1.Introduction

1.1 Overview

Drop foot syndrome is general term for difficulty lifting the front part of the foot from the ground In other words drop foot problem is the loss of communication between the person nerve and central nervous system which is enables the foot to make dorsiflexion . Functional electronic stimulation (FES) is a technique that causes a muscular contractions through the use of an electric pulses. FES has been developed to help patients with neurological disorders, including foot drop, to move more easily and comfortable.

Functional electronic stimulation (FES) is one of the most rapidly growing areas in biomedical engineering. FES has been developed to help patients with neurological disorders, including foot drop, to move more easily and comfortable. FES system works by producing muscular contractions which is mimic natural voluntary gait movement by supplying electric pulses to the nervous system to stimulate paralyzed muscles either externally (across the skin) or directly (if implanted) [1].

In other words, FES is a technique that causes a muscular contractions through the use of an electric pulses. The human body naturally uses electrical currents to make body parts move . When a part of the body needs to move, the brain sends electric pulses to the nerves. The nervous system, acting like electrical wires, relay these pulses to the muscles, directing them to contract(muscle contraction). This muscle contraction causes the body parts to move in a controlled, deliberate way. For example ; the elbow, ankle or finger joints movements. FES allows muscles that have been partially paralyzed or paralyzed by stroke to move.

1.2 Problem statement

Drop Foot is a condition characterized by weakness or paralysis of the muscles involved in lifting the front part of the foot so foot drop can leads trips, falls, slow inefficient walking and difficulty in walking thus people who have these problem need special device to assist them.

1.3 Proposed solution

microcontroller based wireless FES device will be developed. In other words a microcontroller based wireless FES device will be designed to stimulate electrical pulses on the paralyzed muscles to restore muscular contraction in this way FES can be improved the patient's gait performance and also it solves the cable complexity and foot sensors wire discomfort with the design of wireless system.

1.4 Objectives

- design microcontroller based on wireless FES system to reduce cost and size.
- Simulation of the proposed system will be run.
- Implementation of a pro-type system will be done
- Performance evaluation of the system will be done the proposed system should satisfy the following points.
  - ➢ improved the patient's gait performance.
  - ➢ solves the cable complexity and foot sensors wire discomfort with the design of wireless system.

1.5 Scope

The system covers control circuit for FES system Simulation tools Several Simulations software will be used during the system implementation to evaluate the system performance. Proteus and Bascom software which will be used as system simulator.

1.6 Methodology

system works with microcontrollers, force sensing sensors, electrodes, and wireless units.

The force sensitive resistors are placed inside the person shoe (insole) which is transmitter side of the wireless communication unit . When person tries to walk and lifts foot from the ground, transmitter detects this movement and sends signal to the receiver side after that this signal flows on the Atmega16 microcontroller. Then controller sends a stimulus signal to person's nerve at the foot, so that stimulation starts and person can walk. When person's foot strikes to the ground stimulation is stopped by microcontroller the design in divided not three parts.

Part 1: include transition side (sensor and microcontroller should be designed to sense and transmit signal.

Part 2: include receiving side include microcontroller and electrode part which should be designed to correct step.

Part 3: include finalization of the system using compute circuit design

1.7 Chapter organization

Chapter 1: Introduction which present problem statement and the proposed solution along the objectives.

Chapter 2: Literature review cover the main part of the research such as sensor and control system(microcontroller).

Chapter 3: System design explain the hardware, Type of sensor like force sensitive sensor (FSR) Microcontroller atmega16 wireless communication (zigbee) and electrode..

Chapter 4: Simulation and results ,highlight the obtained simulation result and discuses the result.

Chapter 5: Conclusion and recommendations summarizing the work done in the research and highlight several recommendation for future work.