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Department of Electronics & Communication Engineering

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Annexure I

1. Project Title: BABY MONITORING USING SENSORE & WIRELESS CAMERA

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1. Abstract & Objective

1.1 Abstract

In today's situation, parents are busy in their career. As we have seen in India that both the parents need to work and look after their babies/infants, so more workload and stress is there on such families especially on female counterparts. Therefore, the chance of providing better infant care is reduced. This may cause many troubles to the health of children. There is a danger of losing the life even, if the babies are not monitored properly and continuously. For this, we use temperature, moisture, motion and cry detection sensors. So that the system can monitor the external conditions like increasing body temperature, crying of the baby when the voice exceeds the pre-determined range, movements of the baby, when found to be moving continuously and also indicates when the diaper is needed to be changed, if excess wet was observed. The system is based on GSM network to send alert messages to the parents when any of these parameters exceeds the saved values. This system is attached with a video camera which is operated based on the instructions from the microcontroller and is used to capture the video when the motion sensor detects the baby's movements continuously. The video will be displayed on the screen to monitor the baby lively.

1.2 Motivation

We cannot believe that nobody have come up with an innovative idea of designing better infant care systems at a reasonable cost to monitor the condition of a baby continuously and inform parents. There are systems to monitor, but no system completely gives the health status of baby to the parents. The solution to this problem could be design of a special monitoring system, especially for infants i.e., from (0-3) years. The system should continuously monitor the external conditions of the baby and it should be reasonably inexpensive.

Main aim of our project: 1. Save the time 2. Provides maximum security 3. Provides safety

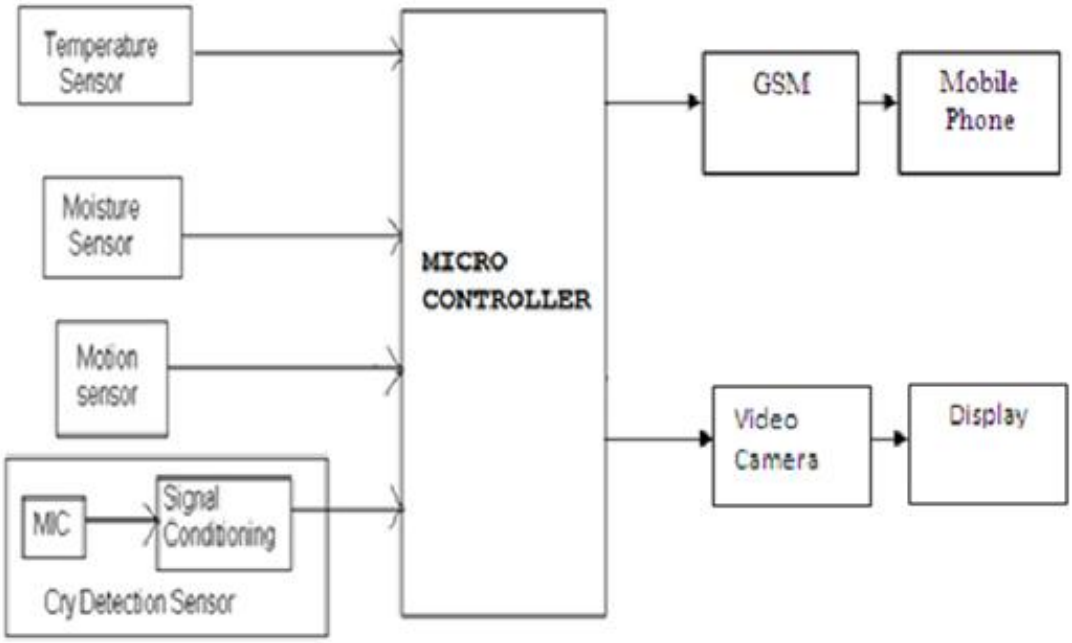
1.3 Objective

The system is based on GSM network to send alert messages to the parents when any of these parameters exceeds the saved values. This system is attached with a video camera which is operated based on the instructions from the microcontroller and is used to capture the video when the motion sensor detects the baby's movements continuously. The video will be displayed on the screen to monitor the baby lively.

.2. Block Diagram & Technical Specifications

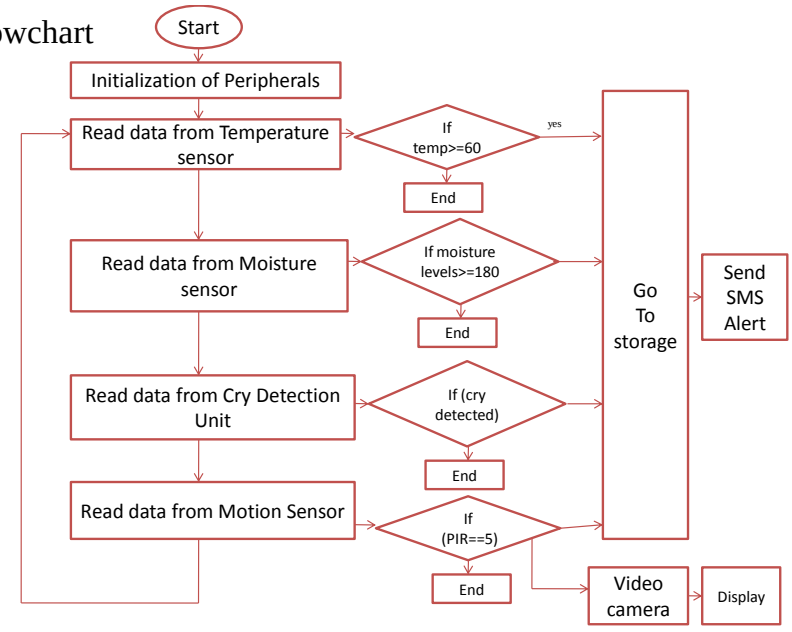
2.1 Block Diagram and Working:

2.1.1. Block Diagram:



2.1.2

Flowchart



2.1.3. Working:

As shown below, the system consists of three sensors and a cry detection unit. The sensors, the cry detection unit and the camera are connected to the arduino. The sensor senses the conditions of the baby and gives that as input to microcontroller. The microcontroller compares the sensed data with the data stored. If any of the data is found to be abnormal then the microcontroller sends the information using GSM module to parents mobiles numbers and if the baby starts moving, camera will be switched using controller and displays it on the laptops/ TVs etc., which lasts upto 50 counts

2.2 Technical Specifications:

2.2.1. ARDUINO-UNO ARCHITECTURE: The Arduino platform has become quite popular with people just starting out with electronics, and for good reason. Unlike most previous programmable circuit boards, the Arduino does not need a separate piece of hardware(called a programmer) in order to load new code onto the board-you can simply use USB cable. Additionally, the ARduino IDE uses a simplified form factor that breaks out the functions of the micro-controller into a more accessible package.

FEATURES OF ARDUINO UNO

1.Memory: The Arduino UNO has 32 KB memory. It comes with 2 KB of SRAM and also 1KB of EEPROM (EEEPROM library is required to read or write into this).

2.Clock speed: The performance of this controller is based on its clock speed. The Clock speed of the Arduino is 16 Mhz so it can perform a particular task faster than the other processor or controller.

3.USB interface: Most important feature of Arduino Uno is USB connectivity. It means if we want to operate arduino with pc, then we can do that and data communication between pc and arduino become easy.

4.Input output voltage: The Arduino Uno can be powered via the USB connection or with an external power supply. If we3 are using external power then we can supply 6 to 20 volts. Arduino works on 5 Volts.

5.Input output pins: Each of the 14 digital pins on the Uno can be used as an input or output. 6 pins out of 14 can be used as PWM output, 6 pins can be used as analog pins.

2.2.2Interfacing of LCD with Arduino

For interfcing LCD with arduino connect the RS pin of the LCD module to the digital pin 12 of the arduino. R/W pin of the LCD is grounded. Enable pin of the LCD module is connected to digital pin 11 of the arduino. In this project, the **LCD module and arduino are interfaced in the 4-bit mode**. This means only four of the digital input lines (DB4 to DB7) of the LCD are used. This method is very simple, requires less connections and you can almost utilize the full potential of the LCD module. Digital lines DB4, DB5, DB6 and DB7 are interfaced to digital pins 5, 4, 3 and 2 of the Arduino.

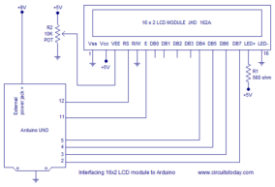


Figure 2.4: Interfacing LCD with Arduino microcontroller

2.2.3 RELAY MODULE

Transistors and ICs must be protected from the brief high voltage 'spike' produced when the relay coil is switched off. The fig: 5.9 shows how a signal diode (eg 1N4148) is connected across the relay coil to provide this protection. The diode is connected 'backwards' so that it will normally not conduct..

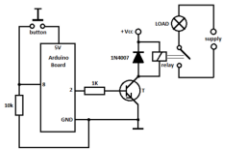


Figure 5.10: Interfacing Relay module with Arduino

2.2.4. SENSOR NETWORK

2.2.4.1 LM35 TEMPERATURE SENSOR

INTERFACING OF LM35 WITH ARDUINO

- The VCC pin of LM35 is connected to +5V of Arduino board.

- Since LM35 generates Analogue value at its output pin that's why I have connected this pin to 'A0' pin of Arduino board. This pin of Arduino board is used to receive analog data from external source.
- And the last pin is connected to the GND pin of Arduino board.

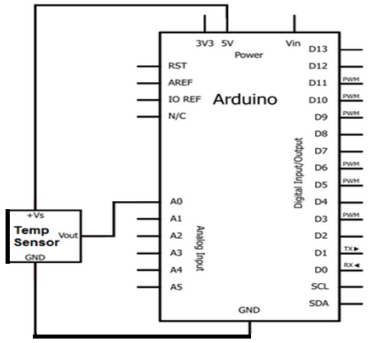


Figure 5.15: Interfacing of LM35 with Arduino

2.2.4.2 Motion Sensor

Interfacing PIR Sensor with Arduino

For interfacing PIR sensor with arduino the connections should be made as,

1. Pin#1 is of supply pin and it is used to connect +5 DC voltages.
2. Pin#2 is of output pin and this pin is used to collect the output signal which is collected by PIR sensor.
3. Pin#3 is marked as GND pin. This pin is used to provide ground to internal circuit of PIR sensor.

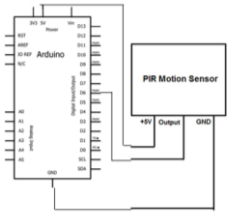


Figure 5.19: Interfacing of PIR sensor to arduino

2.2.4.3: MOISTURE SENSOR: ***Interfacing of Moisture Sensor with Arduino:*** For interfacing the moisture sensor with arduino connect the vcc pin of the sensor to the supply pin of arduino. As the output of the sensor is an analog value, it is given to the one of the analog pins of the arduino(here pin A1).

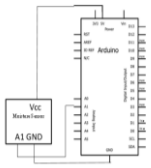


Figure 5.21: Interfacing of Moisture Sensor with Arduino

2.2.4.4 CRY DETECTION UNIT:

In this monitoring system the main purpose of cry detection unit is to detect the voice of the baby when he/she is crying. So in order to facilitate this, we are using a MIC(Microphone) followed by an amplifier(LM358 op-amp).

Interfacing of Cry Detection Unit with Arduino: For interfacing this unit with arduino connect the vcc pin of the unit to the supply pin of arduino. As the output of the sensor is an analog value, it is given to the one of the analog pins of the arduino(here pin A2).

Figure 5.25: interfacing of Cry Detection Unit with Arduino

2.2.4.5: JMK Wireless A/V Camera:

Wireless A/V camera high receive sensitivity +18dB, Receive signal picture sound 0.9G/1.2G with high quality output. RM0100 is a wireless A/V camera with high sensitivity.

Figure 5.26 :JMK wireless A/V Camera

Specifications

Table 5.27: Specifications of JMK Wireless A/V Camera

Image Sensor	CMOS
Signal System	PAL/CCIR NTSC/EIA
Horizontal resolution	380 TV lines
Scan frequency	PAL/CCIR:50Hz NTSC/EIA:60Hz
Min Illumination	3LUX
Transmission power	50mW
Transmission frequency	1.2G/2.4G
Transmission Power Supply	DC 9V
Receiving Frequency	1.2G/2.4G
Demodulation Mode	FM
Antenna	50 ohm SMA
Receiving Power Supply	DC 9V

2.2.4.6: SIM900 GSM (Global System for Mobile Communication) Module

Interfacing of GSM Module with Arduino

Interfacing a GSM module to Arduino is pretty simple. You only need to make 3 connections between the gsm module and arduino..

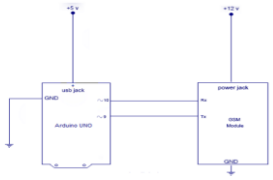


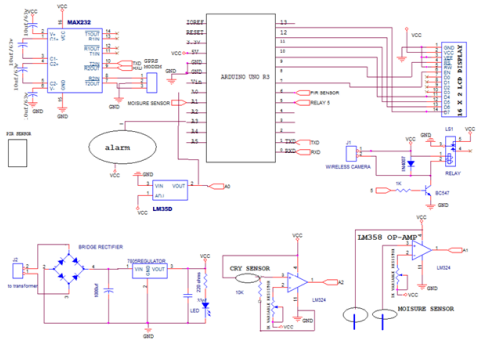
Figure 5.29: Interfacing of GSM module with Arduino

2.2.4.7: SCHEMATIC DIAGRAM

The entire schematic diagram of the baby monitoring system using sensors & wireless communication is shown in the fig 4.25. Here the connections of microcontroller with the peripherals like LCD module, Relay modules, LM35 temperature sensor, PIR Motion Sensor, Moisture Sensor, Cry detection Unit and Camera are shown. LM35 is a temperature sensor having 3 pins. The Vcc pin is connected to 5V power supply, the ground pin is connected to ground and the analog out pin is connected to analog in of the microcontroller. Each relay on board has three contacts namely NC, C and NO. NC means Normally Connected, C means

Common, either connected to NC or NO. If relay is off, C is connected to NC. If relay is on C is connected to NO. NO means Normally Open.

Overall Schematic:



2.3. Results & Analysis

This project mainly consists of Arduino, LCD module, GSM module LM35 temperature sensor, PIR motion sensor, Moisture sensor, cry detection unit, camera, and Android mobile. The fig: 5.1 show the physical view of entire project.

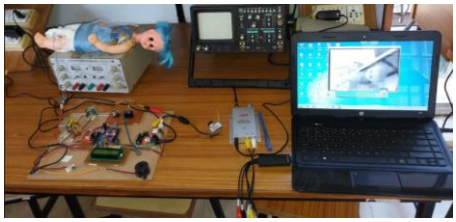


Figure 6.1: Physical View of Entire Project

Below shown are the figures which are showing the results displayed by LCD at various conditions like, sending the SMS when temperature is increased, moisture is detected, baby is moving, baby is crying:

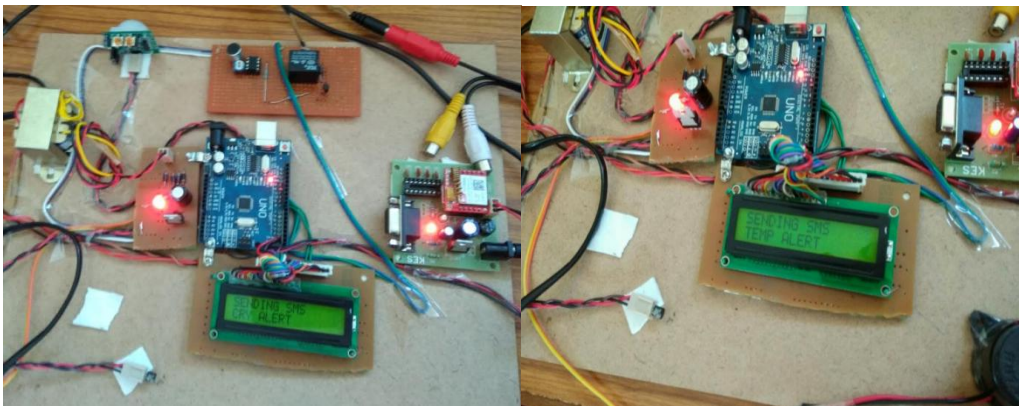


Fig 6.2: LCD showing "Sending SMS Cry Alert" Fig 6.3: LCD showing "Sending SMS TEMP Alert"

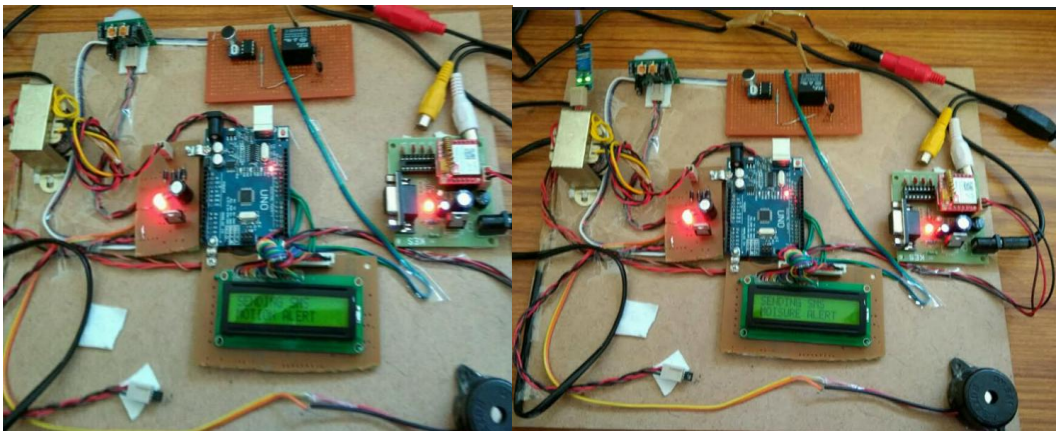


Fig 6.4: LCD Showing "Sending SMS Motion Alert" Fig 6.5: LCD Showing "Sending SMS Motion Alert"

The figures shown below are the screen shots taken from the mobile phone which has received the SMS from GSM module.

Fig 6.6: Screenshot of mobile screen after receiving different messages

3. Conclusion

3.0. Conclusion: The design model is easy to implement and very customizable according to the user requirement. The integration of various sensors with arduino will provide a better way for the monitoring of the baby. The concept of camera interfacing to arduino and which is controlled by arduino itself helps in monitoring of babies lively.

The POs and PEOs like Engineering knowledge, Problem analysis, Design/development of solutions, The Engineer and Society, Environment sustainability, Ethics, Individual and team work, Communication, Project management and finance, Life-long learning are attained. The details of attained POs and PSOs are available in Appendix B.