



**MESSAGE CONVEYOR BY MOTION FOR PARALYZE
PEOPLE POWERED BY RADIO FREQUENCY (RF)
ENERGY HARVESTING**

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Telecommunications) with Honours.

by

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TECHNOLOGY (FTKEE)

2019

BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

Tajuk: Message Conveyor By Motion For Paralyze People Powered By Radio
Frequency (Rf) Energy Harvesting

Sesi Pengajian: 2019

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ABSTRACT

Message conveyor for paralyzing people is designed to help communicate because some of the paralyze people cannot talk. One of the objectives of this project is to develop a message conveyor for paralyzing people powered by RF energy harvesting. The development and implementation of the Message conveyor for paralyzed people is presented for the Bachelor's Final Year Project. This project is introducing the latest and current technology update in the world, RF energy harvesting. RF energy harvesting is an option to powering the circuit by converting RF energy to DC power. RF energy is generated from the ambient environment transmitted by millions of radio transmitters and telecommunications media around the globe, such as wireless internet, mobile phones, base station, broadcasting station, Wi-Fi and a Radio Frequency transmitter. RF energy is a long-lasting replacement of power if the Radio Frequency signal is present in the surrounding area. Arduino Mega is used in this project as it is easier to program the coding and a low power sensor. The project serves the needs of the community as it can paralyse people to communicate and can enhance the reduction of electricity bills as the RF signal controls the motion sensor.

ABSTRAK

Penghantar mesej untuk orang yang lumpuh direka untuk membantu berkomunikasi kerana sesetengah orang yang lumpuh tidak boleh bercakap. Salah satu objektif projek ini adalah untuk membangunkan penghantar mesej untuk orang yang lumpuh yang mengguna kuasa oleh penuaian tenaga Radio Frekuensi. Pengembangan dan pelaksanaan penghantar Mesej untuk orang lumpuh ini disampaikan untuk Projek Tahun Akhir Ijazah Sarjana Muda. Projek ini memperkenalkan teknologi terkini di dunia, penuaian tenaga Radio Frekuensi. Pengambilan tenaga RF adalah pilihan untuk menghidupkan litar dengan menukar tenaga RF ke kuasa DC. Tenaga RF dijana daripada persekitaran ambien yang dihantar oleh berjuta-juta pemancar radio dan media telekomunikasi di seluruh dunia, seperti internet tanpa wayar, telefon bimbit, stesen pangkalan, stesen penyiaran, Wi-Fi dan pemancar Frekuensi Radio. Tenaga RF adalah penggantian kuasa yang tahan lama jika isyarat Frekuensi Radio ada di kawasan sekitarnya. Arduino Mega digunakan dalam projek ini kerana lebih mudah untuk memprogramkan pengekodan dan sensor kuasa rendah. Projek ini memenuhi keperluan masyarakat kerana ia boleh melumpuhkan orang untuk berkomunikasi dan dapat meningkatkan pengurangan bil elektrik kerana isyarat RF mengawal sensor gerak.

DEDICATION

To my beloved mother

ACKNOWLEDGEMENTS

First, I am gratitude shukr' to Allah Almighty and the Most Merciful for giving me strength physically and mentally to complete this project. I am deeply grateful to Mr Win Adiyansyah Indra, my supervisor, for his support and motivation for this final year's project. I want to thank my mother, Hasnah Binti Omar, for giving me support, strength and funding to complete this final year project. This work would not have been completed without their devotion, attention, and motivation. My deep gratitude to my friends for keeping me thinking about this project and sharing information. Finally, I would like to thank Universiti Teknikal Malaysia Melaka (UteM) for helping me to follow my dreams and complete my bachelor's degree.

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LIST OF ABBREVIATIONS

PCA	Principal Component Analysis
RF	Radio Frequency
DC	Direct Current

CHAPTER 1

INTRODUCTION

1.0 Introduction

This section will clarify the investigation review and the project's motivation. Also, provide an explanation of Message Conveyor by Motion for Paralyze People Powered by Radio Frequency (RF) Energy Harvesting. The part includes the background of the study, the statement of the problem, the objectives of the project to be accomplished and the scope of the work to be conducted, and then the contribution of the project will be followed.

1.1 Background

A people-supporting system with disabilities displays a message by only moving any part of their body. The system operates by reading the user wrist part's tilt direction. It is necessary to mount this device on the wrist of the user. The user must tilt the device to convey a message in a particular angle. Tilting the device in various directions transmits a different message. Applying accelerometer, plus gyro, the wrist movement circuit is used to detect wrist movements. To transfer the data signal, the patient motion recorder device consists of an RF transmitter.

On the other hand, an RF receiver receives the data and then decodes it to the microcontroller to process and respond to the input. It will display the messages as their wrist movement instructed on the LCD. This project using energy Radio Frequency as a power supply for entire electronic parts in the circuit. RF energy may be a renewable energy source.

Therefore, electrical power enhanced through the RF energy harvesting system is usually small. By using this technique, it only provides Ultra-Low Power devices in a stable system.

This project is an operation with low power consumption to save long - term electrical bills. Everyone is going to be able to use this RF energy system. This system can be implemented by government and private hospital.

1.2 Problem Statement

Compared to an average person, paralyze People cannot move the whole body. Paralysis is the loss of some of your body's muscle function. The way messages pass between person brain and muscles happens when something goes wrong. It can be complete or partial paralysis. It can occur on a person body's one or both sides. In just one area, it can also occur, or it can be widespread. A stroke happens when the cerebrum's blood supply is suddenly blocked or when a mind vein burst. Absence of oxygen will bite the dust inside minutes because of nerve cell in the zone that influenced cerebrum not work. Stroke is a b illness that can influence the entire body, including psychological and memory shortfalls, discourse issues, passionate challenges, issues with everyday living, and torment.

There are many of stroke symptoms which is speech problem and paralysis of brain face, arm or leg. The reason only these two symptoms that highlighted is hard to understand what they want to say when they have a speech problem. This will be difficult to communicate with other people. Some of their body paralyzed, so the movement is too limited.

1.3 Objectives

The objectives of this project:

- 1) To develop a system that helps paralyzed to convey a message.
- 2) To implement energy harvesting from Radio Frequency to power the circuit
- 3) To Analyze of Radio Frequency (RF) Energy Harvesting performance implements on the circuit.

1.4 Scope

The scope of this project is to introduce the technology that can be used in hospitals or households to help paralyzed people when they are hungry, thirsty or otherwise. The harvesting of RF energy is an RF to DC converter powering the circuit. This RF development kit is consisting of Radio Frequency transmitter, antenna, and battery recharging board. The Atmega Microcontroller consists of 28 pins. Why Atmega? Because it is a simple, low-cost, low-power microcontroller. This is the best that can reduce power consumption. Using accelerometer gyro or hand gesture, the hand movement circuit used to detect hand movements and then transmit this information to the receiver system wirelessly via RF. The receiver system designed to receive and process these commands, display them on the LCD.

CHAPTER 2

LITERATURE REVIEW

2.0 Overview

In order to make this project successful, some studies and researching have been done. All the information obtained from journals, articles, books and the internet users in this project as the primary guide to making sure this project succeeds. In this chapter has covered the earlier and previous system also study that related and connected to this project.

2.1 Paralysis Patient

In different conditions, the definition of paralytic disease caused, which can be classified as affecting the muscles and indirectly acting through nerves, which control muscle actions. In cases of paralysis, there are four common causes of paralysis, which are a head injury, spinal cord injury, stroke and multiple sclerosis. It has been said that spinal cord injury occurs when the neck or spine is injured, and the brain cannot function as normal, causing paralysis. It is because the spinal cord transmits signals from the brain to the body. If damage occurs, the brain could not transmit a signal to the muscle, and the patient is paralyzed. Vehicles accident fall or accident while working is the most common example of spinal cord injury. Apart from that, when the brain acts, it causes damage to the specific muscle. In addition, stroke causes paralysis as well. This disease happens when blood is unable to supply the brain that requires a constant supply of oxygen and nutritional blood. If the blood supply process flow to the brain is disturbed, the patient will get stroke disease.

2.2 Previous system of message conveyor for paralysis patient

(Tapkir, Jadhav, Tapre, & Katekar, 2018) There will be gadget development to send a crisis message, as the name proposes. Utilize a 3-pivot accelerometer that is a gadget with three tomahawks, for example, X, Y and Z. Thus, it can likewise accomplish more exceptional accuracy with little development. This accelerometer is set on the moving piece of the impaired individual's body. On the off chance that the individual has any issue, he will move to a specific heading his body part containing the accelerometer. The adjustment in point will be seen by accelerometer. Along these lines, the point of tilt will be sent to the Arduino Uno. This point of tilt will demonstrate the heading of tilt of accelerometer. Utilizing remote transmission, this message will be transmitted through an RF transmitter to the collector. Collector will get the message and decipher it in parallel information. For further development, these sources of info will be given to the 8051 microcontrollers. The microcontroller will be associated with a 16* 2 LCD presentation to show the message according to the program. Not exclusively will the message be shown, yet by utilizing a signal that will be associated with the 8051 microcontrollers, a caution will be given. This alert is expected for the general population who are the parental figures of the debilitated patient. Another component is to interface a temperature sensor to the Arduino Uno that will ceaselessly gauge the temperature of the body and show it on the LCD.

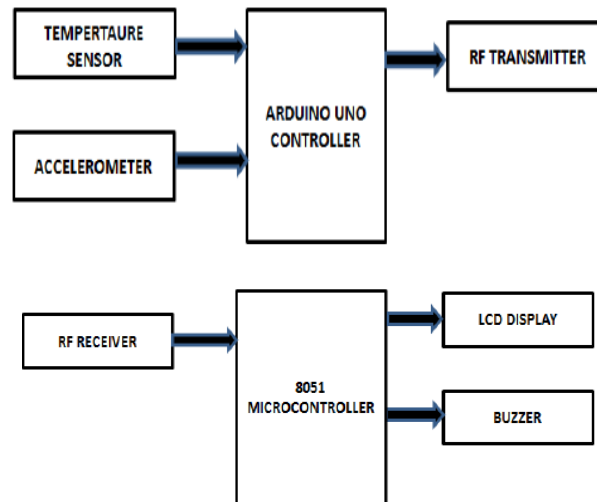


Figure 2.1 block diagram of Motion Based Message Conveyor for Physically Disabled People

Arduino Uno, accelerometer, the sensor of temperature and transmitter of RF. In this gadget, Arduino Uno assumes a significant job as it is the microcontroller used to control the various activities that this gadget performs. Utilize a 3-pivot accelerometer to accumulate gadget point change readings and pass on a message according to the directions modified. The temperature sensor utilized to screen and show the body temperature on a consistently. By utilizing the RF transmitter, this data transmitted to the recipient. The RF recipient is utilized to get the sign on the beneficiary side and offer it to the 8051 microcontrollers. This microcontroller uses sign and shows the message on the LCD show, and the message is blown to the bell.

(Vardhan & Prasad, 2014) Motion acknowledgement is the procedure through which the client's signals are utilized to transmit the data or to control the gadget. For individuals who are edgy or experiencing quadriplegia and paraplegia, maladies brought about by spinal string wounds, and an electronic hand glove was made. On every single finger of the glove, five accelerometer sensors were utilized in this glove. Along these lines, they additionally give more accuracy in minimal finger developments. Accelerometers recognize the

increasing velocities of a hand development in three opposite ways, and the quickening esteems been transmitted to the microcontroller. The various messages that were changed over to voice messages utilizing sound module were given diverse hand motions.

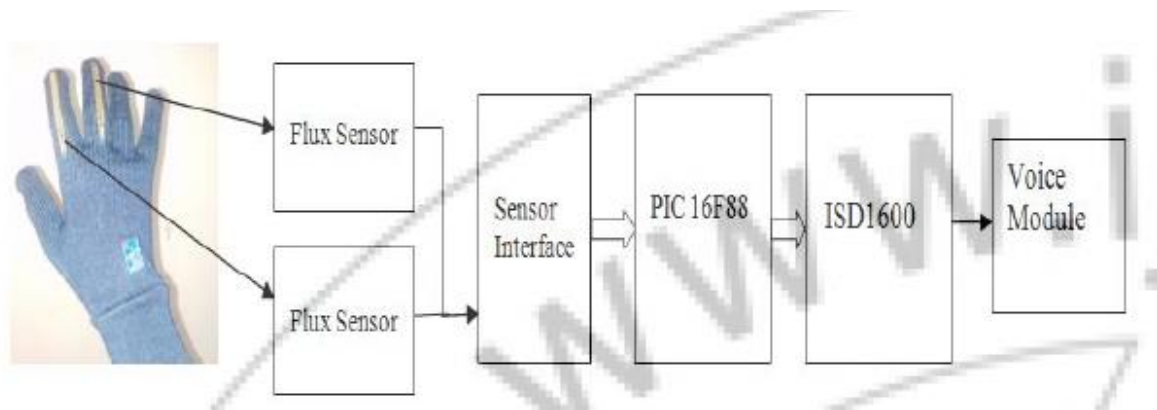


Figure 2.2 block diagram of message conveyor by using a hand gesture

(Patil, Patole, & Pawar, n.d.) Correspondence between crippled or handicapped patients and attendants ought to be built up. A patient can send messages to the attendant effectively by basically tilting an accelerometer that is associated with a moving piece of the body. This tilt edge sent to a controller that starts correspondence between the patient and nurture and chooses which message to transmit dependent on the tilt edge. Message can be shown on the LCD just as the message is changed over to sound utilizing discourse module. The framework likewise incorporates the GSM module related to the bell, which will help alert the specialist or individual worried by sending SMS if there should be an occurrence of a crisis.

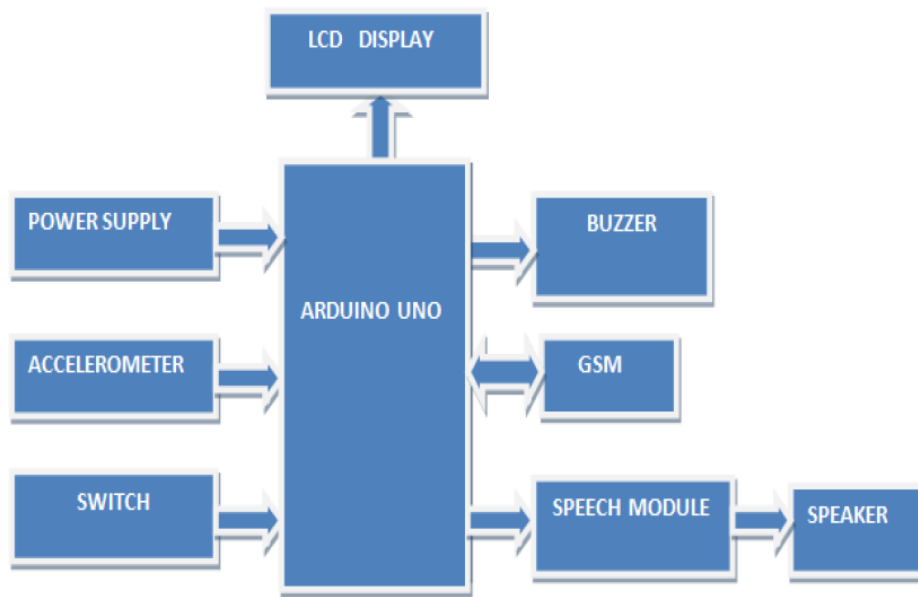


Figure 2.3 Block Diagram of Message Conveyor for Disabled Patient

2.3 Previous System and Existing Technology for RF (Radio Frequency) Energy Harvesting

(Nintanavongsa, Member, Muncuk, Lewis, & Chowdhury, 2012) RF harvesting has the least vitality thickness contrasted with regular elective vitality sources, for example, sunlight based and wind. The present condition of - the-workmanship arrangements are just successful over tight recurrence ranges, are constrained considering productivity, and require higher information control levels. With the developing notoriety and uses of massive, sensor-based remote systems (for example basic wellbeing checking, human wellbeing observing, to give some examples), it is of principal significance to embrace reasonable, green correspondence methodologies. Due to the area of the sensor, battery substitution might be basically and monetarily inadequate in specific organizations or may present noteworthy dangers to human life. The idea of remote vitality harvesting, and exchanging is not new, yet Tesla demonstrated it over 100 years prior. Figure 2.4 displays the proposed vitality harvesting circuit parts. The voltage multiplier changes over the episode RF capacity to dc

control. Made of inductive and capacitive components, the coordinating system guarantees the most extreme power supply from receiving wire to multiplier voltage. Such a plan should be circumspectly structured as expanding the number of multiplier stages gives the heap a higher voltage, while lessening the current through the last burden branch.

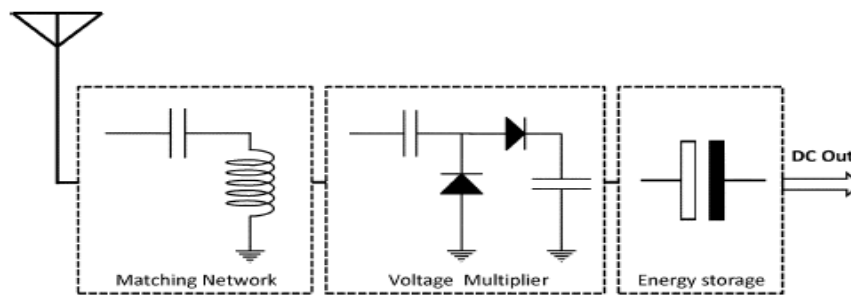


Figure 2.4 Ambient RF energy harvesting

(Mimis, Gibbins, Dumanli, & Watkins, n.d.) Wireless energy transmission was proposed and explored for decades in order to remove or supplement the battery, and among other applications, the implementation of self-sufficient energy devices. Recently the harvesting of ambient, RF energy present in both urban and suburban environments have attracted much attention. This energy is rectified by powering low-power sensors which, because of the location or number of sensors, make it difficult or costly to power up via cables or batteries. Energy storage guarantees a smooth delivery of the load.

(Jabbar, Member, Member, & Jeong, 2010) The types of environmental sources used for energy harvesting are the wind, the solar, vibration, electromagnetic, temperature gradient, thermoelectric, heel strike, push buttons and the RF. Some of the radio waves ' electromagnetic spectrum consists of magnetic, electrical and magnetic components. Radio waves transmit data in the frequency band by varying the amplitude, frequency and phase of the wave combination. When in contact with a conductor such as an antenna, EG radiation induces electric current on the surface of the conductor known as the skin effect. As the