# FOOT ANATRYPSIS: *A Non-invasive therapeutic technique to relieve foot pain*

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***Abstract-*** **The most common and challenging symptom following surgery is pain. The idea is to create anaffordable foot massager that can be used without any restrictions to relieve pain, in addition to a sensing accelerometer that assists with tilt position-based massage. There will be no need for the entire massage of lower limb but only for the foot is enough. Furthermore, there is a noticeable rise in demand for massages as a result of the heavy workload. Electrical Muscle Simulator would be a more useful method. Electrical musclestimulation reduces swelling, eases pain, and strengthens weak musclesto aid in the healing of wounds. The aim of this project is to develop a low-cost foot massage shoe with an electrical stimulation system at the bottom to address this problem. Hence, it is inferred that the foot massage shoes developed will be help to relieve the pain.**

**Keywords: Electrical Muscle Stimulator, Accelerometer, pain, Massage shoe**

## I. INTRODUCTION

Actually, according to statistics, 77% of individuals claim that foot discomfort has had some sort of impact on their lives. Owing to age-related variables, working all day, and stretching the foot will only hurt when we keep our legs still or in a resting posture. The project's goal is to increase foot massage therapy's capacity to relieve pain. EMS massages may be used to treat the symptoms of arthritis or chronic pain as well as to assist people find pain relief from daily tasks like work or chores. Electrical muscle stimulation, or EMS, is one of the natural approaches of treating pain. Healthy muscles are gradually stimulated by EMS, which causes them to contract and relax to temporarily improve local circulation and relieve pain. Enhancing and facilitating muscular performance is another benefit of stimulating robust muscles.

## II. LITERATURE REVIEW

The corresponding sole Yongquan acupoint of massage footwear position was first identified and provided with vibrator; and vibrator makes vibrator drive massage to the sole be close to the Yongquan acupoint, has improved the massage effect [1].This introduced a foot massage robot based on mechanism which helps in the 8 cartesian co-ordinate-based systems that involves the distance and directions for positioning[2],[3]It has been suggested that the beneficial effects incurred are induced from massage stimulation of pressure receptors on the body leading to enhanced vagal activity and reduced cortisol levels. This aims to use the principle of electro reflex principle that aims to massage the foot by heat exchange principal.[4],[5] Based on this method, threshold used is used based on the timings and the threshold values it can be used to help in foot massage and relieve in their pressure. The aim of this study was to examine the effect of hand massage and foot massage on fatigue in hemodialysis patients[6]. The aim of the present study was to explore the impact of foot massage with chamomile oil and almond oil on the severity of fatigue and quality of life of Hemodialysis patients[7]. This highlight the importance to screen psychological symptoms among those patients and PMR should be taught to them as one of the stress-reducing measures[8].It was concluded that Foot reflexology can be used to reduce fatigue in hemodialysis patients and no information was provided about the possible side effects and

negative effects of foot reflexology[9].Measurements were taken before and after giving foot reflexology and back massages using the FAS Fatigue Assessment Scale.t can be concluded that foot reflexology and back massage have an effect on reducing feelings of fatigue in hemodialysis patients[10].

## III. METHODOLOGY

Hardware components :

Micro controller - A device of Arduino-programmed micro controller called the Lily Pad Arduino 32 Main Board is made to be readily
incorporated into wearable and e-textile projects. Any type of change, including tilt and vibration, can be measured with an accelerometer.

Accelerometer - This Lilypad system accelerometer has three axes. The Lilypad Accelerometer is based on the ADXL335 MEMS accelerometer from Analogue Devices and is capable of detecting vibration, tilt, and joint movement.

Power Supply - A 0V to 3V analog signal is output on each axis by the ADXL335 device. With a 500mA charge rate, the Lilypad Simple Power is an easy-to-use e-textile board that can be used to connect, charge, and turn on LiPo batteries. It comes with a sliding switch and a JST connector for the battery. With a 500mA charge rate, the LilyPad Simple Power is an easy-to-use e-textile board that can be used to connect, charge, and turn on LiPo batteries. It includes a slide switch and a JST connector for the stitching abilities and batteries.

Vibrators - A tiny vibration motor called the LilyPad Vibe Board may be operated and stitched into designs using conductive thread. These batteries, which use lithium ion technology, are incredibly thin and light. At 850mAh, each battery produces a nominal 3.7V. includes a standard 2-pin JST-PH connector with a pin spacing of 2 mm at the termination. It takes extra energy to charge these batteries.

Software requirements :

Arduino IDE: To program Arduino micro

controllers, utilize the Arduino IDE (Integrated Development Environment) software platform. It offers an intuitive graphical user interface for writing, compiling, and uploading code to Arduino devices.

Lilypad Arduino Library: The official Lilypad Arduino library provides functions specificallydesigned for Lilypad boards.

Direct Use of AVR Lib: AVR Lib is the standard C library for AVR micro controllers, and you can use it in your Arduino sketches to access lower-level function.

## IV. PROPOSED METHOD

The design of the foot massage isbuilt with Lilypad Arduino as the main interface which is given with power supply additionally we have implemented the Electrical Muscle simulator which helps in the stimulation of muscles. Lilypad boards are designed for the comfort of the users and washable purposes. The sensor used here is a Lilypad Accelerometer which is used in the basic tilt sensor. In basic terms, it senses when the slipper is more vertical and activates the motors accordingly.

The motors of the slipper shut off when it is in a more horizontal position, like when walking, which also helps cut down on power consumption. The LED's are connected into it for the indication of their positions. After interfacing these hardware components they are stitched using conductive threads and coding is done in Arduino software and uploaded into Lilypad Arduino board.

The Arduino programming language is employed for programming the Arduino board. Our proposed foot massage system uses the Lilypad Arduino and some of the Lilypad Vibe Boards for the actual massage, along with an EMS stimulation mechanism.

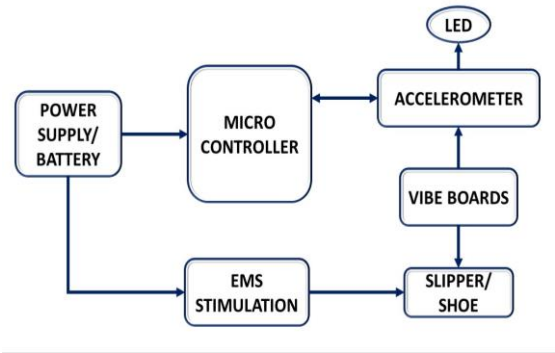


**Fig.1** ***Proposed Methodology for Foot Anatrypsis***

The seven components that make up this mechanism are designated as components 1 to 7, and those are the Arduino Lilypad Main Board, Lilypad Accelerometer Boards, Lily pad Power Boards, Lilypad Vibe Boards, Lithium Ion Polymer Batteries, Conductive Thread and slippers respectively.

The mechanism that generates the motion is a battery, which transmits power to provide vibrations. The sensor used is a Lilypad Accelerometer, which only serves as a basic tilt
sensor. The Lilypad Arduino board, which powers this system, has its inputs encoded with the support of the Arduino IDE.

## V. TECHNOLOGY ADAPTED

Vibrating Motors: Many foot massage shoes incorporate small vibrating motors in the soles to create vibrations that stimulate the foot muscles and improve blood circulation. Users can often adjustthe intensity and speed of these vibrations.

Ergonomic Design: These shoes are often designed with ergonomic considerations to provide maximum comfort and support for the feet.

Rolling and Kneading Nodes:Advanced foot massage shoes are equipped with rolling or kneading nodes that move along the contours of the feet, applying pressure to various pressure points.

Acupressure Points: These shoes may have strategically placed nodules or rollers that target specificacupressure points on the feet. Massaging these points can have various health benefits.

Rechargeable Batteries: Many models are cordless and powered by rechargeable batteries, offering flexibility in where and how you usethem.

Auto-shutoff: Safety features like automatic shutoff timers ensure that the device turns off after a certain period to prevent overuse and conserve energy.

## VI. RESULT

The primary goal of this project is to provide a long-lasting massage system appropriate for local clinics. Foot massages are safe and efficient ways to enhance patient care which are within the field of nursing practice. To effectively reduce pain and anxiety in the future, foot massages should be used in conjunction with pharmaceutical interventions. The prototype of the product is shown in figure 2.

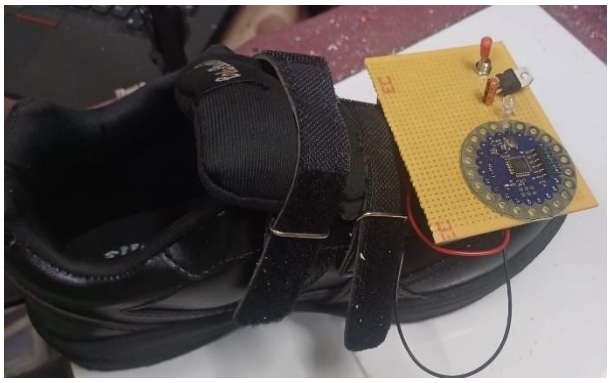

**Fig.2** ***Product Output***

## VII. CONCLUSION

The research review concluded that there was no need for the entire lower limb massage. Furthermore, the demand for massages has significantly increased as a result of the heavy strain. The EMS (Electrical Muscle Stimulation) is one of the natural pain therapy method. With a mild stimulus, EMS causes healthy muscles to contract and relax, temporarily boosting local circulation and relieving pain. Enhancing and facilitating muscle performance is another benefit of stimulating robust muscles. The efficiency of the suggested controller and mechanization design is validated by the experimental findings. As future development, it is proposed to work toward the grant of the certification of this prototype in order to be used in the medical sector. Future studies should consider focusing on frequency, feasibility, acceptability, and participants' satisfaction.

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