IOT BASED SAFETY GADGET FOR CHILD MONITORING AND NOTIFICATION

PROJECT REPORT

Submitted by

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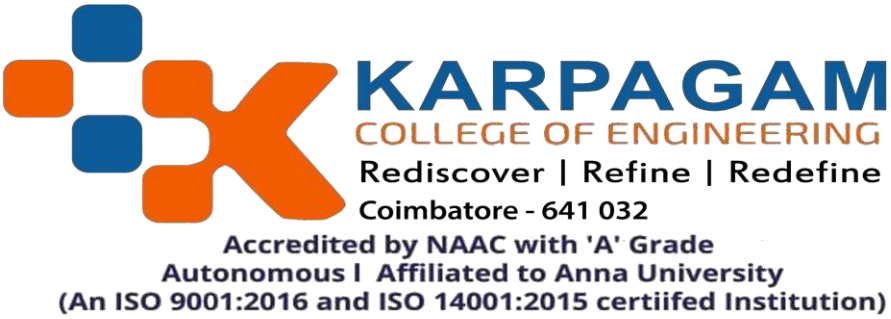
in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

ELECTRONICS AND COMMUNICATION ENGINEERING



NOVEMBER 2022

KARPAGAM COLLEGE OF ENGINEERING

(AUTONOMOUS)

COIMBATORE – 641 032

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BONAFIDE RECORD OF WORK DONE BY

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Certified that the candidate was examined in the viva-voce examination held on

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(Internal Examiner)

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(External Examiner)

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ABSTRACT

This project is focused on an idea to design a Smart Cradle System using IOT which will help Parents to monitor their children even if they are far away from home & can detect every activity of the Baby from any distant corner of the world. It is a smart, innovative & protective Cradle System to nurture an infant in an efficient way. This system considers all the minute details that are required for the care & protection of the Baby in the cradle. The design of smartness & innovation comes with the use of technologies/methodologies which include the Internet of Things (IoT) (Modules like Arduino UNO, Gas, sound sensors & Temperature sensors), Cry Detecting Mechanism, camera Surveillance, database (Data Storage) & User-Friendly Web application (for User Controls). In order to detect each & every activity of Baby, different Sensors/Modules are attached to the Cradle: a Gas& Temperature Sensing Module for the detection of Wetness of the bed, A Camera on top of the Cradle for live video footage &sound sensor to analyze Cry Patterns. All the data which is been taken from the sensors/modules will be stored in data base&analysed at regular intervals.

LIST OF FIGURES

LIST OF ABBREVIATIONS

LCD	LIQUID CRYSTAL DISPLAY
IC	INTEGRATED CIRCUIT
LED	LIGHT EMITTING DIODE
I/O	INPUT/OUTPUT
MHZ	MEGA HERTZ
KHZ	KILO HERTZ
LF	LOW FREQUENCY
HF	HIGH FREQUENCY
UHF	ULTRA HIGH FREQUENCY
VLF	VERY LOW FREQUENCY
PWM	PULSE WIDTH MODULATION
RAM	RANDOM ACCESS MEMORY
IDE	INTEGRATED DEVELOPMENT ENVIRONMENT
ASCII	AMERICAN STANDARD CODE FOR INFORMATION INTERCHANGE
HTTP	HYPERTEXT TRANSFER PROTOCOL
FTP	FILE TRANSFER PROTOCOL
HTML	HYPERTEXT MARKUP LANGUAGE

CHAPTER 1
INTRODUCTION

1.1 INTRODUCTION

As we are very well familiar with the hurdles faced by Parents to nurture their infant and especially in case if both the Parents are working. To give 24 hours of time in such cases is next to impossible. Thus, we should develop something unique that can help Parents to have a continuous surveillance/watch on the Baby/Infant and can notify about the same. Thus, we came up with an idea to design a Smart Cradle System using IOT which will help the Parents to monitor their child even if they are far away from home & can detect every activity of the Baby from any distant corner of the world. It is an innovative, smart & protective Cradle System to nurtue an infant in an efficient way. This system considers all the minute details that are required for the care & protection of the Baby in the cradle. The design of smartness & innovation comes with the use of technologies/methodologies which include Internet of Things (IOT) (Modules like Arduino UNO, Arduino, Humidity & Temperature sensing), Swing Automation, Cry Detecting Mechanism, Live Video Surveillance, Cloud Computing (Data Storage) & User Friendly Android Mobile Application (for User Controls). In order to detect each & every activities of the Baby, different Sensors/Modules are attached to the Cradle: Humidity & Temperature Sensing Module for detection of Wetness of the bed, A Camera on top of the Cradle for live video footage & Cry Detection Circuit to analyse Cry Patterns which eventually triggers the swinging mechanism (if required based on the range of frequency). All the data which is been taken from the sensors/modules will be stored in Cloud (Google Firebase) & analyzed at regular intervals. A Health Algorithm is applied to these datasets to get information about the body conditions which is helpful as any regular symptoms of a disease can be identified easily. An instant mobile notification that will be generated if any abnormal activity is detected

(something unusual OR crying of baby OR wetness due to Baby Urine) in the Android Mobile Application which has been Developed. It has UI controls which include the feature of controlling the swinging mechanism of the cradle (can be turned on, turned off & can maintain the speed of swing), control for the switching on the camera live footage & controls for playing the toy/projector whenever the baby cries.

1.2 EXISTING SYSTEM

1.2.1 **IoT Based Smart Cradle System with an Android App for Baby Monitoring**

[1] Availability of high speed internet and wide use of mobile phones leads to gain the popularity to IoT. One such important concept of the same is the use of mobile phones by working parents to watch the activities of baby while babysitting. This paper presents the design of Smart Cradle which supports video monitoring. Also it activates buzzer and gives alerts on phone if –first, baby cry continues till specific time which means now cradle cannot handle baby and baby needs personal attention and second, if the mattress in the cradle is wet. This cradle has an automatic rotating toy for baby's entertainment which will reduce the baby cry possibility.

1.2.2 **Video-based IoT baby monitor for SIDS prevention**

[2] Availability of high speed internet and wide use of mobile phones leads to gain the popularity to IoT. One such important concept of the same is the use of mobile phones by working parents to watch the activities of baby while babysitting. This cradle swings automatically on detection of crying sound of the baby. Also it activates buzzer and gives alerts on phone if –first, baby cry continues till specific time which means now cradle cannot handle baby and baby needs personal attention and second, if the mattress in the cradle is wet. This cradle has an automatic rotating toy for baby's entertainment which will reduce the baby cry possibility

1.3 PROPOSED SYSTEM

This paper presents an idea to design a Smart Cradle System using IOT which will help the parents to monitor their child even if they are away from home & detect every activity of the Baby from any distant corner of the world. It is an innovative, smart & protective Cradle System to nurture an infant in an efficient way. This system considers all the minute details required for the care & protection of the Baby in the cradle. The design of smartness & innovation comes with the use of technologies/methodologies which include the Internet of Things (IoT) (Modules like Arduino UNO, Humidity & Temperature sensing, etc..,), Cry Detecting Mechanism, Live Video Surveillance, Cloud Computing (Data Storage) & User Friendly Web application(for User Controls). In order to detect each & every activity of the Baby, different Sensors/Modules are attached to the Cradle: Humidity & Temperature Sensing Module for detection of Wetness of the bed, A Camera on top of the Cradle for live video footage & Cry Detection Circuit to analyze Cry Patterns. All the data which has been taken from the sensors/modules will be stored in Cloud? & analyzed at regular intervals. A Health Algorithm is applied to these datasets to get information about the body conditions which is helpful as any regular symptoms of a disease can be identified easily.

CHAPTER 2

LITERATURE SURVEY

2.1. Literature Survey

[1] Availability of high speed internet and wide use of mobile phones leads to gain the popularity to IoT. One such important concept of the same is the use of mobile phones by working parents to watch the activities of baby while babysitting. This paper presents the design of Smart Cradle which supports video monitoring. This cradle swings automatically on detection of crying sound of the baby. Also it activates buzzer and gives alerts on phone if –first, baby cry continues till specific time which means now cradle cannot handle baby and baby needs personal attention and second, if the mattress in the cradle is wet. This cradle has an automatic rotating toy for baby's entertainment which will reduce the baby cry possibility.

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[4] This project represents a baby monitoring system for busy parents so that they can ensure the proper care and safety of their babies. This system can identify the baby's motion and sound, especially crying and video output of baby's present position can be displayed on a display monitor so that the mother or another responsible person can watch the baby while away from baby. This baby monitoring system

is capable of identifying motion and crying condition of the baby automatically. The total control system of the hardware is made using Arduino UNO B+ module, condenser MIC is used to detect baby's crying, PIR motion sensor is incorporated to detect baby's movement and Pi camera is used to capture the baby's movement. A display is used to have video product of sleeping baby. Finally, the developed hardware is tested to analysis the capability of detecting the motion and crying sound of baby as well as the video output. This proposed system can provide an easier and convenient way for busy parents in terms of taking care of their babies.

[5] In order to improve the quality of baby's health care, the function of baby crying recognition is proposed to be added to the nursery box. The hardware core is consist of digital signal processor (DSP) chip TMS320DM643 and multimedia audio codec chip TLC320AIC23B, which will perform well in real time to recognize baby crying. After the baby crying signal is collected by the pickups, it will be processed by the audio decoder chip and then sent it to the DSP chip. In the DSP chip, the sound signal will be preprocessed and extracted for the characteristic parameters - linear prediction coefficient (LPC) by optimized autocorrelation function algorithm. It will be recognized accurately by the method of dynamic time regular (DTW) recognition algorithm, and then the results are sent to the host computer through the serial port. It is proved that the accuracy of the baby crying state can be recognized as high as 97.1%, this study is of great importance in the field of infant care.

[6] As human beings, we begin interacting with the world by expressing our basic needs through crying. Parents strive to identify and timely address these needs before hysterical crying sets in. However, first-time parents usually fail, and this leads to frustration and feelings of helplessness. In this context, our work focuses on creating an automatic system able to distinguish between different infant needs based on crying. We extract various sets of paralinguistic features from the baby-cry audio signals and we train various rule-based or statistical classifiers. We evaluate and in-depth compare the results and obtain up to 70% accurate to the evaluation dataset.

[7] Body temperature of the baby is important element that will inform the actual health condition of a baby. Parents and caregiver occasionally do not aware of drastic increase in body temperature in a short period of time and febrile seizure may happen that could leads to epilepsy. In Malaysia, device that could monitor the infant body's temperature is already available. However, the device could not continuously be used for a long hours and create discomfort to the babies due to its size of devices. Therefore, a small, lightweight device that continuously monitors the body temperature and comfortably used by baby is developed. It directly helps parents by alerting them whenever the baby's body temperature increased higher than normal a degree. This system monitors the vital parameter which is the body temperature by using a wearable sensor. The information then transferred to their

parents through a wireless network. The system is extended for interfacing with the mobile phones to enable remote monitoring. Architecture of the system consists of a wearable sensor for monitoring the vital parameter and a sound buzzer where all of the component be controlled by a single microcontroller, the ESPressoLite V2.0 based on ESP8266 and supplied by the lithium ion polymer battery.Sudden Infant Death Syndrome (SIDS) is also known as crib death, because many babies who die of SIDS, are found in their cribs. It occurs to infants younger than 12 months old. Most SIDS deaths occur in infants younger than 6 months old

[8] Professionals still do not know the causes of SIDS, but risk can be reduced by letting the baby sleep on a firm surface (crib mattress). In addition, the baby should not sleep on a pillow or another a soft surface. The researchers do not know why sleeping on such surfaces increase the risk of SIDS, but they warn that it could be dangerous

[9] For instance, in 2003, a showed that placing an infant to sleep on soft bedding rather than on firm bedding appeared to pose five times the risk of SIDS

[10] Moreover, overheating should be avoided during sleep. Babies should be kept warm during sleep, but the temperature should not be extremely warm. In winter or cold weather, the risk of SIDS increases, because the parents overdress their babies or place them under heavier blanket, thereby overheating them

[11] Therefore, if the room temperature is comfortable for an adult, then it is also appropriate for the baby. Internet of Things (IoT) simply refers to a network of objects that are connected to the internet. It provides devices with the ability to transfer sensor data on the Internet without requiring intervention

[12] The IoT encompasses many devices and is growing at a rapid rate, because it is such a broad category. A forecast states that in 2019, approximately 26.66 billion IoT devices will be active; by 2025, 75 Billion IoT devices worldwide will be available and wirelessly connected to the Internet

[13] Among these connected devices, millions of wearable sensors are widely used in healthcare applications

[14] The total global spending on the IoT in 2016 was 737 billion dollars and was projected to reach 1.29 trillion dollars in 2020. IoT is a prominent field that will increase and grow exponentially

CHAPTER 3

PROJECT DESCRIPTION

3.1 BLOCK DIAGRAM

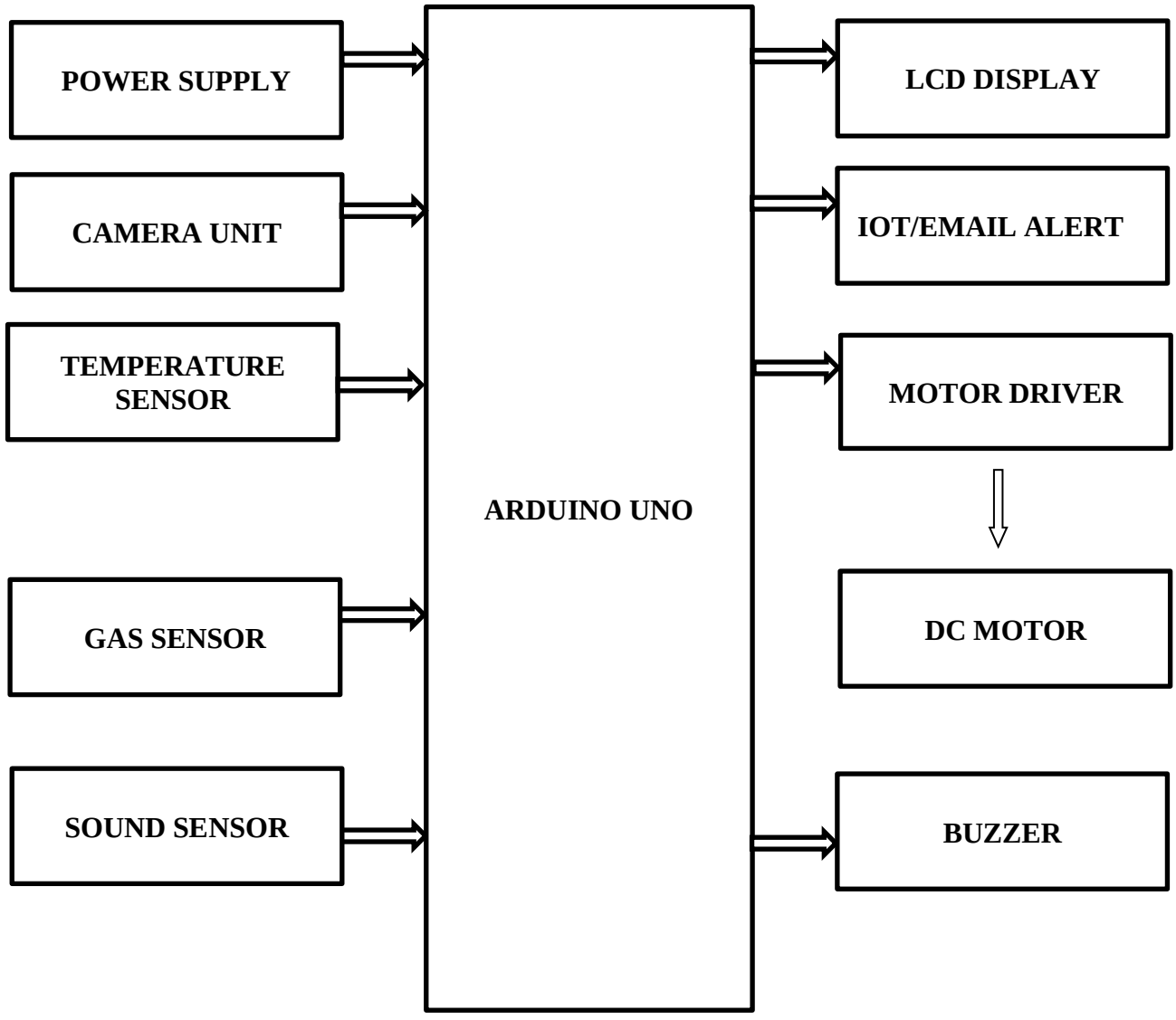

FIG 3.1 BLOCK DIAGRAM

3.2 CIRCUIT DIAGRAM

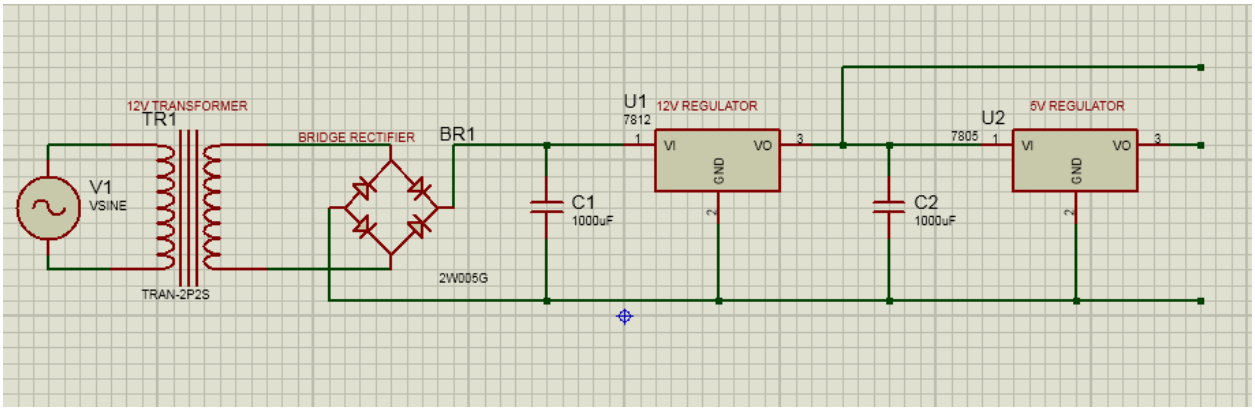

FIG 3.2 CIRCUIT DIAGRAM

3.3 WORKING PRINCIPLE

The above figure represents the architecture design of the system where the temperature sensor, humidity, sound sensor and the camera are connected to the Arduino UNO. The WIFI will send the email to the parent and the L298N motor driver is used to move the dummy shaft using the dc motor. In this proposed system, both sensors and forecasting cloud is used, so that resulting data having high accuracy about the children condition, also we are using surveillance of the children using camera from a Wide Area Network (WAN) which can be viewed in the Web Application and also can control the situation from a remote area anywhere from the world. In this project MCP3008 is used, so connect 3.3v pin from Arduino to all sensors Similarly MCP3008 and all sensor's ground pins should be grounded Now connect sensor's output pins to each channels of MCP3008 (ex: LM-35 to channel 0, gas to channel 1 and SOUND sensor to channel 2 of MCP3008) Connect USB camera with Arduino UNO Connect power supply for Arduino UNO Plug the HDMI cable in Arduino UNO from the monitor using VGA to HDMI converter cable Connect USB Mouse and USB keyboard to the Arduino UNO.

Our proposed system aims at monitoring the vital signs of the baby such as body temperature using wireless technology and sound sensor. We also focus on increase the scope of transmitting the information over the internet in order to provide remote access. The camera module incorporated enables displaying the visual feeds of the whereabouts of the baby and keeping an eye over their movements in a finite area. This system overcomes the drawback of the existing systems which are clumsy, less user friendly and expensive.

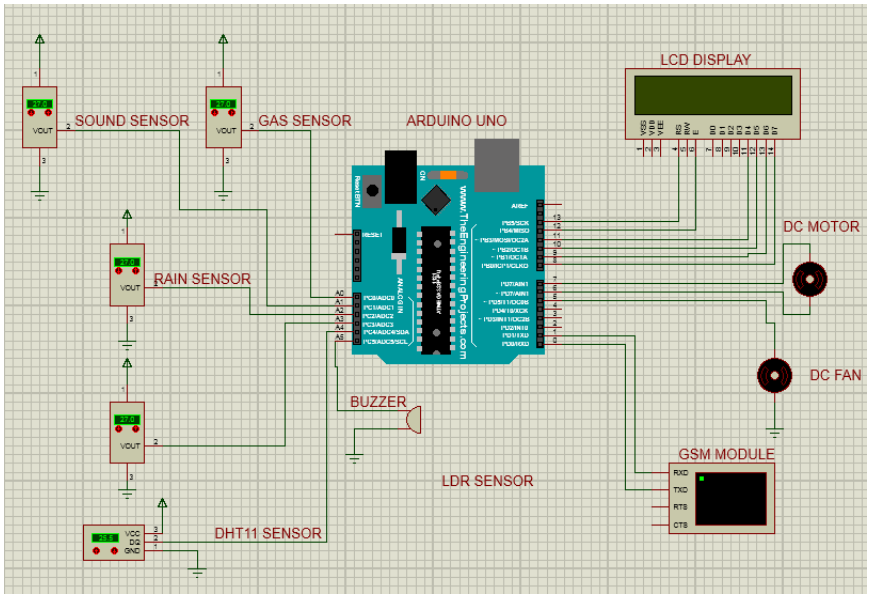

FIG 3.3 SIMULATION CIRCUIT DIAGRAM

CHAPTER 4
SYSTEM SPECIFICATIONS

4.1 HARDWARE SPECIFICATIONS

- Arduino UNO
- Power supply
- camera
- Temperature sensor
- Gas sensor
- Sound sensor
- Lcd display
- Dc motor driver
- Dc motor
- Buzzer

4.1.1 ARDUINO UNO

Arduino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

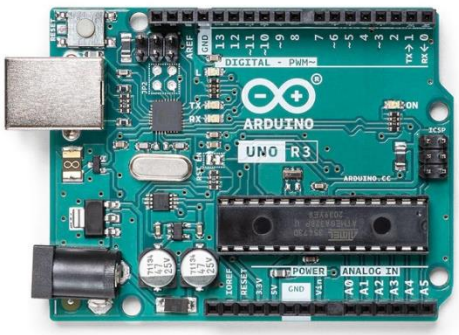

FIG 4.1 ARDUINO UNO 3

4.1.2 POWER SUPPLY:

This is a simple approach to obtain a 12V and 5V DC power supply using a single circuit. The circuit uses two ICs 7812 and 7805 for obtaining the required voltages. The AC mains voltage will be stepped down by the transformer, rectified by bridge and filtered by capacitor to obtain a steady DC level .The 7812 regulates this voltage to obtain a steady 12V DC. The output of the IC1 will be regulated by the 7805 to obtain a steady 5V DC at its output. In this way both 12V and 5V DC are obtained.

4.1.3 GAS SENSOR

The MQ-135 Gas sensors are used in air quality control equipments and are suitable for detecting or measuring of NH3, NOx, Alcohol, Benzene, Smoke, CO2. The MQ-135 sensor module comes with a Digital Pin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. If you need to measure the gases in PPM the analog pin need to be used. The analog pin is TTL driven and works on 5V and so can be used with most common microcontrollers.If you are looking for a sensor to detect or measure common air quality gases such as CO2, Smoke, NH3, NOx, Alcohol, Benzene then this sensor might be the right choice for you.

FIG 4.2 GAS SENSOR

MQ-135 SENSOR FEATURES

- Wide detecting scope
- Fast response and High sensitivity
- Stable and long life
- Operating Voltage is +5V
- Detect/Measure NH3, NOx, alcohol, Benzene, smoke, CO2, etc.
- Analog output voltage: 0V to 5V
- Digital output voltage: 0V or 5V (TTL Logic)
- Preheat duration 20 seconds
- Can be used as a Digital or analog sensor

APPLICATIONS

- Used to detect leakage/excess of gases like Ammonia, nitrogen oxide, alcohols, aromatic compounds, sulfide and smoke.
- Air quality monitors.

4.1.4 LM35 TEMPERATURE SENSOR

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling. The LM35 device does not require any external calibration or trimming to provide typical accuracies of ±¼°C at room temperature and ±¾°C over a full −55°C to 150°C temperature range. Lower cost is assured by trimming and calibration at the wafer level. The low-output impedance, linear output, and precise inherent calibration of the LM35 device makes interfacing to readout or control circuitry especially easy. The device is used with single power supplies, or with plus and minus supplies. As the LM35 device draws only 60 μA from the supply, it has very low self-heating of less than 0.1°C in still air. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy). The LM35-series devices are available packaged in hermetic TO transistor packages, while the LM35C, LM35CA, and LM35D devices are available in the plastic TO-92 transistor package. The LM35D device is available in an 8-lead surface-mount small-outline package and a plastic TO-220 package.

FIG 4.3 LM35 TEMPERARTURE SENSOR

HOW TO USE LM35 TEMPERATURE SENSOR:

LM35 is a precession Integrated circuit Temperature sensor, whose output voltage varies, based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between -55°C to 150°C. It can easily be interfaced with any Microcontroller that has ADC function or any development platform like Arduino.

Power the IC by applying a regulated voltage like +5V (V_S) to the input pin and connected the ground pin to the ground of the circuit. Now, you can measure the temperate in form of voltage as shown below.

If the temperature is 0°C, then the output voltage will also be 0V. There will be rise of 0.01V (10mV) for every degree Celsius rise in temperature. The voltage can converted into temperature using the below formulae.

$V_{OUT} = 10\ mv/°C \times T$

where

- V_{OUT} is the LM35 output voltage
- T is the temperature in °C

LM35 TEMPERATURE SENSOR APPLICATIONS:

- Measuring temperature of a particular environment
- Providing thermal shutdown for a circuit/component
- Monitoring Battery Temperature
- Measuring Temperatures for HVAC applications.

FEATURES

- Calibrated directly in ° Celsius (Centigrade)
- Linear + 10.0 mV/°C scale factor
- 0.5°C accuracy guaranteeable (at +25°C)
- Rated for full −55° to +150°C range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 μA current drain

4.1.5 SOUND SENSOR

The sound sensor is one type of module used to notice the sound. Generally, this module is used to detect the intensity of sound. The applications of this module mainly include switch, security, as well as monitoring. The accuracy of this sensor can be changed for the ease of usage.

This sensor employs a microphone to provide input to buffer, peak detector and an amplifier. This sensor notices a sound, & processes an o/p voltage signal to a microcontroller. After that, it executes required processing.

This sensor is capable to determine noise levels within DB's or decibels at 3 kHz 6 kHz frequencies approximately wherever the human ear is sensitive. In smartphones, there is an android application namely decibel meter used to measure the sound level.

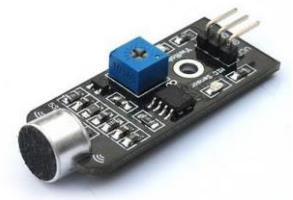

FIG 4.4 SOUND SENSOR

- Pin1 (VCC): 3.3V DC to 5V DC
- Pin2 (GND): This is aground pin
- Pin3 (DO): This is an output pin

WORKING PRINCIPLE

The working principle of this sensor is related to human ears. Because human eye includes a diaphragm and the main function of this diaphragm is, it uses the vibrations and changes into signals. Whereas in this sensor, it uses a microphone and the main function of this is, it uses the vibrations and changes into current otherwise voltage.Generally, it includes a diaphragm which is designed with magnets that are twisted with metal wire. When sound signals hit the diaphragm, then magnets within the sensor vibrates & simultaneously current can be stimulated from the coils.

FEATURES

- These sensors are very simple to use
- It gives analog o/p signal
- Simply incorporates using logic modules on the input area

SPECIFICATIONS

- The range of operating voltage is 3.⅗ V
- The operating current is 4~5 mA
- The voltage gain 26 dB ((V=6V, f=1kHz)
- The sensitivity of the microphone (1kHz) is 52 to 48 dB
- The impedance of the microphone is 2.2k Ohm
- The frequency of m microphone is16 to 20 kHz
- The signal to noise ratio is 54 dB

APPLICATIONS

- Security system for Office or Home
- Spy Circuit
- Home automation
- Robotics
- Smart Phones
- Ambient sound recognition
- Audio amplifier
- Sound level recognition (not capable to obtain precise dB value)

4.1.6 MOTOR DRIVE

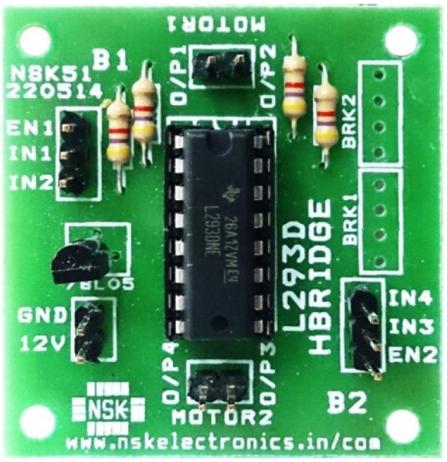

FIG 4.5 MOTOR DRIVE

L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. It works on the concept of H-bridge. H-bridge is a circuit which allows the voltage to be flown in either direction. As you know voltage need to change its direction for being able to rotate the motor in clockwise or anticlockwise direction, Hence H-bridge IC are ideal for driving a DC motor. In a single L293D chip there are two h-Bridge circuit inside the IC which can rotate two dc motor independently. Due its size it is very much used in robotic application for controlling DC motors. Given below is the pin diagram of a L293D motor controller. There are two Enable pins on l293d. Pin 1 and pin 9, for being able to drive the motor, the pin 1 and 9 need to be high. For driving the motor with left H-bridge you need to enable pin 1 to high. And for right H-Bridge you need to make the pin 9 to high. If anyone of the either pin1 or pin9 goes low then the motor in the corresponding section will suspend working. It's like a switch.

Working of L293D

There are 4 input pins for l293d, pin 2,7 on the left and pin 15 ,10 on the right as shown on the pin diagram. Left input pins will regulate the rotation of motor connected across left side and right input for motor on the right hand side. The motors are rotated on the basis of the inputs provided across the input pins as LOGIC 0 or LOGIC 1.In simple you need to provide Logic 0 or 1 across the input pins for rotating the motor.

Voltage Specification

VCC is the voltage that it needs for its own internal operation 5v; L293D will not use this voltage for driving the motor. For driving the motors it has a separate provision to provide motor supply VSS (V supply). L293d will use this to drive the motor. It means if you want to operate a motor at 9V then you need to provide a Supply of 9V across VSS Motor supply.The maximum voltage for VSS motor supply is 36V. It can supply a max current of 600mA per channel.Since it can drive motors Up to 36v hence you can drive pretty big motors with this l293d VCC pin 16 is the voltage for its own internal Operation. The maximum voltage ranges from 5v and upto 36v.

4.1.7 DC MOTOR

A DC motor is any motor within a class of electrical machines whereby direct current electrical power is converted into mechanical power. Most often, this type of motor relies on forces that magnetic fields produce. Regardless of the type, DC motors have some kind of internal mechanism, which is electronic or electromechanical. In both cases, the direction of current flow in part of the motor is changed periodically.

The speed of a DC motor is controlled using a variable supply voltage or by changing the strength of the current within its field windrings. While smaller DC motors are commonly used in the making of appliances, tools, toys, and automobile mechanisms, such as electric car seats, larger DC motors are used in hoists, elevators, and electric vehicles.

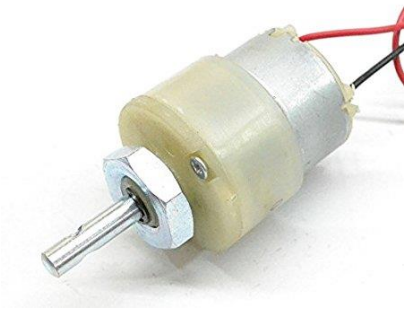

FIG 4.6 DC MOTOR

4.1.8 LCD DISPLAY

There are many display devices used by the hobbyists. LCD displays are one of the most sophisticated display devices used by them. Once you learn how to interface it, it will be the easiest and very reliable output device used by you! More, for micro controller based project, not every time any debugger can be used. So LCD displays can be used to test the outputs.

LCD accepts two types of signals, one is data, and another is control. These signals are recognized by the LCD module from status of the RS pin. Now data can be read also from the LCD display, by pulling the R/W pin high. As soon as the E pin is pulsed, LCD display reads data at the falling edge of the pulse and executes it, same for the case of transmission. LCD display takes a time of 39-43µS to place a character or execute a command. Except for clearing display and to seek cursor to home position it takes 1.53ms to 1.64ms. Any attempt to send any data before this interval may lead to failure to read data or execution of the current data in some devices. Some devices compensate the speed by storing the incoming data to some temporary registers.

4.1.8 WIFI MODULE

The **ESP8266** is a very user friendly and low cost device to provide internet connectivity to your projects. The module can work both as a Access point (can create hotspot) and as a station (can connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making **Internet of Things** as easy as possible. It can also fetch data from internet using API's hence your project could access any information that is available in the internet, thus making it smarter. Another exciting feature of this module is that it can be programmed using the Arduino IDE which makes it a lot more user friendly. However this version of the module has only 2 GPIO pins (you can hack it to use upto 4) so you have to use it along with another microcontroller like arduino, else you can look onto the more standalone **ESP-12** or **ESP-32** versions. So if you are looking for a **module to get started with IOT** or to provide internet connectivity to your project then this module is the right choice for you.The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

Each ESP8266 module comes pre-programmed with an AT command set firmware, meaning, you can simply hook this up to your Arduino device and get about as much WiFi-ability as a WiFi Shield offers (and that's just out of the box)! The ESP8266 module is an extremely cost effective board with a huge, and ever growing, community.

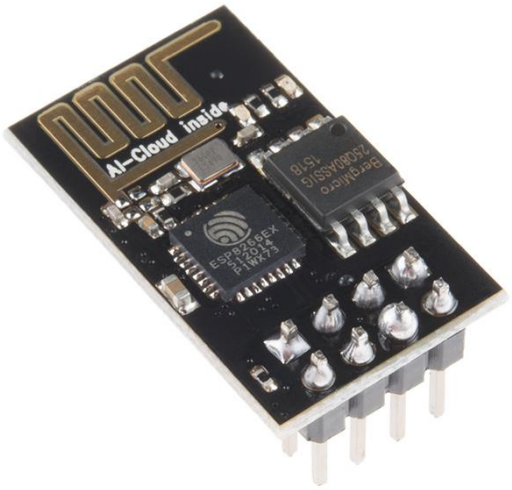

FIG 4.7 WIFI MODULE

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, including the front-end module, is designed to occupy minimal PCB area. The ESP8266 supports APSD for VoIP applications and Bluetooth co-existance interfaces; it contains a self-calibrated RF allowing it to work under all operating conditions, and requires no external RF parts.

4.1.9 BUZZER

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers and confirmation of user input such as a mouse click or key stroke. Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. It generates consistent single tone sound just by applying D.C voltage. Using a suitably designed resonant system, this type can be used where large sound

volumes are needed. At Future Electronics we stock many of the most common types categorized by Type, Sound Level, Frequency, Rated Voltage, Dimension and Packaging Type.

FIG 4.8 BUZZER

4.2 SOFTWARE SPECIFICATIONS

- Python IDE

CHAPTER 5

SIMULATION AND RESULTS

5.1 PROGRAM

```
#include<LiquidCrystal.h>
LiquidCrystal lcd(13,12,11,10,9,8);
int fan = 7;
int motor = 6;
int rain = 18;
int buzzer = 19;
void setup()
{
Serial.begin(9600);
pinMode(A0,INPUT);
pinMode(A1,INPUT);
pinMode(A2,INPUT);
pinMode(rain,INPUT);
pinMode(fan,OUTPUT);
pinMode(motor,OUTPUT);
pinMode(buzzer,OUTPUT);
  lcd.begin(16,2);
  lcd.setCursor(0,0);
  lcd.print("IOT BASED BABY");
  lcd.setCursor(0,1);
  lcd.print("MONITORING SYSTEM");
  delay(5000);
  lcd.clear();
void loop(){
```

```
digitalWrite(buzzer,LOW);
digitalWrite(fan,LOW);
digitalWrite(motor,LOW);
int temp=analogRead(A0);
int temp1=map(temp,0,1023,0,500);
int temp2=analogRead(A1);
int temp3=map(temp2,0,1023,0,500);
int temp4=analogRead(A2);
int temp5=map(temp4,0,1023,0,500);
lcd.setCursor(0,0);
lcd.print("TEMP =");
lcd.setCursor(6,0);
lcd.print(temp1);
lcd.setCursor(9,0);
lcd.print("GAS=");
lcd.setCursor(14,0);
lcd.print(temp3);
lcd.setCursor(0,1);
lcd.print("SOUND = ");
lcd.setCursor(8,1);
lcd.print(temp5);
 delay(1000);
 lcd.clear();
```

```
if(digitalRead(rain)==HIGH)
{
lcd.setCursor(0,0);
lcd.print("EMERGENCY... ");
digitalWrite(buzzer,HIGH);
Serial.println("AT+CMGF=1\r\n");
delay(2000);
Serial.println("AT+CMGS=\"9095331447\"\r\n");
delay(2000);
Serial.println("EMERGENCY...");
delay(2000);
Serial.println((char)26);
delay(2000);
lcd.clear();
}
if(temp1>35)
{
lcd.setCursor(0,0);
lcd.print("TEMPERATURE HIGH ");
lcd.setCursor(0,1);
lcd.print("FAN ON ");
digitalWrite(fan,HIGH);
Serial.println("AT+CMGF=1\r\n");
```

```
delay(2000);
Serial.println("AT+CMGS=\"9095331447\"\r\n");
delay(2000);
Serial.println("TEMPERATURE HIGH, FAN ON");
delay(2000);
Serial.println((char)26);
delay(2000);
lcd.clear();
 }
 if(temp3>35)
 {
 lcd.setCursor(0,0);
 lcd.print("UNWANTED SMELL ");
 lcd.setCursor(0,1);
 lcd.print(" DETECTED ");
 digitalWrite(fan,HIGH);
 Serial.println("AT+CMGF=1\r\n");
 delay(2000);
 Serial.println("AT+CMGS=\"9095331447\"\r\n");
 delay(2000);
 Serial.println("UNWANTED SMELL DETECTED");
 delay(2000);
 Serial.println((char)26);
```

```
delay(2000);
lcd.clear();
 }
 if(temp5>35)
 {
 lcd.setCursor(0,0);
 lcd.print("BABY CRYING... ");
 lcd.setCursor(0,1);
 lcd.print("            ");
 digitalWrite(fan,HIGH);
 Serial.println("AT+CMGF=1\r\n");
 delay(2000);
 Serial.println("AT+CMGS=\"9095331447\"\r\n");
 delay(2000);
 Serial.println("BABY CRYING...");
 delay(2000);
 Serial.println((char)26);
 delay(2000);
 lcd.clear();
 }
 }
```

5.2 PROGRAM OUTPUT

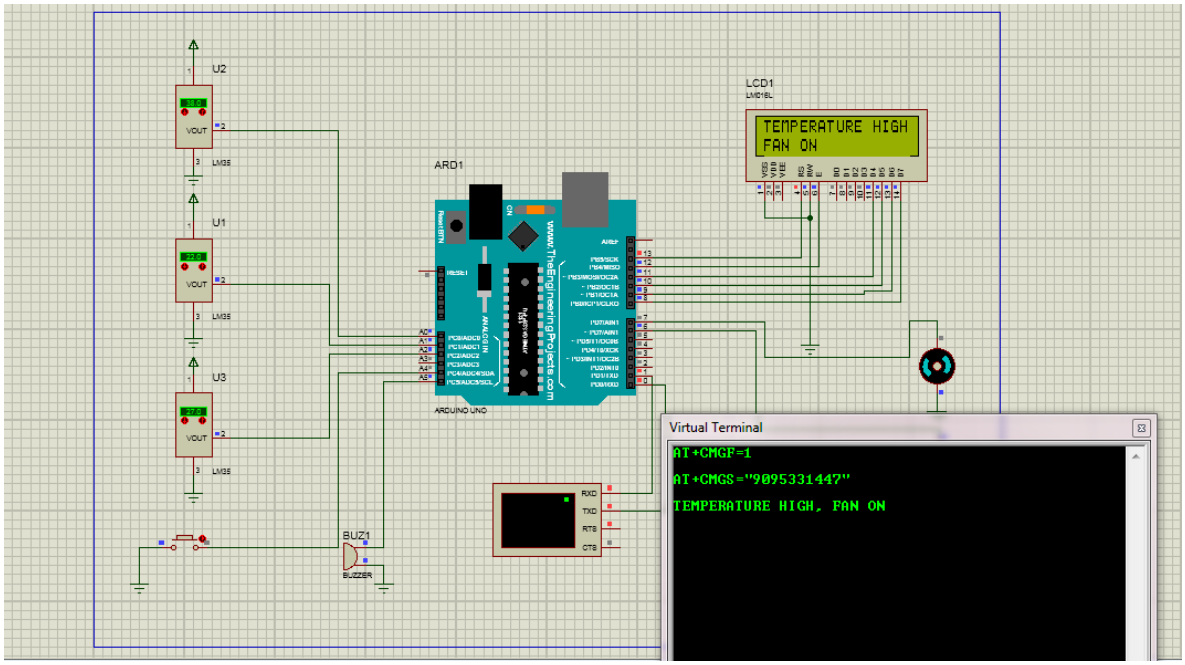

FIG 5.1 OUTPUT 1

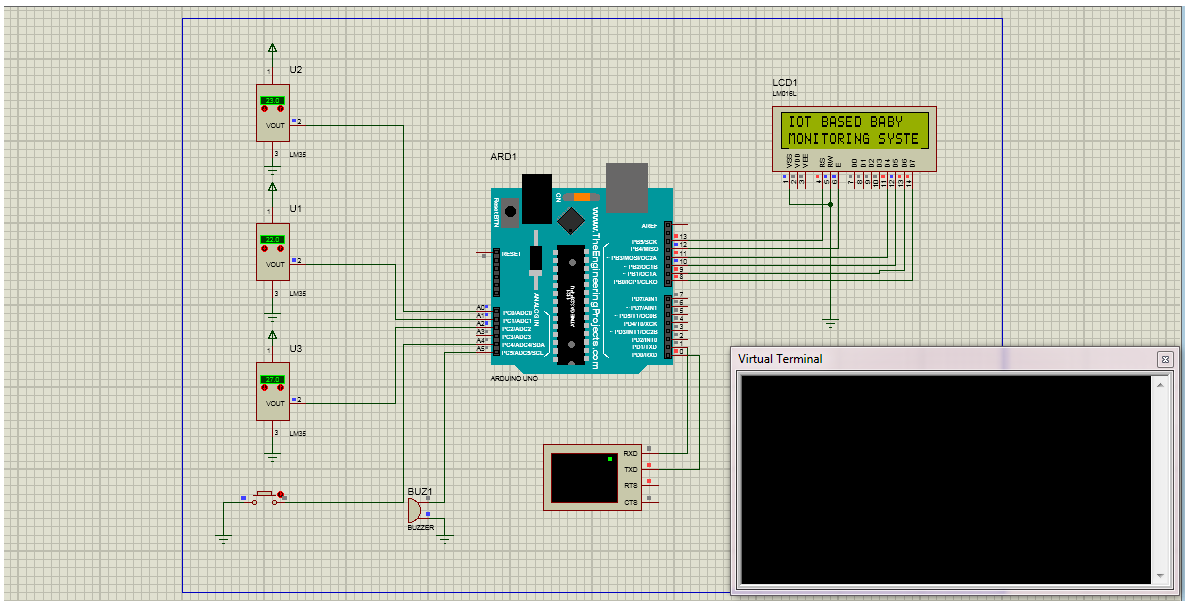

FIG 5.2 OUTPUT 2

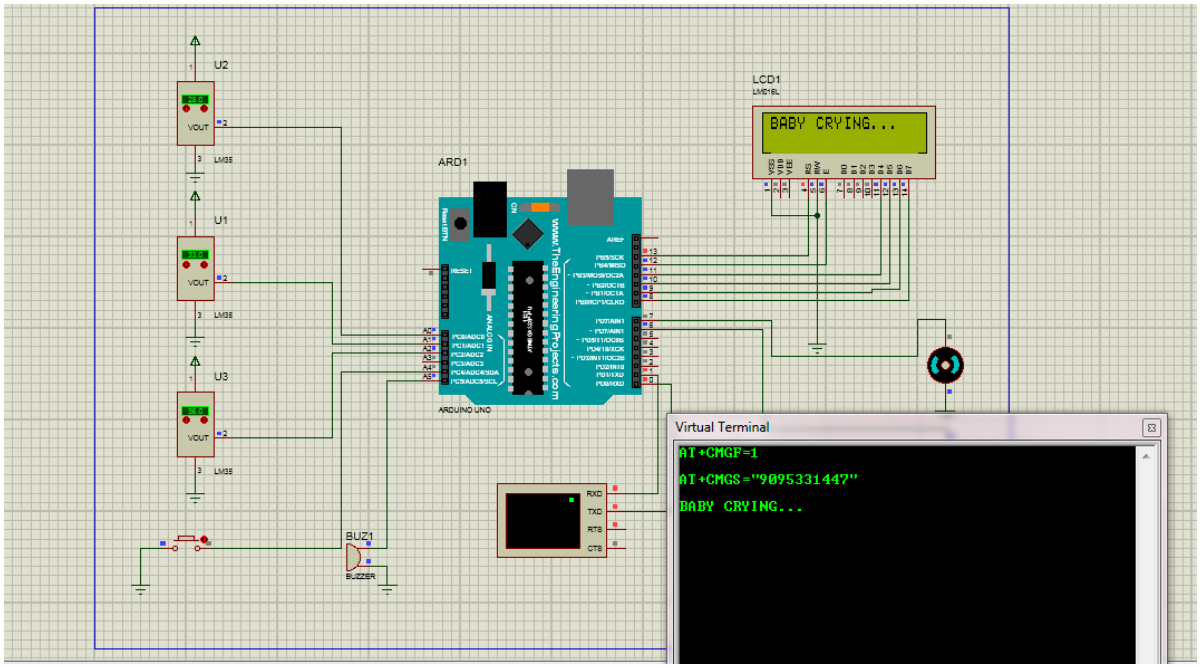

FIG 5.3 OUTPUT 3

CHAPTER 6

CONCLUSION

Our proposed system aims at monitoring the vital signs of the baby such as heartbeats and body temperature using wireless technology and sound sensor used to measure baby cry's. We also focus on increase the scope of transmitting the information over the internet in order to provide remote access. The camera module incorporated enables displaying the visual feeds of the whereabouts of the baby and keeping an eye over their movements in a finite area. This system overcomes the drawback of the existing systems which are clumsy, less user friendly and expensive.

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