Prevention of pressureulcer by using Peltiermodule

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ABSTRACT:Bedsores also said as pressure ulcers leads to injuries to skin and underlying tissue succeeding from prolonged pressure on the skin. Bedsores most often develop on skin that covers bony areas of the body, just like the heels, ankles, hips and tailbone. people most at risk of bedsores are those with a medical condition that limits their ability to change positions or those who spends most of their time in an extremely bed or chair. This paper outlines an anti-bedsore bed that could be a medical device that forestalls or delays prevalence of pressure ulcers by assuaging contact pressure exerted on a patient because of a contact with a bed. during this work, a Peltier module and a fan are fitted in a bed to cut back the temperature and wetness within the bed to optimum condition to stop pressure ulcers. The bed set consists of quite four Peltier modules and a brushless fan aligned with a patient's head, hip, thighs and heels that are usually the bedsores occurring areas. The air flow and temperature changes sporadically as per needed mistreatment controller unit. this may conjointly scale back the patient uncomfortable conditions.
KEYWORDS: PressureUlcer,PeltierModule,Arduino.

I. INTRODUCTION

Bedsoresalsocalledaspressureulcersordecubitusulcersareinjuriestoskinandunderlyingtissueresultingfromprolongedpressureontheskin.Theyhappenwhenapatientliesorsitinonepositiontoolongandtheweightofyourbodyagainstthesurfaceofthebedorchaircutsoffthebloodsupply.Withouttreatmentthesebedsorescangetworseanddeepensthepressure.Itisnecessaryforthepatientstokeepmovingorchangepositionsforevery4hoursinterval.Someofthebedriddenpatientsmaystayathomeandtakencarebythecaretaker.Thisisnotpossibleforthepoorpatientsandsotheyarereliableonthevarietyofantibedsoreproductsthatarecapableofcuttingbacktheriskofpressurebuildbymovingcontactpointsbetweenpatientandalsothesupport.TherequiredcomponentssuchasPeltiermodulesandbrushlessfanswithairductsarefixedunderthecushionofthegenericbed.Theobjectiveisthattop

roposeadesigningofanewanti-bedsoremechanismsuchthattherewillbenochanceofdefectsintheexistingproducts.Thedesigntobeproposedisthatthecomponentsareinstalledbelowwiththemattressoftheregularhospitalbed.Theinstallationofcomponentscomeswithfoursectionsandeachcanworkindependently.ButthetemperatureandthefansRPMisbeingcontrolledbytheECU(ElectronicControlUnit)board.Thus,allmodulesworkinasimultaneouspattern.

II. LITERATURESURVEY

Pressureulcerskeepasignificantpathologicalstatetouchingpreparingtoseveralmillionadults.theeyepriceandUtilizationProject(HCUP)reportfoundfrom1993to2003asixtythreehundredincreaseinpressureulcers,butthewholevaryofhospitalizationsthroughoutpresentlyquantityexaggeratedbywhollyelevencyphers.Pressureulcerssquaremeasurehighpricedwithamedianchargeperkeepof$37,800.AmongthefourthannualHealthGradesPatientSafetywithinthebarofpressureulcerssquaremeasuregoingtobeamultidisciplinaryresponsibility,nursesplayanenormousrole.In1992,theU.S.severaloftheproofonpreventingpressureulcerswassupportedLevel3proof,skilfulopinion,andpanelagreement,stillitservedasafoundationforprovidingcare.Mortalityisadditionallyassociatedwithpressureulcers.Severalstudiesnotedmortalityratesashighassixtyyoutakecareofolderpersonswithpressureulcerswithinoneyearofhospitaldischarge.Mostoften,pressurelesionsdonotcausedeath;ratherthepressurelesiondevelopsonceaconsecutivedeclineinhealthstanding.Pressureulcersdeveloponcecapillariesoffertheskinandcoveringtissuessquaremeasurecompressedenoughtoimpedemovement,leadingultimatelytotissue.Since1930,wehaveunderstoodthatunitlevelwithincapillariesrangesfromtwentyto40mmHg;32mmHgistakenintothoughtaday.Akeyapartofanalysisstudiesthathaveaccordingreductionofpressureulcersisthattheasaresultofsustainthemomentumovertime,notablyoncetheflexibilitychampionleavestheinstitution.It'sclearfromtheproofthatmaintainingacultureofpressureulcerationbarindegreeterriblycaresettingmaybeasignificantchallenge,onethatdesiresthesupportofadministrationthereforetheattentionofclinicians.In1994,AHR

Qwhollyscanclinicalfollowrecommendationsontreating pressureulcers.copiousoftheproofrelatedtotreating pressureulcerswassupportedLevelCproof,requiringoneoradditionalofthefollowing:onecontrolledtrial,resultsofaminimumoftwocaseseries/descriptivestudiesinhumans,orolderopinion.Theroleofproteincaloriepathologicalstateandpressureulcerationdevelopmentremainsunderstudied.Moreover,analysisintodietarysupplements(vitamins,minerals,etc.)amongtheabsenceofadietarydeficiencyislacking.Extranursingstudiesunitofactivityneededtoanalysiswhetherornotornottheutilizationofdietarysupplementshasanyresultonpressureulcerationbar.Recentnursingstudiespromptthatacomprehensiveapproachtobarcancauseimportantdecreasesinpressureulcerationincidence.However,studiesworkwaysinwhichtosustainthesedecreasesinpressureulcerationdevelopmentunitofactivitygreatlyneeded.Extraanalysisisadditionallyneededtoadditionalourunderstandingofrisklevelandmeteranalysisofpreventivemeasures.

III. EXPERIMENTATION

ASMPS(switchmodepowersupply)isusedtoconvertACtoDC,wherealltheusedinthisprojectarerunsinDC.Themainprocessingunitusedinthisprojectis ArduinoUNOR3whichusesaATmega328microcontroller,theArduinoUNOR3ispoweredby12VDCfromSMPSthroughabarrelconnecter.TheLM35isusedasainputtemperaturesensorbecauseithasawiderangeoftemperaturerangebetween55°Cto150°Calsoitoperatesinavoltageof5VDCanditdrawsabout60µAofcurrent,theoutputfromtheLM35sensorareconnectedtoA0,A1analogueinputpinsofArduino,AdigitalsignalgeneratedbyArduinobasedontheinputprogramme(code)producedindigitalpinsD1andD2whichtotransmittedtoDualchannelrelayusestheSVDCfromtheSMPStoswitchthePeltiermoduledependsonthevariousscenarios,thePeltiermoduledraws12VDC,10A(12W)fromtheSMPSwhenrelayturnsON,thenthePeltiermodulebecomeseithercoolorheatdependingupontheambienttemperaturetheAluminiumheatspreaderwithaairductsareusedtodissipatethetemperaturequicklytomaintaintheproperairflowBrushlessFansareusedwhichuses12VDCeachfromtheSMPSunit.Thisprocessiscycliceventwhentherearechangesintemperaturetheoperationgetsstartedandexecuted.
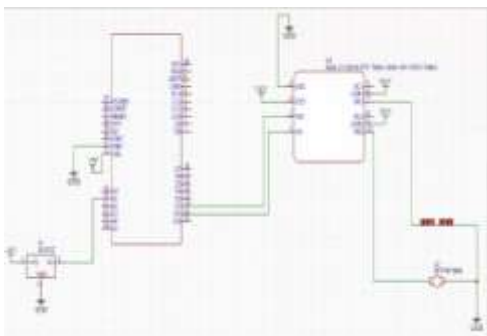
LINE CIRCUIT DIAGRAM
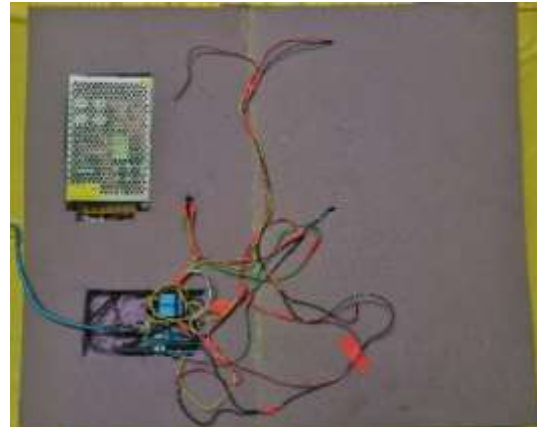
CIRCUIT WIRE CONNECTION

Source Code For The Microprocessor:

```
int sensorPin1=A0;
int sensorPin2=A1;
float sensorValue1=0;
float sensorValue2=0;
float voltageOut1=0;
float temperatureC1=0;
float voltageOut2=0;
float temperatureC2=0;
int relay_1=3;
int relay_2=4;
void setup()
{
pinMode(sensorPin1,INPUT);
pinMode(sensorPin2,INPUT);
pinMode(relay_1,OUTPUT);
pinMode(relay_2,OUTPUT);
Serial.begin(9600);
digitalWrite(relay_1,LOW);
digitalWrite(relay_2,LOW);
}
void loop()
{
  sensorValue1 = analogRead(sensorPin1);
  voltageOut1 = (sensorValue1 * 5000) / 1024;
  temperatureC1 = voltageOut1 / 10;
  sensorValue2 = analogRead(sensorPin2);
  voltageOut2 = (sensorValue2 * 5000) / 1024;
  temperatureC2 = voltageOut2/ 10;
Serial.print("Temperature(°C)1: ");
Serial.print(temperatureC1);
Serial.print(" Voltage(mV)1: ");
Serial.println(voltageOut1);
Serial.print("Temperature(°C)2: ");
Serial.print(temperatureC2);
Serial.print(" Voltage(mV)2: ");
Serial.println(voltageOut2);
  delay(1000);
  if(temperatureC1>37.5)
```

```
{
digitalWrite(relay_1,HIGH);
digitalWrite(relay_2,LOW);
Serial.print(" cooling ON ");
 }
 else if(temperatureC1<37.5)
 {
digitalWrite(relay_1,LOW);
digitalWrite(relay_2,HIGH);
Serial.print(" heating ON ");
 }
 else
 {
digitalWrite(relay_1,LOW);
digitalWrite(relay_2,LOW);
Serial.print(" BOTH OFF ");
 }
 if(temperatureC2>37.5)
 {
digitalWrite(relay_1,HIGH);
digitalWrite(relay_2,LOW);
Serial.print(" cooling ON ");
 }
 else if(temperatureC2<37.5)
 {
digitalWrite(relay_1,LOW);
digitalWrite(relay_2,HIGH);
Serial.print(" heating ON ");
 }
 else
 {
digitalWrite(relay_1,LOW);
digitalWrite(relay_2,LOW);
Serial.print(" BOTH OFF ");
 }
}
```

IV. OBSERVATION FROM THE TEST CONDUCTED

When the power supply is switched ON according to the programme feed in the Arduino the temperature is measured by the LM35 sensors and when temperature drops from 37.5°C in bed the dual channel relay switch ON the heating element of Peltier module, It takes around 2.34 minutes to attend the optimal temperature of 37°C, And in different scenario when the temperature to exceeds 37.5°C the Arduino switch ON the cooling element of Peltier module and it takes one and 5 minutes to completely cools and attend the 37.5°C mark and when it achieves the 37.5°C make it shut down whole process and when there is a change in temperature again it starts the programme according to the condition. Also, the brushless fans run 24*7 to improves air circulation.

V. CONCLUSION

Thus, by looking from the project the overall result is observed, our main objective is to prevent the pressure ulcer by means of simple and affordable components. There other platform with similar objective but compare to that ours is affordable. It is good replace for the conventional hospital beds for a bed ridden persons, it is fully automated it requires less militance and also it consumes less power. It also reduces the manpower required to watch after the bed ridden persons. In the future it could be improved and adds the Iot(Internet of things) and AI to enhance the efficacy of the machine which shows it is more advance than the existing systems. And it may use in the future to minimizing the rate of pressure ulcer.

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