LOW COST MOBILE SHOE FOR PATIENTS WITH PARALYZED LEG

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ABSTRACT

The main aim of this project is to make the paralyzed leg into movable leg. This proposed system is especially for the persons having single paralyzed leg. Here a shoe is designed to operate in free living conditions. The principle behind this is light sensing and moving to appropriate distance. Let we consider a handicap person who has his right leg paralyzed and his left leg perfectly normal. In this project a self moving shoe with wheels for the right leg and a normal shoe for the left leg will be designed. When the person is standing with his legs together, there is a continuous passage of light from the light source to the light detector from one shoe to another. At that time there is no need of controlling or driving the wheel of paralyzed leg. When the person keeps his left leg forward, in an attempt to walk forward, there is a break in the passage of light between the shoes. At that time, microcontroller detects the variation and make the motor fitted in the paralyzed leg will run or move until it reaches the normal leg (i.e., by detecting the source). Therefore, the right shoe, provided with wheels moves forward to reach the light from the left shoe, to come in parallel position with the left shoe. Likewise, for every step the person keeps with his left leg, the right shoe helps the person move his leg to appropriate distances. Therefore, the person with a paralyzed leg is able to walk with the walking shoe.

***Keywords:* Mobile Shoe, Monoplegia, Paralysis, Paralyzed Leg, Wearable Shoe**

I. INTRODUCTION

Paralysis is defined as complete loss of strength in an affected limb or muscle group. Thousands of people every year suffer spinals and lose their ability to walk. Complete loss of communication prevents any willed movement at all. This lack of control is called paralysis. [1]. the types of paralysis are classified by region:

- monoplegia, affecting only one limb
- diplegia, affecting the same body region on both sides of the body
- hemiplegic, affecting one side of the body
- Paraplegia, affecting both legs and the trunk.

The nerve damage that causes paralysis may be in the brain or spinal cord (the central nervous system) or it may be in the nerves outside the spinal cord (the peripheral nervous system). The most common causes of damage to the brain are,

- stroke, tumor, trauma (caused by a fall or a blow), multiple sclerosis (a disease that destroys the protective sheath covering nerve cells)[2]
- cerebral palsy (a condition caused by a defect or injury to the brain that occurs at or shortly after birth)
- metabolic disorder (a disorder that interferes with the body's ability to maintain itself)

Solitaire Revascularization Device is a mechanical thrombectomy device combining the ability to restore blood flow, administer medical therapy, and retrieve clot in patients experiencing acute paralysis. Mechanically breaks up and removes the blood clot. It needs optimal radial force and the uses of medical therapy.The drawback of these devices are, 1) these technology needs very high investment to cure the problem which is very difficult for the poor people [3]. 2) The person for whom the paralysis cannot be cured or the poor people having paralysis will go for a walking stick or a wheel chair. (i.e. dependency).

In our proposed method, a new type of mobile shoe which is based on light sensing is proposed. This shoe helps the monoplegia patient (i.e., paralysis affecting only one limb) to walk with the affected leg as like a normal leg [4]. This shoe can be implemented at very low cost suitable to all kinds of people and make the patients to feel independent.

The paper is organised as follows, the construction and working of the proposed model is presented in section 2. The detailed experimental results and discussions are given in section 3. The conclusions are summed up in section 4.

II. CONSTRUCTION AND WORKING

2.1 Basic Principle

The main principle needed for constructing our project is light sensing and detection .It includes light sensor at transmission side and light detector at the receiving side. Laser is used for light sensing which is given at the normal leg shoe and LDR is used for light detecting which is given at the affected leg shoe.LDR at the receiving side detects the laser light , thereby it helps the person to move his affected leg forward until it reaches the normal leg.

2.2 Block diagram

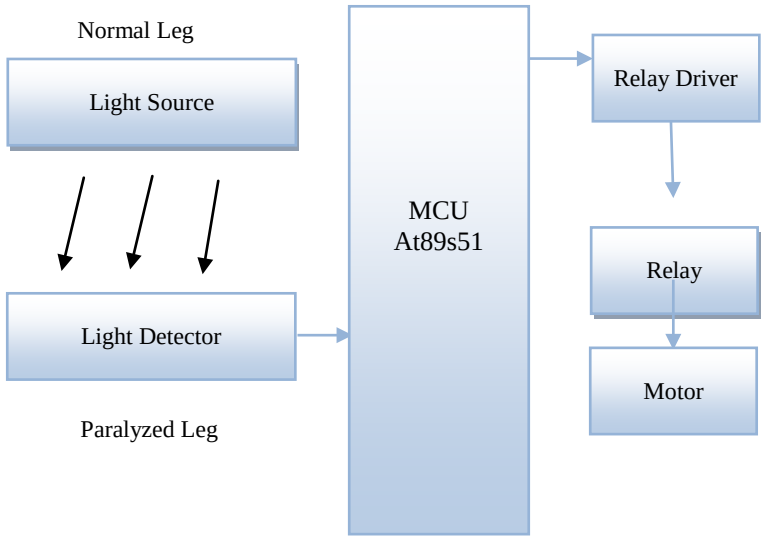

Fig. 1: Block diagram of light sensing mobile shoe

The block diagram mainly contains two sections namely transmitting section and the receiving section as shown in Fig. 1. Transmitter is placed at the normal leg. Receiver is placed at the affected leg. LASER light is used for transmitting light to the receiver. LDR is used for receiving the LASER light which is at the receiving side. LDR transmit the received signal to the 89s51 microcontroller. From the controller the signal is given to the relay driver. Relay driver drives the relay so that it delivers the input for the motor to move the affected leg.

2.3 Working

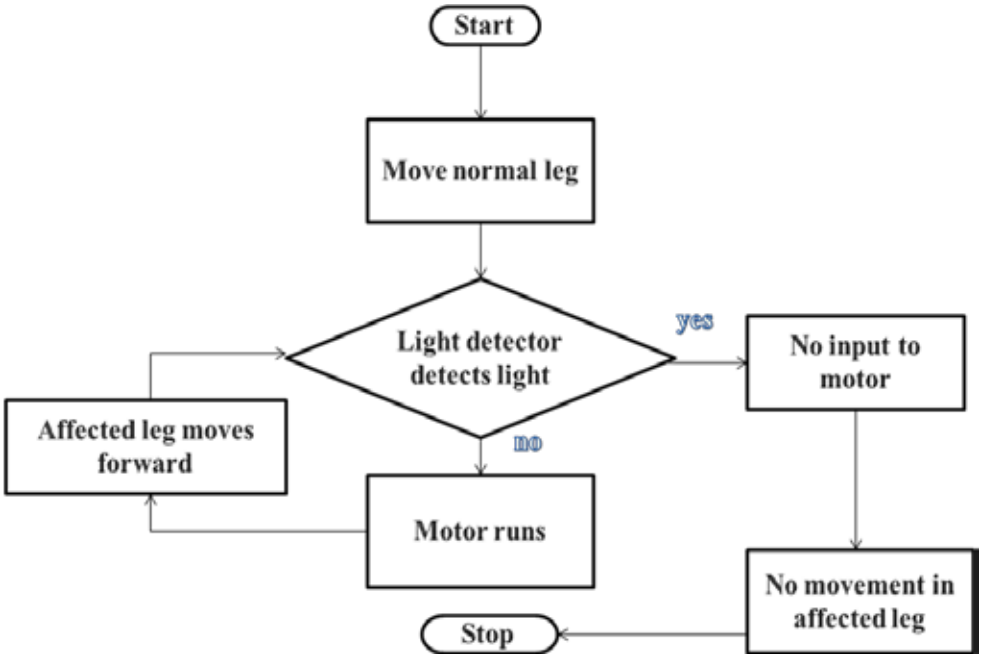

Fig. 2: Flowchart of Mobile Sensing Shoe

The working operation can be explained in two stages namely,

a) When the person is not moving.

b) When the person step forward his normal leg.

When the person was standing (i.e., before moving his normal leg forward) LASER light source given to the transmitter placed at the normal leg continuously transmit the light to the LDR placed at the affected leg. There will be a continuous passage of light between the normal leg and the affected leg. At that time micro controller make the relay to go low whenever the LDR is high. Since the relay was low there will be no input for the motor to move the affected leg forward.

When the person step forward his normal leg, LDR at the affected leg is unable to receive the LASER light which is in normal leg. That time there will be a breakage in the continuous passage of light which cause the LDR to goes low. Microcontroller allows the relay to go high whenever the LDR is low. Relay driver is able to drive the high input relay. Thus the relay supplies the required input for the motor to run. Finally motor runs the wheels attached to the affected leg and helps the patient to move his affected leg forward until it reach the normal leg.(i.e., until there is a continuous passage of light between normal leg and the affected leg.

III. EXPERIMENTAL RESULTS

The snap shots of the prototype of our proposed mobile shoe are shown in Fig. 3 to Fig. 8.

Fig. 3: Top view of mobile shoe

Fig. 4: Side view of left shoe with laser

Fig. 5: Kit Snapshot

Fig. 6: Side View Of A Mobiokle Shoe (Right Shoe)

Fig. 7: Motor and Wheels Attached

Fig. 8: Bottom View of the Right Shoe to the Mobile Shoe

Fig. 9: Mobile Shoe Attached With Hardware

IV. CONCLUSION AND FUTURE SCOPE

The proposed project, light sensing mobile shoe has a greater application in the medical field. The light sensing mobile shoe for the paralytic patients has been successfully constructed. This shoe can be utilized by the paralyzed persons to move like normal persons at cheaper cost. This shoe is implemented on many persons. The shoe works successfully. The advantage of this project is that the paralyzed person can move independently without the help of others. This project is implemented only for one leg paralyzed persons. In future it can be implemented for persons having two legs paralyzed.

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