# Mems Assist Red-Tacton Based Communication

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***Abstract-*** *This paper deals with the application of obtaining real time data of the patients at hospitals using Red-tacton transceiver, tri-axial accelerometer and a MEMS sensor. The MEMS used here gives different values in X, Y, Z direction for different acceleration. This is the source of input. The change in limb position of the patients provides us with the corresponding output in terms of an audio/message. The audio in turn has been programmed in accordance to the patients' needs. Apparently so many technologies have been developed for the partially mobilized patients'. MEMS are one such device which makes use of Red-tacton application. It is intended to employ human body surface as a medium of communication for exchanging data between people, objects and networks.*

***Keywords***- MEMS accelerometer, Tri- axial direction, Red Tacton, Partially mobilized and Human Body Communication.

## I. INTRODUCTION

An accelerometer sensor is a micro electro mechanical device which is used in various application as shown in figure. 1. They have become indispensable in automobile industry, computer and audio-video technology [1] [2]. In this treatise this accelerometer is applied in the medical field.

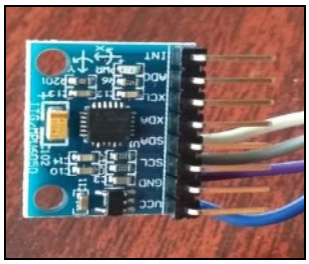

**Figure. 1. MEMS accelerometer MPU6050**

There are many types of accelerometers namely mono-axial, bi-axial and tri-axial; here we have used tri-axial accelerometer . It operates in an advanced technique than that of the conventional devices unlike mono- axial accelerometer. It gives different outputs for different inputs. It fetches data in three different angles (X, Y, Z) by measuring the change in acceleration according to the input. The acceleration changes occur by changing the position of the hand where the sensor is attached .

A Red-tacton is a transceiver device that makes communication possible via human body network as shown in figure. 2. It requires maximum voltage of 5. Transmission of data is made possible by the minimum electric field that is present in default condition in the surface of human body. A Red-tacton is also used in applications like temporary one-to-one private networks based on personal handshaking, device personalization, security systems. Using this Red-tacton, the health parameters of the patients is analysed. It is made possible by connecting the transmitter to the patients' body and receiver to the doctor. And finally the data are displayed on the receiver's PC.


**Figure. 2. Red Tacton Transceiver- UART TTL(9600)**

## II. LITERATURE REVIEW

MEMS Accelerometer and wireless sensor networks play an important role in the medical field. Ms.Maithili had MEMS Accelerometer involved in a project that aided physically disabled people for transferring their gestures into signals and thereby control the movement of their wheelchair and the same was done using a 3D accelerometer[3]. Dr.Shaik Meeravali mentioned in his paper that visually challenged people benefitted from MEMS by involving it in an action for sensing accelerations in different directions[4]. The hand gestures were recognised by the visually impaired using code templates and enabled self assistance. Wheelchairs were also controlled by head motion recognition technique designed mainly for the paraplegics[5]. It proved to be a beneficial method by limiting all time assistance to such patients. Human body communication was employed by placing a sensor on the epidermis of the patient for creating potential difference

between two points in the body[6]. Another such system dealt with a voice recognition using the principle of dynamic programming[7]. It helped in home automation with very high recognition accuracy and noise robustness. Smart materials were infact used for keeping track of pregnant women[8] for keeping into account their levels of glucose and haemoglobin over a particular rate. It avoided early birth of infants and handicapped infant delivery. Cardiac patients were also monitored using a real time system that was associated with the use of smart phones[9]. Medical information of patients were processed and it proved to be affordable too. Heartbeat was also monitored using using microcontroller and Zigbee[10].

## III. PROPOSED METHODS

The project has been designed to focus on providing a device to aid partially mobilized and physically challenged persons.

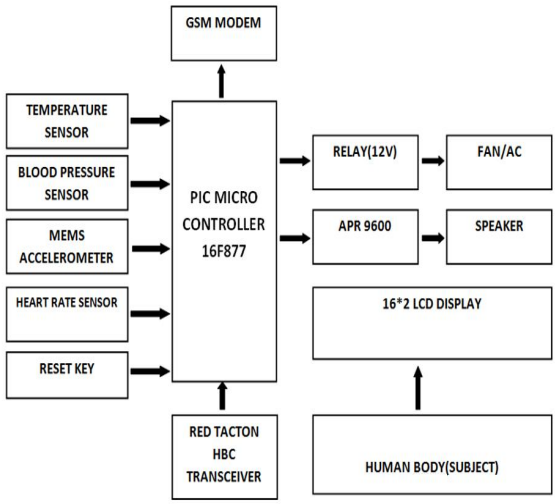


**Figure.3. Block diagram of proposed method**

The required health parameter measuring sensors are connected in parallel to PIC16F877. GSM modem is connected in series where all output are sent as message to the supervisor's number that is feeded. MEMS helps in accquiring data from the change in patient's position and the output is received as audio through speaker and stored using APR9600. Red Tacton communication is carried out with the aid of human body and is displayed on the PC.

Here our aim is also to provide a compact systems that is portable and user friendly. The device is for bed ridden patients. Two electronic gadgets named accelerometer and Red-tacton were used to achieve our target. The specifications and detailed description of the required components will be explained in the following content.

MEMS tri-axial accelerometer as mentioned above will measure the change in acceleration. For the different values of acceleration different X, Y, Z values will be obtained which in turn brings different output. GY521 is a gyroscope module that operates in motion processing technique. The operating voltage ranges from 2.37 V to 3.46 V. The MPU6050 has six built in 16 bit ADC channels, three for the gyroscope outputs and three for the accelerometer outputs. It communicates with the microcontroller using the I2C protocol.

Here accelerometer is placed on any part of the hand and altering the position of the hand hence brings out changes in the value. PIC microcontroller is programmed for desired ranging value of MEMS to give corresponding audio as output, The audio is programmed as per the requirements of the patients as shown in the Table 1.

PIC 16F877 is one of the most advanced microcontroller. It is widely used in many modern applications because of its low price, availability and high quality. Its operating voltage ranges from 2.0 – 5.56 volts. In addition to that we have also connected sensors for monitoring basic vital parameters of human where those parameters are displayed in the personal PC using Red-tacton.

In Red-tacton where TACTON refers to "action triggered by touching" and RED is an excellent colour indicating warmth and love. It functions in a unique manner.It completely works depending on the minimum electric field that is present on the surface of the human body.

Communication takes place through human body network. In case of any emergency the patients situation will be updated to the concerned though GSM modem. Using Red-tacton we can minimize the power consumption of sensors and actuators[11]. Real time monitoring of patient can be carried out at any instance.

## IV. RESULT AND DISCUSSION

Placing the MEMS sensor on the wrist in different directions and changing the position of the hand will yield various results. Even minute changes in the position are taken into account seriously which is a challenging part to analyse liable position for particular commands. Thus instead of fixing single value, a range of values were designated for all X, Y, Z angles. And particular command was fixed for particular ranges as shown in table 1.

| Position | | X Value | Y Value | Z Value | Command |
|---|---|---|---|---|---|
| Thumb facing | Up | 010-025 | 070-075 | 250-255 | Need food |
| | Down | 030-040 | 030-045 | 100-110 | Need help |
| Palm facing | Up | 050-065 | 220-240 | 055-075 | Need water |
| | Down | 020-030 | 090-095 | 050-070 | Need medicine |

**Table 1- Ranging X, Y, Z values of accelerometer according various position.**

The first position is made by keeping the palm facing downwards. The obtained ranging values of X is 030-040, Y is 030-045 and Z is 100-110 for which the corresponding command programmed is “Need help”.

The second position is made by keeping the palm facing upwards where the obtained X, Y, Z values of that particular position is 010-025, 070-075, 250-255 respectively. And the command programmed is “Need food”.

The third position is made by keeping the thumb facing down where the obtained X, Y, Z values of that particular position is 020-030, 090-095, 050-070 respectively. And the command programmed is “Need medicine”

The fourth position is made by keeping the thumb facing up where the obtained X, Y, Z values of that particular position is 050-065, 220-240, 055-075 respectively. And the command programmed is “Need water”. The circuit system of MEMS function alone is shown below in figure. 3.

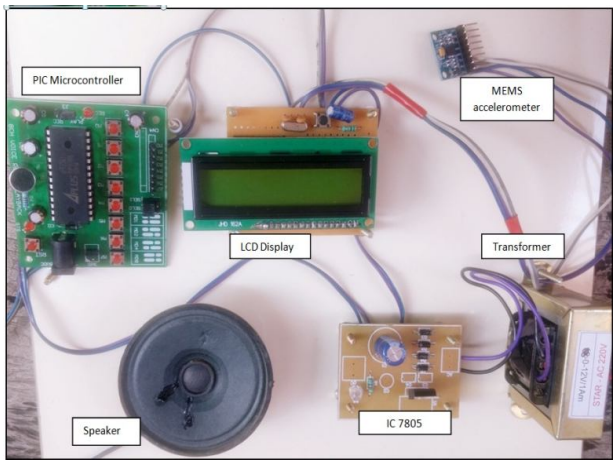


**Figure. 3. MEMS circuit module**

Thus all sensors connected to patients to receive their health parameters like blood pressure, heart rate, body temperature is displayed using red tacton. The Transmitter is with the patient and the receiver with the concerned, the receiver shall obtain the required parameter values on his PC as shown in figure.4.


**Figure. 5. Display of parameters using Red-tacton transceiver in PC**

Finally all the parameters and the audio output are sent through GSM module to the care taker/ doctor/ whomever is concern in case of any emergency or for future reference.

## V. CONCLUSION

Thus the MEMS assist red tacton based communication via human body network device will be a emergency supporting device. It would serve as an ultra low cost Multi parameter monitor in clinics thereby giving real time data to the doctor for the patients who are in normal ward too. As the procedures are quite uncomplicated it can be thought to patients very easily. It stays as a user friendly device for both patient and doctor.

## VI. FUTURE SCOPE

In future the kit shall have additional commands added to it . At present the patient is forced to observe the change in position in an avid manner. It can be improvised by addition of switches for an easier use. The switch shall be connected to the MEMS sensor. Application of Red-tacton can made more advanced and vast. Doctors can carry the transceiver and send highly confidential medical data in public places just through a hand shake as shown in figure.5 which will be un- doubtful and safe.

**Figure. 5. Exchange of personal data’s through hand shakes**

## REFERENCES


[1] Dr.Shaik MeravaliM.Aparna "Design and development of hand-glove controlled wheel chair based on MEMS" International Journal of Engineering Trends and Technology(IJETT). Pp 3706-3711 Volume 4, Issue 8-August 2013.

[2] Bagale.P, " Prototype for MEMS based assistance for physically disable people" International Journal Of Engineering And Computer Science. Vol5, Issue09,PP 18071-18073, Sep 2016

[3] Satish, Vinit Mahale,Pradeep donni, Sachin Soratur, Rajvrat." Movement based wheelchair control for physically challenged Head" International Journal of current Engineering and Scientific Research.(IJCESR) , Vol-3,Issue-5,2016

[4] Sandeep Joshi, Sneha Nagar "MFCC-Based Voice Recognition System for Home Automation Using Dynamic Programming" International Journal of Science and Research (IJSR), ISSN (online) : 2319-7064. Index Copernicus value ,2014

[5] Prabha Sundaravadivel, Saraju P. Mohanty, Venkata P.Yanambaka. "Exploring human body communications for IoT enabled ambulatory health monitoring systems" IEEE International Symposium on Nanoelectrics and Information systems,2016

[6] Priyanka Kakria, N.K Tripathi, Peerpong Kiti Pawang. "A Real Time Monitoring System For Remote Cardiac Patients Using Smartphone and Wearable Sensors" International Journal of Telemedicine and Applications. Research Article. Article ID-373474, 2015

[7] Smitha.M, T,Ayesha Rumana, Sutha.P "Hand gesture based home automation for visually challenged" International journal of innovations in Engineering research and technology. Vol2, Issue 4,April 2015

[8] Media aminian, Hamid reza nagi " A hospital Healthcare Monitoring System Using Wireless Sensor Networks" Open access Journal- J Health med inform vol-4, issue 2, ISSn-2157-7420, 2013

[9] Salman Ahmed, Sabrin Millat, Md.Aymanur Rahman, Sayeda Naeyna Alam. "Wireless health Monitoring System For Patients" Electrical and Computerscience Engineering(WIECON-ECE). IEEE international WIE conference, Dhaka,Bangaledesh, 2016

[10] Uttara Gogate, Jagdish W.Bakal. "Smart Healthcare Monitoring System Based On Wireless Sensors" Computing, Analytics and Security Trends(CAST), International conference on Pune, India. INPSEC, Vol-137,May 2017

[11] Rajeswari. "A Healthcare Monitoring System Using Wireless Sensor Network With GSM" International Journal of Engineering and Technology(IRJET). Vol-4, Issue-2,2017

[12] Maithili.M, Rashmiprita.S,Shailaja.R, Sumithra.K, Amala.M"Gesture control of wheelchair and electrical devices by physically challenged using 3d mems accelerometaer and health monitoring" International Journal of Emerging Research in Management and Technology. ISSN:2278-9359. volume 5, Issue-5, 2016

[13] Spandana K, Kalpana P, Anjaneyulu K, Bhargavi G." Automatic Wireless Health Monitoring System In Hospital for Patients" International Journal of Advanced Technology in Engineering and Science. Vol 5, Issue 1, Jan-2017.


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