Industrial Science
ISSN 2347-5420

Impact Factor : 1.5015(UIF)
Volume - 1 | Issue - 12 | Aug - 2015

ROBO LEG FOR PHYSICALLY CHALLENGED

Bhavana Nili

ABSTRACT

According to the 'National Sample Survey Organisation', at the all-India level, the number of disabled persons enumerated in urban and rural India was 26,679 and 49,300, respectively. Approximately 69 persons per 100,000 were either born disabled or become disabled due to some reasons in India; during the last year. The physically challenged persons are one of the expelled sections of our society and also they face more number of problems in their daily life. In order to develop a successful programme for social combination of the disabled to estimate human intentions related with walking in order to at ease and unharmed support to a paraplegia patient's walk, for an improvement of strong and healthy person's activities and for support of physically challenged person's daily life. [1] The project aims in designing a leg for physically challenged people who can be fixed to amputated leg and the movement of the leg has been designed automated. This project is designed for physically disabled people to walk without anyone's support. This robo leg will allow the person to sit on the floor, to climb the stair case and all those things that a normal human being can do. These have been designed to make the movements as natural as possible.

KEYWORDS :*Robo leg, Paraplegia, walking support, controlling movement.*

INTRODUCTION :

People may have relaxation, muscle rigidity, stroke, involuntary contraction of muscle, and sensory paralysis due to cerebral paralysis, spinal cord injury, muscular dystrophy and post polio syndrome. Even if people do not suffer from these problems, the aging may cause to make various troubles with their body parts. In most cases the people who have problems with their lower limbs due to aging problems or due to above symptoms are unable to walk naturally and are confined to bed all day long without any movement.

The paralyzed or disabled person faces the problem of wheel chair and stick.

Especially, wheelchair users have to keep sitting position for a long time and in such cases the lower body portion have less opportunities to move. This causes internal injuries with the muscles of

leg and backbone also. And the same is for the stick used patients.

The person who is physically disabled, who cannot even walk without stick, needs support to walk; for those people the Robo Leg is designed. Normally, the operation cost of artificial leg is high, around 60,000 to 1, 00,000 and even after the operation the person cannot bend his leg or sit on floor like a normal human being. But with the same cost the robo leg allows to survive patient with all natural activities.

The heart of this Robo leg is AT89S52 Microcontroller which controls the movement of leg. Automatic controlling of leg successfully improves healthy person's walking, running, cycling, stair-climbing, standing up and sitting posture and sync with his/her body condition and sensing activity. For all these work, Ground Reaction Force (GRF) sensor and joint angles are used as a sensing element to detect the motion information of the patient's condition. All posture control as well as sensing-detecting, recognizing with the environment along with the patient's condition is very important in this project.

In the project overview, a brief introduction of ROBO leg for physically challenged and its applications are discussed. The hardware description deals with the block diagram of the project and explains the purpose of each block. In the same chapter the explanation of microcontroller, power units, sensor, A/D converter, and foot step power generator is considered. Software description explains the implementation of the project using different compiler software.

II.PROBLEM STATEMENT

1. Wheelchair users have to keep sitting position for a long time.
2. Operation cost of artificial leg is high.
3. Due to physical disability, the patient can't sit on the floor and survive like normal human being.
4. Wheelchair makes cause to backbone disability.
5. Need support every time to stand up from sitting posture.
6. Wheelchair's cost is also goes high for a middle class people.

III.BLOCK DIAGRAM AND EXPLANATION

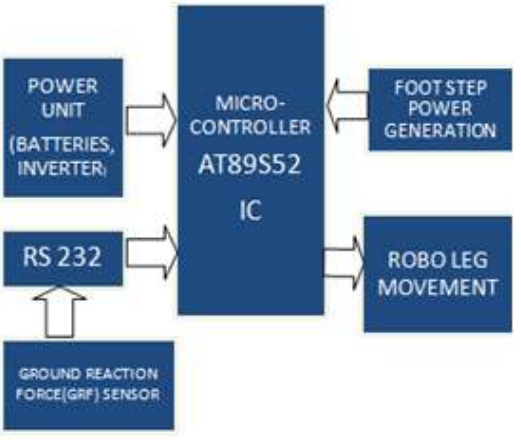

Fig1: Block diagram of system

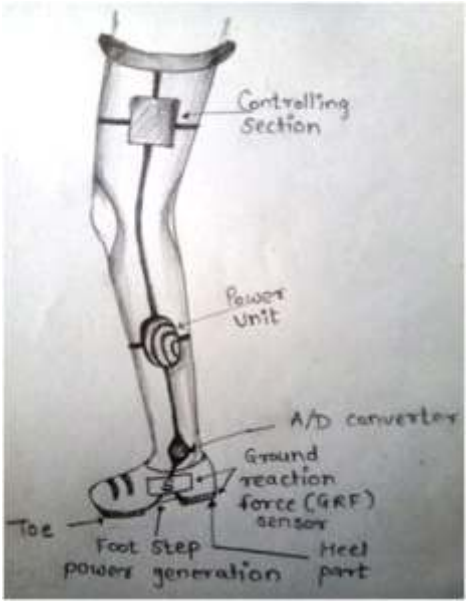

Fig2: Structural Concept.

IV.HARDWARE DESCRIPTION:

Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8Kbytes of in-system programmable Flash memory. The program memory can be reprogrammed with the on chip flash or by a conservative static memory programmer. The Atmel AT89S52 is a powerful microcontroller which provides a highly-flexile and economical solution to many embedded control system applications.[3]

Ground Reaction Force (GRF)

The Walking speed, Step length, the centre of pressure (CoP) and the centre of mass (CoM) have been considered as important Factors in the data related to motion information to the controller.

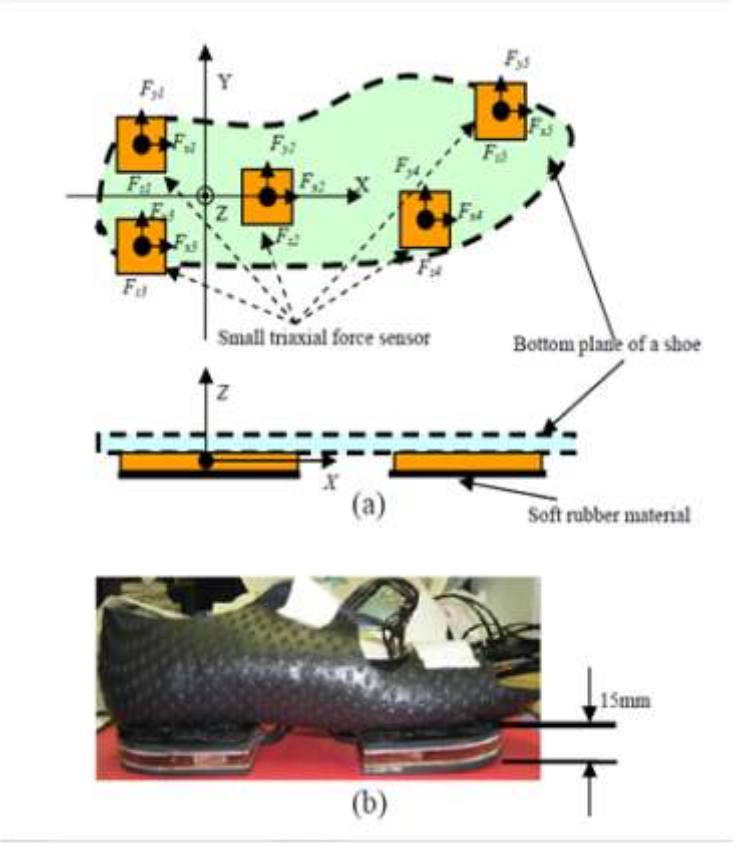

Fig3: Working of Ground Reaction Force sensor [2]

GRF sends motion signals to the controller and microcontroller acts accordingly on the leg. The A/D converter is used to convert the analog motion signals into digital data signal. This GRF sensor is connected via RS232 to the Microcontroller to get interact.

Power Units

Power unit contains integrated batteries, inverter.

The power generated from the foot step power generation gets stored in the batteries. Whenever battery gets discharges the inverter starts to recharge the battery. Power unit supplies the 5V power supply to the Microcontroller to do operation and also to the GRF sensor.

Foot Step Power Generation

The integrated foot step power generation is used to generate power. It is directly connected to power unit. As power generate; it sends to the power unit.

V.SOFTWARE DESCRIPTION

This project is implemented using following software's:

1.Express PCB – for designing circuit
2.PIC C compiler - for compilation part
3.Proteus 7 (Embedded C) – for simulation part.

VI.ADVANTAGES

1.The main advantage of project is that it has a wireless operation.
2.The person who is disabled can move his leg and survive; so there is no need of anyone to support for walking.
3.There is no need to do operation of disabled bodies; all the drawbacks of wheelchair and sticks are overcome by this robo leg.
4.It can move slowly by lifting the knee and also it can move fast like skate.

VII.APPLICATION

1. The main application of it is; it can be used in medical field where the robo leg is useful for disabled person who cannot walk.
2. It can be used in robotics as a leg of that robot.
3. It can be beneficial for the disabled Army soldiers who lost their legs or got paralyzed to the lower limbs. They can rejoin the army field.

VIII.CONCLUSION

All the hardware components are used in a integrated manner. Presence of every module has been logical out and positioned carefully, thus contributing to the best work of the project. Secondly, using highly developed IC's with the help of latest technology, the project has been effectively implemented. Thus the project has been successfully considered and experienced. The leg can be removing and re-attach to the lower body part.

IX.FUTURE ADVANCEMENT IN THE PROJECT

•In the future, we can use implementation of solar technology to get powered.'
All the hardware components can be implementing in integrated chip; so that can be ease to handle the leg.
•As this project is for the disabled leg; but in the future it can be redevelop for the disabled hands called Robo Hand.

X.REFERENCES

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