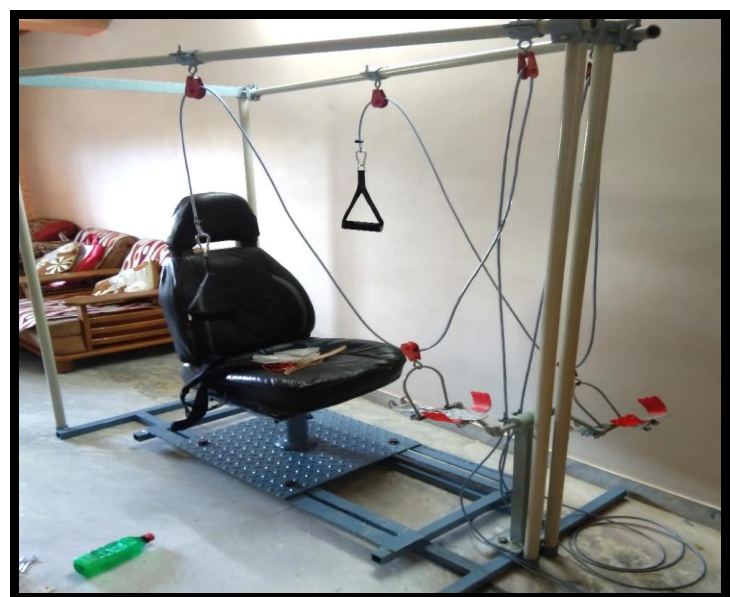


FIG 2: Final Product Front View

2.5 Advantages of Modified Design

1. The essential benefit of Neural Rehabilitator is that, person with any height or age can do exercise on the machine.
2. The sliding mechanism can help the patient to sit comfortably on the machine and to do exercise properly.
3. By doing exercise on this machine day by day, the walking style is changed of the patient and this can cure the disease at very much extent.

3. CONCLUSION

Under the supervision of physiotherapist the testing took place and conclusion came that by doing repetitive motion on Neural Rehabilitator, helps the patient to gain the ability to walk. This method is way more helpful than others like medication and surgery which are quite dangerous than this. Patient's walking style can be improved up to some extent. They can walk again like a normal Human being walk. By synchronizing doctors' suggestion, the machine can be modified and can be used for different stretching exercise and different therapies like hippo-therapy, suspension therapy etc.

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