HUMAN STRESS MONITORING SYSTEM USING WEARABLE SENSORS

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Abstract -Workers have a right to a safe workplace. A safe and healthy workplace is one of the keys to business success. To develop a system that can accurately predict the stress level with a given input set of data such as body temperature , pulse rate and blood pressure. To monitor the symptoms and diagnose the vital signs that are caused due to increase in stress . The collected data are analyzed and the victim is prescribed to consult the concerned doctor.

- ***Keywords* – Arduino UNO ,Sensors,Ethernet Module.**

I. INTRODUCTION

Due to the Factories Act, more and more vigilance is required to keep track of the health of the employees working in hazardous operations. Health monitoring is the forerunner of all health promotion activities. In today's occupational health practice, factory medical officers have the daunting task of promoting the health of employees in industry. Surveillance cameras ware used for monitoring. It needs human beings to watch and identify dangerous situations.Using the camera we cannot able to find out the employees potential, general health information, hypertension, diabetes information, stress level, etc.

70% correlation exists between age of employee and man-days lost due to sickness. 82% correlation exists between work Experience of the employee and man-days lost. This Risk Factor identification helps the Corporate HR /Dr Take preventive measures to avoid extreme medical incident occurrences which may be irreparable and costly. Early detection of diseases through a preventive test not only saves life but also shields the person and his family from going through immense physical, emotional and financial turmoil.

II. Aims

Aim:

By initiating good health and safety practices in the workplace, a business is likely to have more motivated and productive employees, lower absenteeism rates, fewer business disruptions and reductions in the costs of sick pay and temporary replacement staff. This will help to reduce the sometimes serious impacts of injury and illness on employees, families and the wider community and improve the business's reputation both in the business world and as an employer of choice. Allowing the Company to frequently monitor the Employee Health no matter where they are located. Thus prevent untoward Absenteeism and Hospitalization.

III. PROPOSED SYSTEM

The proposed system is Health monitoring or health surveillance at work site is an integral component of health promotion (HP). The supervision of the health of workers is specifically carried out by means of check-up. This check-up varies according to three types, whether it is a pre-employment medical examination, a periodic medical examination or a special check-up following long periods of illness or injury. Those periodic tests have become particularly important today because these tests help us to diagnose the earliest deviations in health and permit prevention of illness.

Chronic diseases such as blood pressure, diabetes can be detected at an initial stage. Thus, occupational health service is able to supervise an important sector of the population but the supervision takes place immediately, thus making it possible to protect and improve workers health without incurring loss of time or absenteeism which would be the case if they had to go to health centres for that purpose.

In this proposed system consist following,

Heart beat sensor used to measure the heart beat rate of human body. And also Blood Pressure sensor used to measure the pressure level of blood. These sensor data collect by Arduino control unit.

Temperature sensor used to measure the body temperature.

Each employee has to be measure these vital sings and monitor on system.

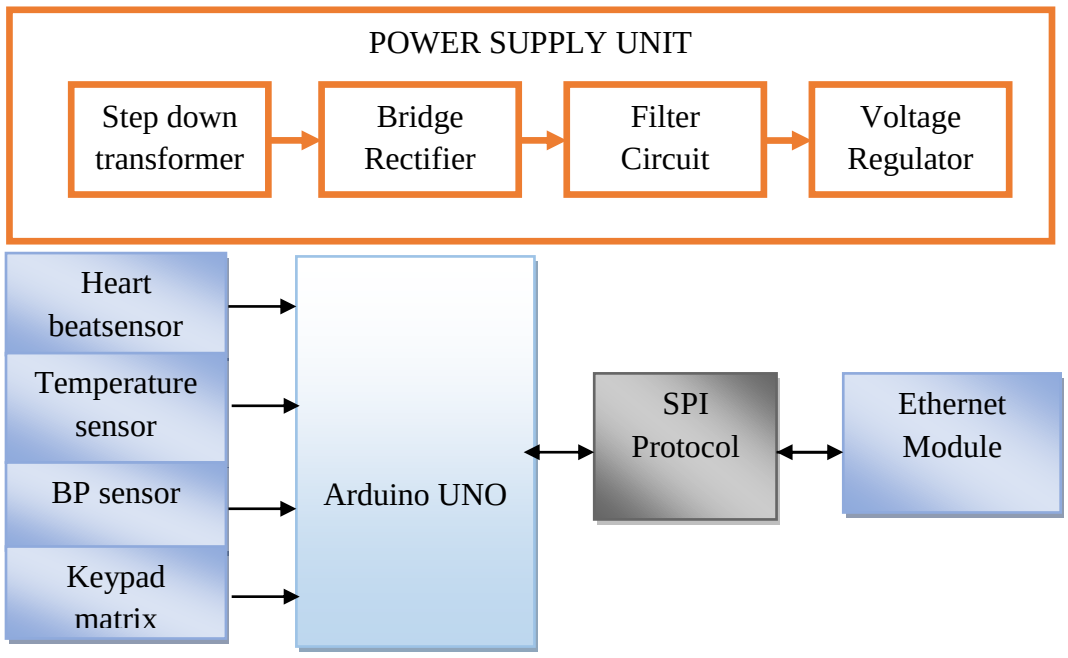
Keypad is used to enter specific id for each employee and update the health information based on this id.id like employee name or Id number.

The symptoms of the employee when he/she is under stress can also be inputted and the medical Centre will diagnosis the disease and prescribe the concerned test to be taken.

IOT technique is implementing for update this health information on online. So it is possible to view the health information about employee in anywhere.

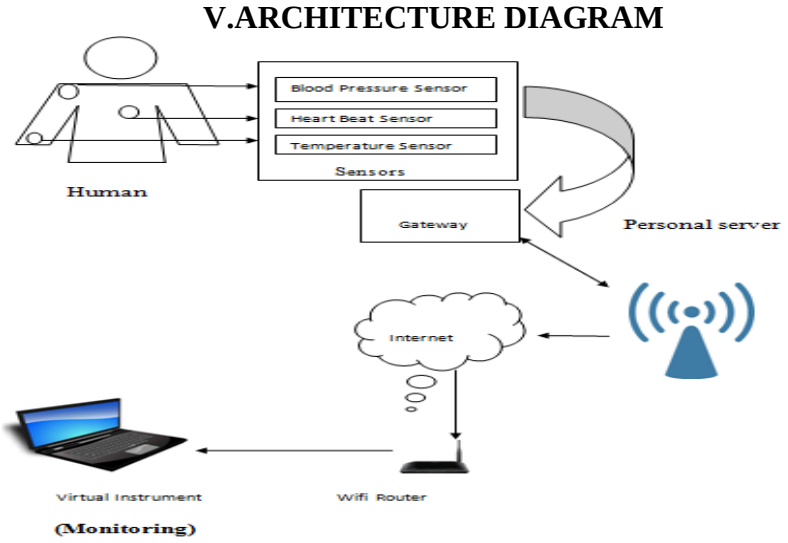
IV.BLOCK DIAGRAM

HEALTH MONITORING UNIT



RECEIVER UNIT

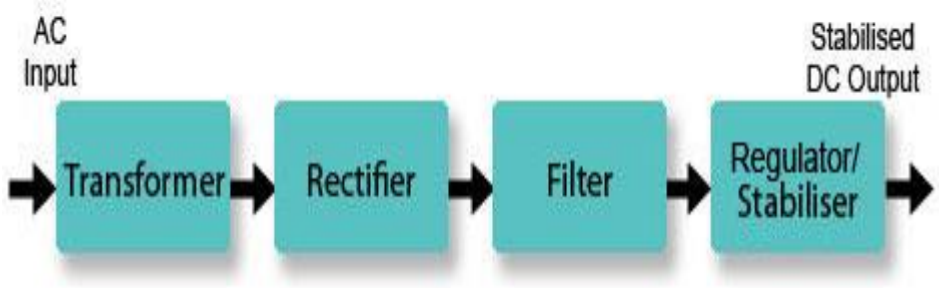
V.ARCHITECTURE DIAGRAM



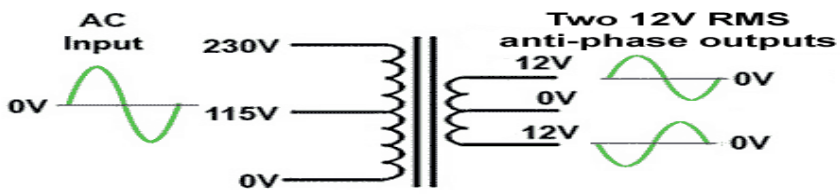
VI.REQUIREMENTS

a)POWER SUPPLY

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.



b)TRANSFORMERS

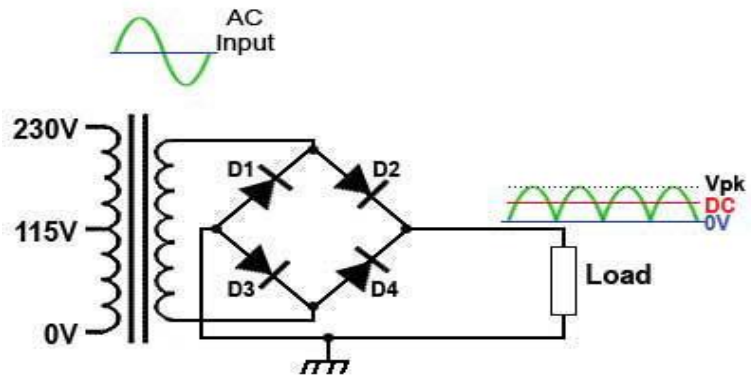


Basic power supply is the input power transformer has its primary winding connected to the main (line) supply. A secondary winding, electro-magnetically coupled but electrically isolated from the primary is used to extract an AC voltage of suitable amplitude, and after further processing by the PSU, to drive the electronics circuit it is to supply.

The transformer stage must be able to supply the current needed. If too minimal a transformer is used, it is likely that the power supply's ability to maintain full output voltage at full output current will be impaired. With too minimal a transformer, the losses will increase dramatically as full load is placed on the transformer.

As the transformer is likely to be the most expensive item in the power supply unit, careful consideration must be given to balancing cost with likely current requirement. There may also be a need for safety devices such as thermal fuses to disconnect the transformer if hyperthemia occurs, and electrical isolation between primary and secondary windings, for electrical safety.

c)THE RECTIFIER STAGE

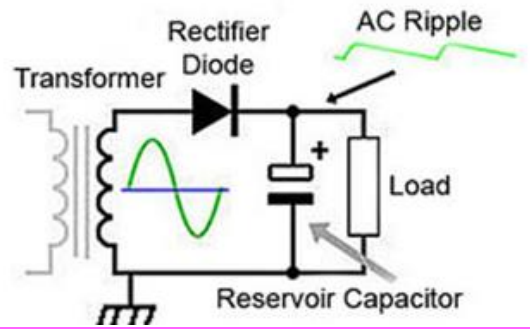


Rectifier circuit is used , to convert the AC input is converted to DC. The full wave bridge rectifier uses four diodes arranged in a bridge circuit to give full wave rectification without the need for a centre-tapped transformer. An additional advantage is that, as two diodes are conducting at any one time, the diodes need only half the reverse breakdown voltage capability of diodes(specialized electronic component) used for half and conventional full wave rectification. The bridge rectifier can be built from separate diodes or a combined bridge rectifier can be used.

The current paths on positive and negative half cycles of the input. It can be seen that on each half cycle, opposite pairs of diodes conduct, but the current through the load remains in the same polarity for both half cycles.

d)FILTER

A typical power supply filter circuit can be understood by dividing the circuit into two parts, the reservoir capacitor and the low pass filter. Each of these parts contributes to removing the remaining AC pulses, but in different ways.



Electrolytic capacitor used as a reservoir capacitor, so called because it acts as a temporary storage for the power supply output current. The rectifier diode gives current to charge a reservoir capacitor on each cycle of the input wave. The reservoir capacitor is large electrolytic, usually of several hundred or even a thousand or more microfarads, especially in main frequency PSUs. This very large value of capacitance is required because the reservoir capacitor, when charged, must provide sufficient DC to maintain a steady PSU output when the input current is absent; i.e. at the time of gaps between the positive half cycles when the rectifier is not conducting.

The action of the reservoir capacitor on a half wave rectified sine wave. During each cycle, the rectifier anode AC voltage increases towards Vpk. At some point close to Vpk the anode voltage exceeds the cathode voltage, the rectifier conducts and a pulse of current flows, by which the reservoir capacitor to the value of Vpk is charged.

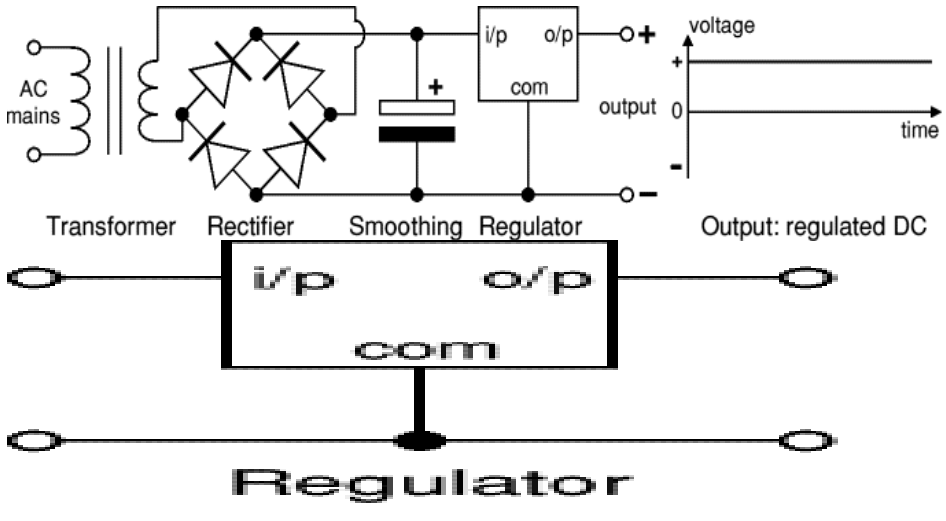
Once the input wave passes Vpk the rectifier anode falls below the capacitor voltage, the rectifier becomes reverse biased and the conduction stops. The load circuit is now given by the reservoir capacitor alone.

Of course, even though the reservoir capacitor has large value, it discharges as it gives the load, and its voltage falls, but not by very much. At some point during the next cycle of the mains input, the rectifier input voltage increases above the voltage on the discharged capacitor and the reservoir is re-charged to the high value Vpk .

e)REGULATOR

Voltage regulator ICs are available with fixed or variable output voltages. They are also rated by the maximum current they can pass. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from more current and overheating.

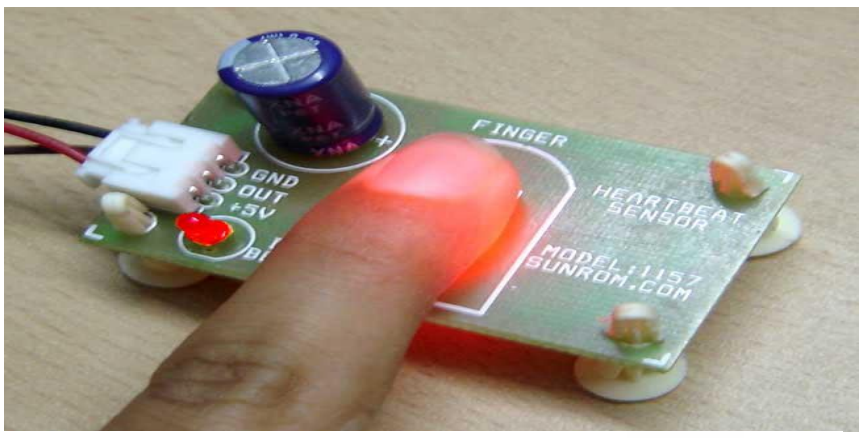
The LM78XX series of three terminal regulators is available with several fixed output voltages useful in a wide range of applications. One of these is local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages present allow these regulators to be used in logic systems, instrumentation, HiFi, and other solid state electronic equipment. Although designed primarily as fixed voltage regulators these devices can be used with external components to extract adjustable voltages and current.It regulate the negative voltage.The regulated DC output is very smooth with no ripple. It is suitable for all electronic circuits.

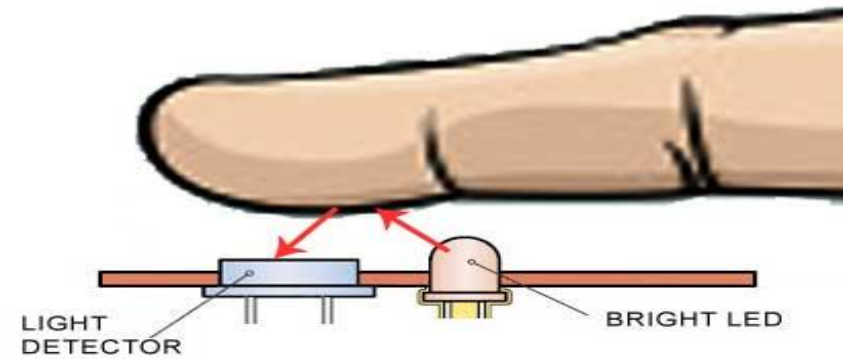


VII.SENSORS USED

a)HEART BEAT SENSOR

Heart beat sensor gives the digital output of heat beat when a finger is placed on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller to measure the Beats Per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.





b)TEMPERATURE SENSOR

A temperature value is converted to an electrical value using the temperature sensor .They are the key to read temperatures correctly and to control temperature in industrials applications. The temperature sensors contain a sensing element made of plastic or metal..

In the temperature functional module we developed, we use the LM34 series of temperature sensors. The LM34 series are the precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Fahrenheit temperature. The LM34 has an advantage over linear temperature sensors measured in degrees Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Fahrenheit scaling. The LM34 does not require any external calibration. It is easy to include the LM34 series in a temperature measuring application. The LM34 series is available packaged in hermetic TO-46 transistor packages, while the LM34C, LM34CA and LM34D are available in the plastic TO-92 transistor package.

c)BLOOD PRESSURE SENSOR

Blood pressure (BP) is the pressure applied by circulating blood upon the walls of blood vessels. Blood pressure is usually expressed in terms of the systolic pressure over diastolic pressure and is measured in milli meters of mercury (mm Hg). It is one of the vital signs along with respiratory rate, heart rate, oxygen saturation, and body temperature. Normal resting blood pressure in an adult is 120/80 mm Hg approximately.

Blood pressure varies depending on situation, activity, and disease states. It is regulated by the nervous and endocrine systems. Blood pressure that is low due to a disease state is called hypotension, and pressure that is invariably high is hypertension. Both have many causes which can range from mild to severe. Both may be of sudden inception or of long duration. Long term hypertension is a risk factor for many diseases, including kidney failure, heart disease, and stroke. Long term hypertension is more common than long term hypotension in Western countries. Hypertension often goes undetected because of rarely monitoring and the absence of symptoms.

SYSTEMIC ARTERIAL PRESSURE

Classification of blood pressure for adults		
Category	**systolic, mm Hg**	**diastolic, mm Hg**
Hypotension	< 90	< 60
Desired	**90–119**	**60–79**
Prehypertension	120–139	80–89
Stage 1 hypertension	140–159	90–99
Stage 2 hypertension	160–179	100–109
Hypertensive emergency	≥ 180	≥ 110
Isolated systolic hypertension	≥ 140	< 90

X.CONCLUSION

As mentioned in [21] the future work has been enhanced and the focus had been placed on real-life medical applications, such as on body temperature , blood pressure signals and heart beat using our proposed approach. In addition, when the staff had symptoms or side effects due to stress , it can be inputted and the system diagnoses the disease and prescribe the concerned medical test to be taken in order to have productive employees, lower absenteeism rates, fewer business disruptions and reductions in the costs of sick pay and temporary replacement staff.

XI. REFERENCES

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