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Adjustable Spoon for Parkinsons Sufferer

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Abstract: Parkinson's disease is one of the most common nervous system disorders after Alzheimer. It is a neurodegenerative disorder.

Early detection of Parkinson's disease can be helpful in preventing it but it cannot be completely cured. In Parkinson's Disease when a person try to focus more on his/her specific body part, at that time the body part on which he/she focuses more shakes very vigorously.

We first discuss the preliminary of the PD and did some background study before working upon the project. The most important of all the problem which they suffer is eating food. Due to continuous shaking for their hands they are not able to eat food properly and therefore, their food fall down. We decided to contribute to the mankind and to do something for humanity and therefore we choose to do this project for the welfare of the society.

This project "Adjustable Spoon for Parkinson's Sufferers" presents our idea on which we worked upon for providing the stability to the Parkinson's sufferers while eating to a lot extent. We considered the parameter of shaking in hand due to which they are not able to eat properly.

In this report, we propose an idea and a working model of an "Adjustable Spoon for Parkinson's sufferer". This adjustable spoon cannot completely remove the tremors in hand. But it can provide stability to the motion (or shaking) of the hand while eating. The patient can easily eat the food with the help of this adjustable spoon.

I.   INTRODUCTION

Parkinson's Disease is one of the most common neurological disorder and has influenced individuals in different age groups. It is the second most common neurodegenerative disorder in the world after Alzheimer. According to Dexter and Jenner (2013) 2% of the world population, over 60 years old, lives with PD [1]. It is a progressive disorder that is caused by degeneration of nerve cells in the part of the brain called the substantia nigra, which controls the movement. These nerve cells die or become impaired, losing the ability to produce an important chemical called dopamine. Without enough dopamine, this balance is disrupted, resulting in tremor (trembling in the hands, arms, legs and jaw); rigidity (stiffness of the limbs); slowness of movement; and impaired balance and coordination. Studies have shown that symptoms of Parkinson's Disease develop in patients with an 80 percent or greater loss of dopamine-producing cells in the substantia nigra. They often start with a slight tremor in one hand and a feeling of stiffness in the body. Over time, other symptoms develop, and some people will have dementia. When Parkinson's develops before the age of 50 years, this is called "early onset" PD. PD is a chronic, degenerative neurological disorder that affects one in 100 people over age of 60 years. While the average age at onset is 60 years, people have been diagnosed as young as 18 years. Estimates of the number of people living with the disease therefore vary. The cause of Parkinson's essentially remains unknown. However, theories involving oxidative damage, environmental toxins, genetic factors and accelerated aging have been discussed as potential causes for the disease.

II.   RELATED WORKS

Pharmacologic therapy is an option to cure tremor but it has its own side effect. There are other invase technologies existing like Deep Brain Stimulation (DBS)[2] which is a neurosurgical procedure which uses microelectrodes to electronically stimulate certain areas of the brain Tremor. There are other existing technologies like gyroglove[3] based on motion detection by gyroscopes and then by using spinning top technology it helps to keep hand upright via spinning.one can also use spinning disc which help to resist movements with overall effect that feels like moving your hand through viscous treacle[4].

A.   Proposed Method

Keeping all the data in the mind, regarding the architecture of the device the placement of our Arduino Nano and the connection of two consecutive servo motors along with each other is such that the horizontal shaft of one is connected with the other shaft causing the spoon to rotate. Both of them are connected to digital pins of Arduino Nano. MPU6050 sensor detect the tremor and roll angle of the vibration of the patients hand. The Pin diagram of the proposed method is shown in the Fig.1

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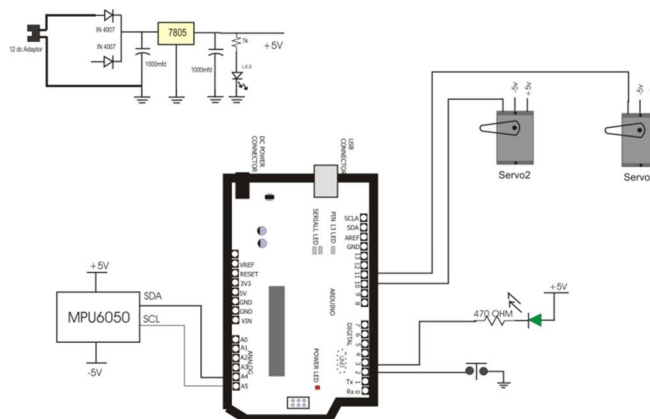*Volume 7 Issue V, May 2019- Available at www.ijraset.com*

Fig 1. Pin diagram

We have taken a power supply from 12V – 1 Amp adapter which is then converted to 5V by using a voltage regulator (7805). Then this supply is given to both Arduino and reference circuitry. First, our 6-axis accelerometer (MPU 6050) detects the deviation and sends it to analog pins of UNO board. Now, these signals are converted to PWM from where the supply is given to the motor causing the rotation of first motor simultaneous to the rotation of second motor which is connected to the shaft of first motor. Our first motor is responsible for controlling vertical motion and second motor is responsible for horizontal motion.

III. RESULT AND ANALYSIS

Following is the area that covers the results and analysis related works of this project.

A. Developed a supporting unit for the patients who suffering from Parkinson's disease

IV. CONCLUSION

The main objective of the project was successfully achieved. PD is one of the common neurodegenerative disorders. Due to this disorder the patient suffers from severe tremor related issue. When the person focuses on a particular body part he/she suffers severe tremor in that body part. Due to this the person is not able to eat properly and therefore suffers a lot of problem. To overcome this problem we designed an Adjustable Parkinson's spoon for the Parkinson's sufferer while eating which help to control the tremor violated.
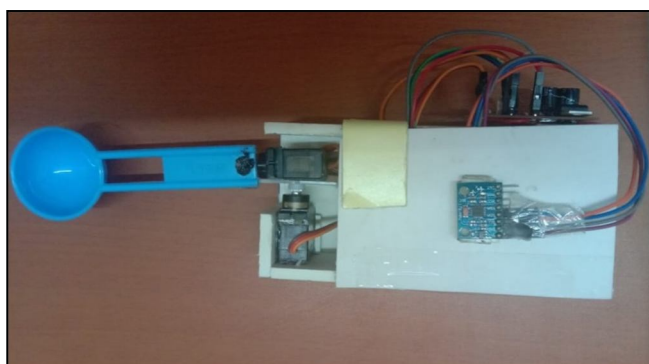
We have used Arduino UNO, servo motors and 6 axis accelerometer and gyroscope for the development of this device. This device can be used as a rehabilitation or supportive device as it does not completely removes the tremors. The objective of our project was to keep the spoon always in upward direction so that the food does not fall down while eating. The planes which we took into consideration are X-plane and Y-plane for the movement of our spoon. Our idea was that when we move our hand in downward direction the spoon goes in the upward direction and vice-versa. Similarly, when our hand goes in right direction the spoon will go in the left direction and vice-versa. Note that the spoon will always remain facing upwards so that the food does not fall down from the spoon.

From an engineering perspective, this project has many concepts acquired through Electronics and electrical engineering and Biomedical engineering. The application of this project is in the field of the biomedical engineering but the concept for the development of this project is all based on electronics and electrical engineering. The servo motors used, coding in Ardunio UNO and the connection between Arduino UNO and servo motor, and Connection between 6-axis accelerometer and gyroscope and Arduino UNO is all based on electronics engineering.

V.   ACKNOWLEDGMENT

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