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IDENTIFICATION AND PREVENTION OF PREGNANT WOMEN AT RISK FOR PRE-ECLAMPSIA

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***Abstract*— Pre-eclampsia is a complex pathogenesis that requires a personalized medicine approach. The main goal of this project is therefore to develop a clinically robust predictive blood trying pre-eclampsia, using innovative technologies and utilizing new metabolite and protein biomarkers. This project is refines two innovative prototype screening tests for pre-eclampsia, common complication of late pregnancy. Approximately 50 million babies are born to first time mothers worldwide every year and almost 1 in 20 of these pregnancies is complicated by pre-eclampsia. The condition is allied globally with 70,000-80,000 maternal and over 500,000 infant deaths once a year. For the mother it can lead to acute problems in the liver, kidneys, brain and the clotting system and it is the most important cause of maternal death in Europe – accounting for 17-24% of all maternal deaths they resulted in 29,000 deaths in 2014.**

Identification of women at risk of pre-eclampsia is the first step to effective intervention and intervention and prevention. Current screening is based on the presence of clinical features however the majority of women who develop pre-eclampsia are first-time mothers, who commonly have no identifiable clinical risk factors in early pregnancy.

***Index Terms*— Pre-eclampsia, Maternal and Infants death, Swelling bands**

I. INTRODUCTION

Causes of maternal death during pregnancy are very variable and usually occur in events of risk pregnancy or in a premature birth. According to World Health Organization (WHO) about 800 women die each day worldwide from unnecessary causes related to pregnancy risk. About 99% of these deaths occur in developing countries. Although this maternal death worldwide dropped by almost a partially only, in 2010, almost about 300,000 women died along and following pregnancy and during childbirth. The majority of these deaths occurred in developing countries and most of them could have been prevented with due medical care.

Researchers continue to study ways to prevent pre-eclampsia, but so far, no clear strategies have emerged. Eating a smaller amount salt, changing your activities, restricting calories, or strong garlic or fish oil doesn't reduce your risk. Increasing your intake of vitamins C and E hasn't been shown to have a benefit, and the research into vitamin D is ongoing.

Every woman who dies in childbirth, dozens more suffer injury, infection or disease. The majority of maternal deaths are due to infection, risky abortion, and eclampsia, or from health complications worsened in pregnancy.

But nowadays infections and unsafe abortions are avoided for a safe delivery. But eclampsia is very much complicated in pregnancy. So we should overcome these disorder during pregnancy.

II. LITERATURE SURVEY

A. SMART MOBILE SYSTEM FOR PREGNANCY CARE USING BODY SENSORS

Authors: Mário W. L. Moreira, Joel J. P. C. Rodrigues, Antonio M. B. Oliveira , Kashif Saleem.

Hypertensive disorders are the most common problems during pregnancy. They cause about 10% of maternal deaths. The world mortality rate has decreased but several women are still dying every day from pregnancy complications. Various technique sources are being used in an in corporate manner in order to reduce even more the death of both mothers and babies. Mobile devices with Internet access have a great potential to expand actions of health professionals. These devices help care with people that are living in remote areas, assisting in patient monitoring. Information exchange anywhere and any time between experts and patients could be an important way to advance the pregnancy monitoring. This paper presents a mobile monitoring result using body sensors to identify worsens in the health status of pregnant women suffering hypertensive disorders. This mobile applicationuses NaïveBayesclassifier to better identify hypertensions everit helping experts in decision making process. Results show that the proposed mobile system is promising for monitoring blood pressure disorders in pregnancy.

B. TELEMEDICINE IN THE CLOUD ERA: PROSPECTS AND CHALLENGES

Authors: Z. Jin and Y. Chen.

The combination of cloud computing and telemedicine introduces new opportunity for transforming healthcare delivery in a more effective and sustainable manner. A

number of telemedicine applications have been investigated and developed on the cloud, such as tele-monitoring and tele-consultation, all of which fully demonstrate the potential of telemedicine in promoting more affordable and higher quality healthcare through the acceptance of rising cloud and mobile technologies. The need to deploy cloud-based telemedicine has also presented numerous challenges, including how to attain high assurance, interoperability, security and privacy, and storage flexibility. This article discusses these challenges and several open research issues, with the goal of inspiring research and development in this rising area.

III. EXISTING SYSTEM

Researchers continue to study ways to prevent preeclampsia, but so far, no clear strategies have emerged. Eating a smaller amount salt, changing your activities, restricting calories, or uncontrollable garlic or fish oil doesn't cut your risk. Increasing your intake of vitamins C and E hasn't been shown to haves a benefit, and the research into vitamin D is ongoing.

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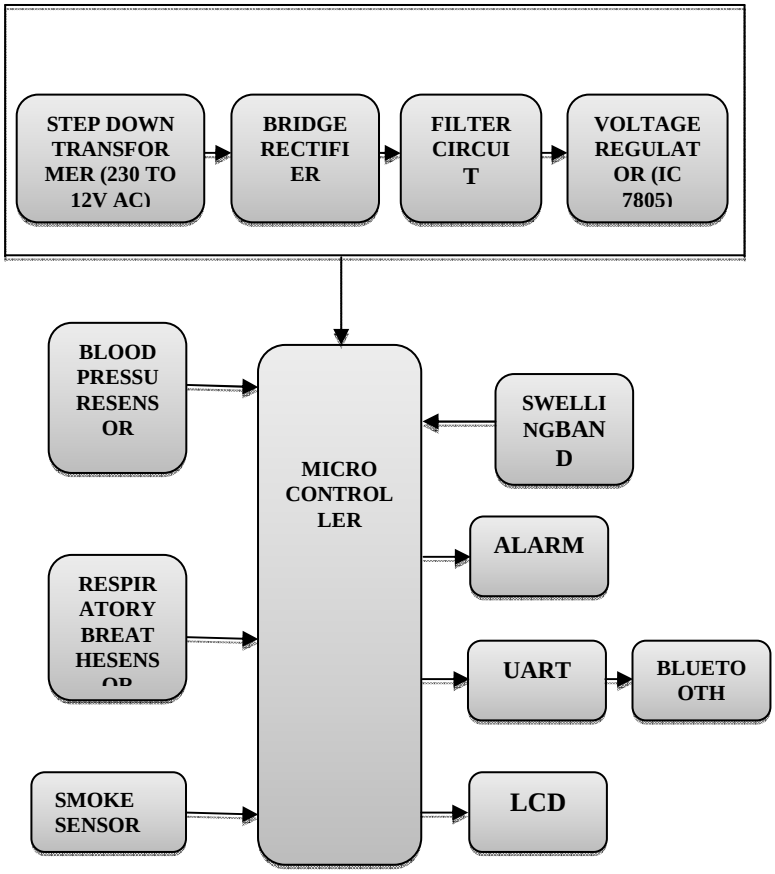
IV. PROPOSED SYSTEM

The proposed approach is based on a machine- learning algorithm. In the proposed approach, results show fine performance agreement between humans and the proposed method. There is several number of tests are required for preventing this disorder. So we are using number of body sensor for continuous monitoring of blood pressure and breath level and neighboring abnormal gases.

Here this system is constantly monitoring the pregnant women at the particular time interval. In case any abnormality occurs to in the sensor then the indication system will automatically initiate the critical situation. In case they forget to do the check up at the particular time interval, then alarm will produced and intimate to the pregnant women.

V. BLOCK DIAGRAM POWER SUPPLY UNIT



A. POWER SUPPLY

1) Block Diagram:

The ac voltage, typically 220V rms, is connected to a transformer, which steps that ac voltage down to the level of the preferred dc output. A diode rectifier then provides a full-wave rectified voltage that is primarily filtered by a simple capacitor filter to produce a dc voltage. This resultant dc voltage usually has several ripple or ac voltage variation.

A regulator circuit remove the ripples and also residue the same dc value even if the input dc voltage varies, or the load linked to the output dc voltage changes. This voltage regulation is usually obtained using one of the accepted voltage regulator IC units.

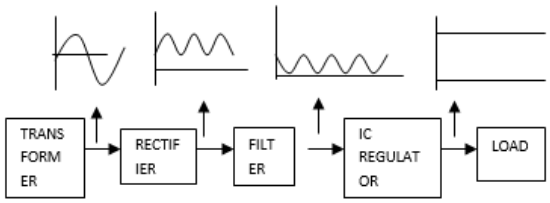


Figure 1:Block Diagram of Power supply

B. Working principle:

1) Transformer:

The potential transformer step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be coupled to the precision rectifier, which is constructed with the aid of op–amp. The advantages

of using precision rectifier are it will give peak voltage yield as DC, rest of the circuits will give only RMS output.

2) Bridge rectifier:

When four diodes are associated as shown in figure, the circuit is called as bridge rectifier. The input to the circuit is applied to the diagonally opposed corners of the network, and the output is taken from the residual two corners.

3) IC voltage regulators:

Voltage regulators comprise a class of broadly used ICs. Regulator IC units include the circuitry for reference source, comparator amplifier, control device, and overload cover all in a single IC. IC units provide parameter of either a fixed positive voltage, a fixed negative voltage, or an adjustably set voltage. The regulators can be chosen for operation with load currents from hundreds of milli amperes to tens of amperes, equivalent to power ratings from milli watts to tens of watts.

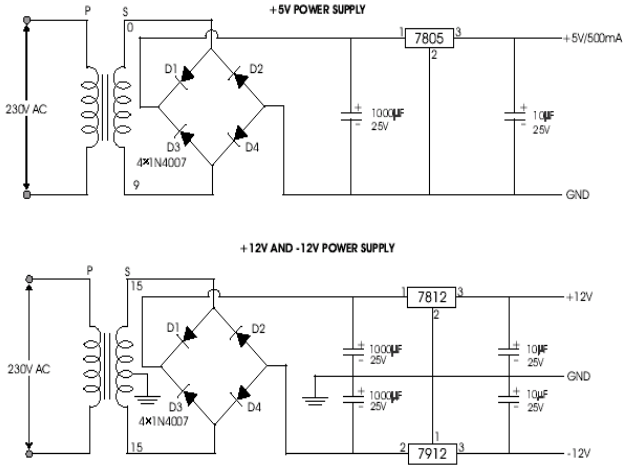


Figure 2:Circuit Diagram Of Power Supply

Power supply is used to feed the PIC microcontroller with the AC power. It is helpful to work the microcontroller.

4) BLOOD PRESSURE SENSOR

Blood pressure is the pressure of blood in the arteries as it is pumped around the body by the heart. When your heart beats, it contracts and pushes blood through the arteries to the respite of your body. This energy creates pressure on the arteries. Blood pressure is recorded as two numbers the systolic pressure (as the heart beats) over the diastolic pressure (as the heart relaxes between beats). The entity which measures this is called Sphygmomanometer. Blood Pressure & Pulse reading are shown on display with serial out for external projects of embedded circuit processing and display shows Systolic, Diastolic and Pulse Readings. Here we are using Sphygmomanometer in order to find whether the increase in BP is due to pre-eclampsia (i.e due to increase in intake of air by fetus) or normal BP.

5) RESPIRATORY BREATHE SENSOR

Respiratory sensor is used for measuring the abdominal and theoretical breathing of an individual. Any change in respiratory rate is measured and it detects whether the change is due to normal (i.e, blood pressure or any external circumstances) or over oxygen intake of fetus.

6) SMOKE SENSOR

Smoke sensor is used to detect the cause of insufficient breathing i.e, whether the suffocation of mother occurs due to any allergic reaction like presence of smoke, petroleum gas, any other dust, etc., in the atmosphere (or) due to over intake of fetus. The result of smoke sensor is sent to display (LCD) through microcontroller.

7) SWELLING BAND

Our project is to identify the risk of pre-eclampsia in pregnant women through number of stages which involves bloodless method of detection. Pre-eclampsia occurs due to disorder in the umbilical cord which causes the fetus to grow faster also it drains intake of air of mother. The main symptom of pre-eclampsia is swelling of feet. Actually during pregnancy period swelling of feet occurs normally.

But there is certain limit until which it can happen. If drastically swelling increases then it may be the symptom of pre-eclampsia. This stage can be detected using swelling band. We designed swelling band to a standard. When level crosses the standard we need to move to the next steps to confirm the occurrence of pre-eclampsia.

8) LIQUID CRYSTAL DISPLAY (LCD)

LCD is used to display the digital of the devices. The most commonly used Character based LCDs are based on Hitachi's HD44780 controller or other which are companionable with HD44580. Most LCDs with 1 controller has 14 Pins and LCDs with 2 controller has 16 Pins (two pins are spare in both for back-light LED connections).

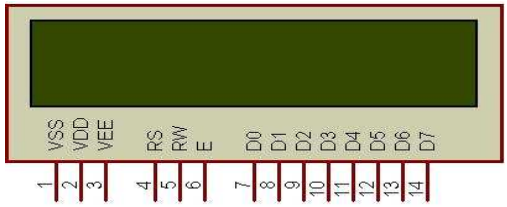


Figure 3:Character LCD type HD44780 Pin diagram

C. MICROCONTROLLER

1) PIC16F877A Microcontroller:

The term PIC, or Peripheral Interface Controller, is the forename given by Microchip Technologies to its single – chip microcontrollers. PIC micros have developed to become the most broadly used microcontrollers in the 8- bit microcontroller segment.

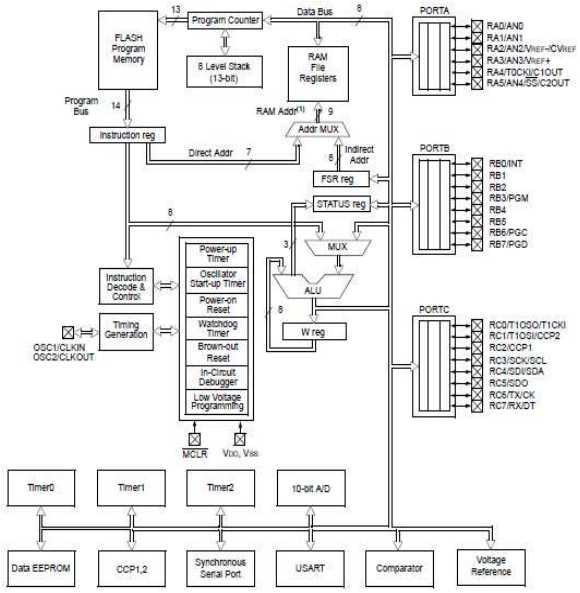


Figure4:Block Diagram of PIC16F877A

The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward companionable with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction completing, 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 confine/evaluate/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

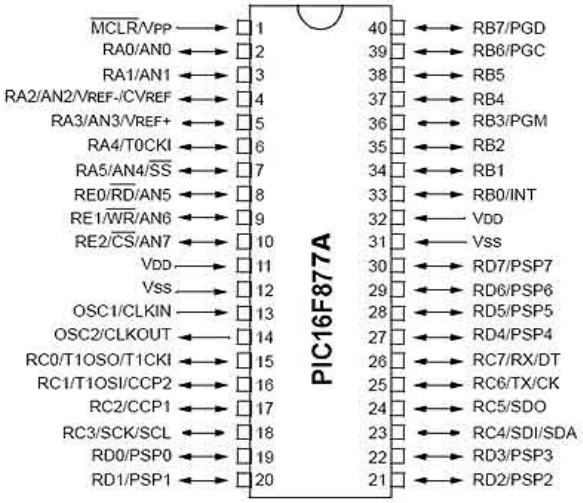


Figure 5: Pin Diagram of PIC16F877A

Microcontroller is used to do specific function. It acts as a microcomputer. We are using PIC microcontroller because it has inbuilt Analog-to-Digital converter. Blood pressure sensor, Respiratory breathe sensor, Smoke sensor produces the analog output. It is processed by the microcontroller and then sent to the Android device through Bluetooth. Obtained digital values are compared with the standard values of normal person. Alarm is used when the output deviates greatly from the standard values. Thus the output is printed wheather the result is positive or negative based on digital values. Output of project can be viewed through the Bluetooth of android device.

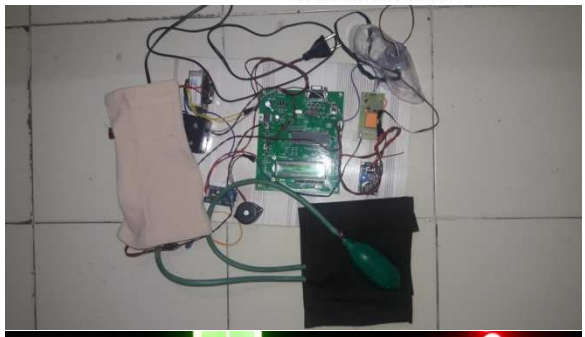
BLUETOOTH

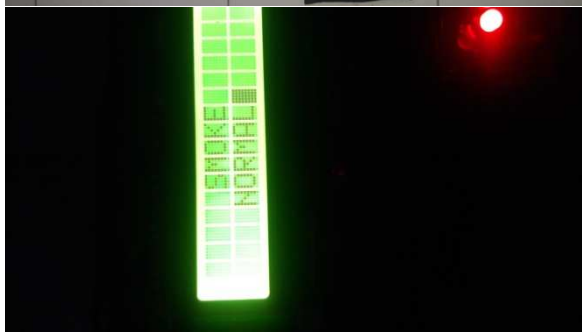
The Bluetooth standard, like WiFi, uses the FHSS technique (Frequency-Hopping Spread Spectrum), which involve splitting of the frequency band of 2.402-2.480 GHz into 79 channels (called hops) each 1MHz wide, then transmitting the signal using a series of channels recognized to both the sending and receiving stations. Thus, by switching channels as often as 1600 times a second, the Bluetooth standard can avoid interference with other radio signals.

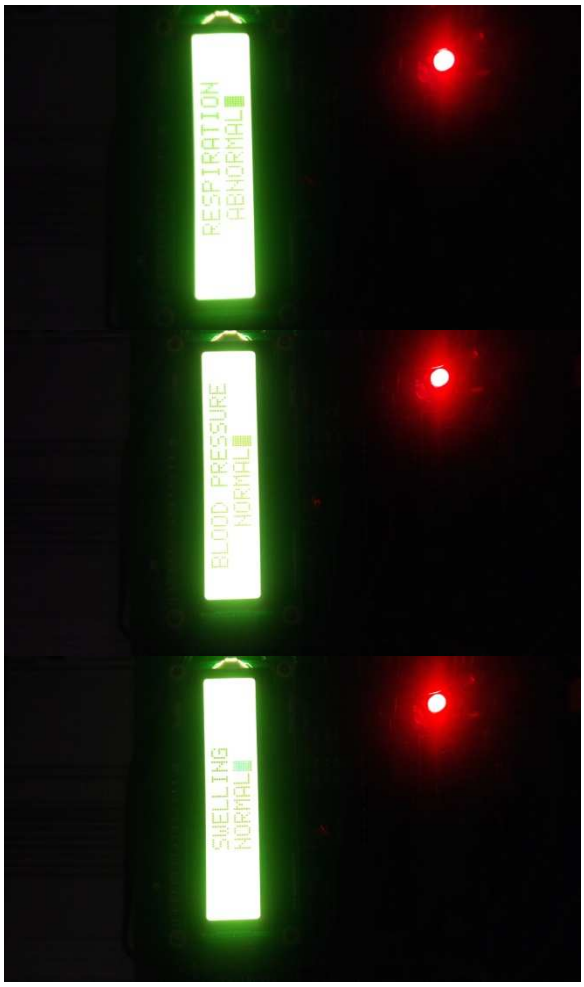
Here we are using bluetooth inorder to save the results of Swelling band and it is connected to the PIC microcontrollor through UART technology. Thus, the output gets saved in the bluetooth we can view it through the android device.

OUTPUT

RECEIVING SECTION:







VI. CONCLUSION

This project consists of two major components a wearable devices and an App . The wearable devices are capable of measuring the values and displays the results in LCD. An App is used to store the values using Bluetooth. App used here is **'BlueTerm'**. It shows N for 'Normal' and A for 'Abnormal'. We can also make use of cost efficient components for development of device.

We have surveyed and studied various papers and web references to help us understand and identify various components in our project and methods that can be used in developing and building the system more reliable and efficient.

A. FUTURE WORK

Our project can be further improved by including Electrocardiogram (ECG) to our circuit. ECG accurately differentiates the heartbeats of fetus and mother. Through which we can easily recognize the faster growth of fetus obviously presence of Pre-eclampsia. Also abnormalities can be given interms of digital values so that corrective measures can be taken appropriately.

B. APPLICATIONS:

Mainly for finding risk of pre-eclamsia in pregnant women. Also useful for identification of many diseases which involves blood less treatment.

C. ADVANTAGES:

Cost effective Invasive method of treatment accurate result

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