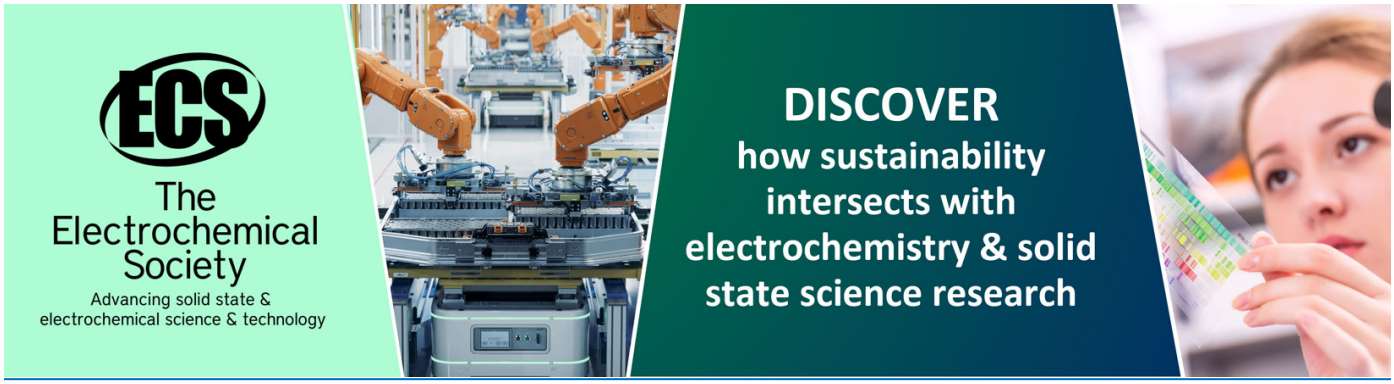
Design of Baby Box for Early Detection Based on Microcontroller



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Design of Baby Box for Early Detection Based on Microcontroller

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Abstract. In general, baby nurses in the hospital, if the baby cries and bedwetting can not immediately find out because there is no completeness or tool to inform / monitor the baby's condition by using several indicators. Therefore, this article discusses the design of automatic baby box device. In the planning and making of paper modules, the writer has problem boundaries, namely planning and making baby boxes equipped with bedwetting sensor, crying sensor accompanied by musical rhythm

1. Introduction

With the existence of medical devices in the world of medicine, it will make it easier for medical users to conduct examinations or just monitor the situation of patients in the hospital [1]. Of the many medical devices that are very important in supporting the comfort of a baby one of them is a baby box, in general a baby box serves as a place to place a healthy baby not premature [2]. In the previous baby box is still simple not yet equipped with some supporting electronic components [3] to make it easier in maintaining baby comfort. For this reason, we provide several electronic components [4] including wetting sensors [5], sound sensors [6], temperature monitoring [7], music rhythms and Uninterruptable Power Supply to be carried anywhere. With the sensor in the baby box is expected if the baby feels uncomfortable can be detected immediately. Discomfort in babies is usually caused by, among other things, babies in the wet state. This needs to be followed up, if left unchecked can cause the baby's skin to become irritated, causing illness including eczema, spots, and irritation to the skin. this of course can affect the growth and development of infants and infant health is also less than optimal. In the Baby Box if the baby is having difficulty sleeping, music can be sung so that the baby can fall asleep and when the baby cries music will sound to play a song so that distracts the baby. It is hoped that this tool can be put to good use and can facilitate the work of doctors and medical nurses.

2. Methodology

The research and manufacture of this module uses a non-experimental method, that is, research whose observations are carried out on the subject variables which are in an as-is condition without any manipulation or intervention from the researcher. In this case the subject variable is the baby's skin as a research medium.

The baby box is equipped with UPS, crying sensor, temperature sensor, music rhythm based on AT89s51 microcontroller [8]–[16]. Broadly speaking A block diagram of a baby box planning aircraft with early detection can be described as below.

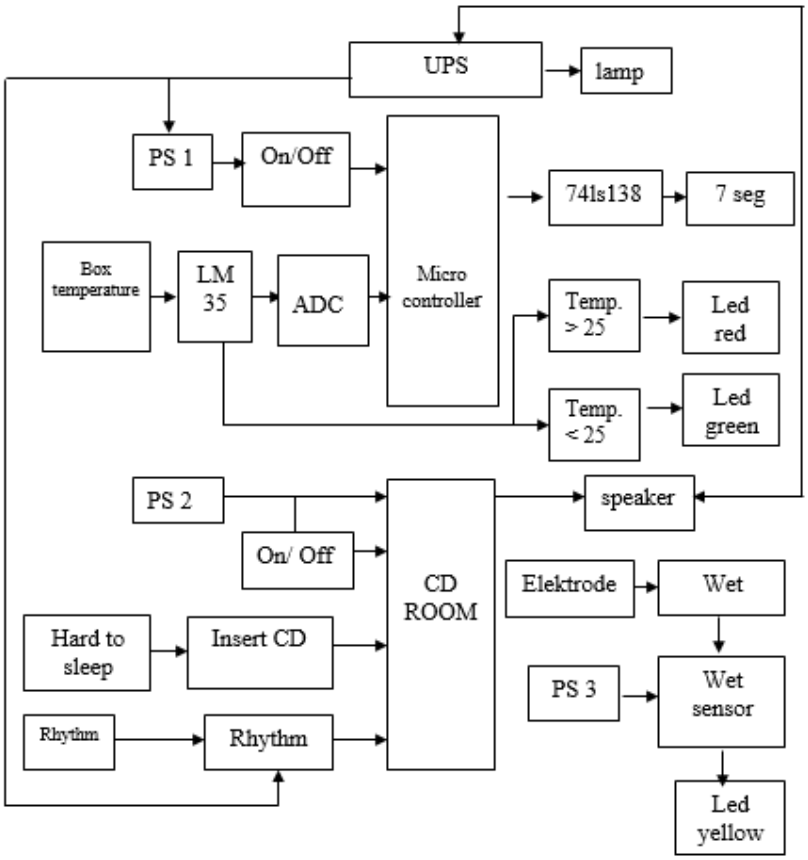

Figure 1. System block diagram

Press the power On button on the UPS which is located in the cupping box Automatic baby box Oops mencharge and make a series of seven segments work showing the room temperature of the baby box, along with the working temperature sensor circuit, the CD Rom contained in the baby box is also on but cannot work because it has not get input from the sound sensor, when the sound sensor gets input then the CD Rom works Automatically playing Cd Audio. If the baby is having trouble sleeping, music can be played manually. When the temperature in the box exceeds 250C then the red LED lights up, when the temperature in the box drops to less than 250C then the green LED lights up, the bedwetting sensor circuit works when both electrodes touch the bedwetting the yellow led lights up.

2.1 Research variables

The independent variable is the microcontroller [17] – [23] as a regulator of the ADC series and 7 Segments, The dependent variable is a sound sensor that can work based on the sound signal captured by the Mic Condenser. electrode if there is a baby's wet the sensor's bed-wetting sensor will work. Controlled Variable, namely CD ROM which is controlled based on the output of the sound sensor.

2.2 Hardware design

Making a baby box is designed using insulating material that is wood, this is aimed if there is an unwanted short circuit it is not easy to conduct electricity.

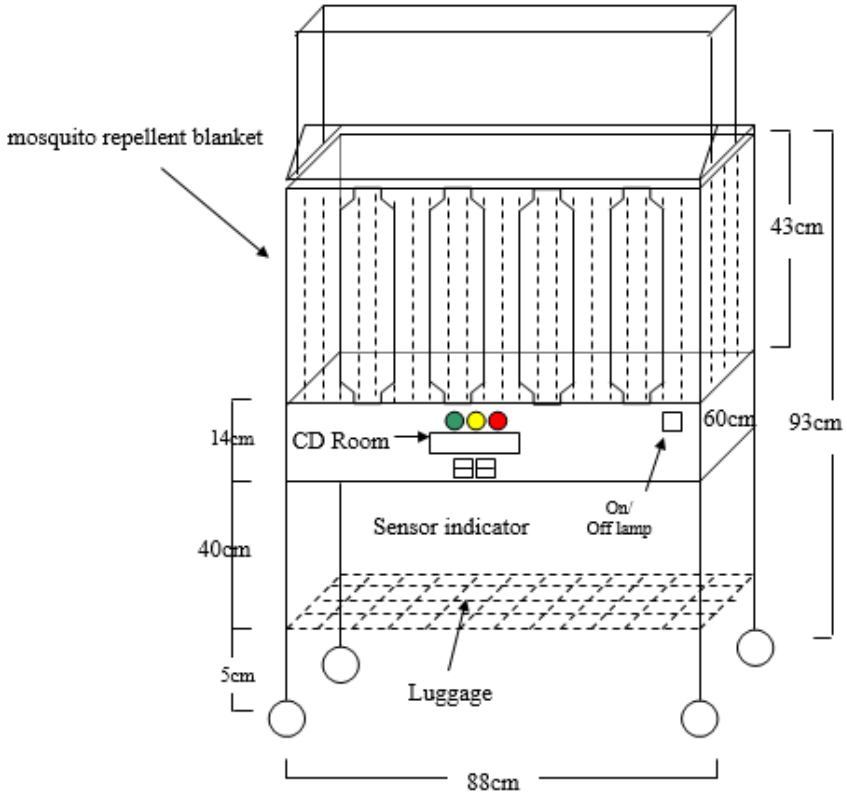

Figure 2. Baby box design

In making the final assignment module needs to be held testing and measurement, for that the author conducts data collection through the measurement process assessment. The purpose of the measurement and testing is to determine the accuracy of the module making sure whether each component of the intended module circuit is working according to its function as planned.

2.3 Measurement scheme

Measurement of bedwetting sensor baby is done several times in conducting experiments. So we get the following measurements.

Table 1. Measurement of sensor wet during the electrode before being exposed to water and after being exposed to water

No	Component	Base pin condition	
		Dry	Wet
1.	***Transistor 1***	- 0.32 V	1.15 V
2.	***Transistor 2***	- 0.38 V	0.58 V
3.	***Transistor 3***	0.72 V	0.57 V

Table 2. Comparison of the relay and led conditions when the electrode is exposed to water and after exposure to water

No	Component	Relay and LED condition	
		Dry	Wet
1.	***Relay***	- 0.32 V	1.15 V
2.	***LED***	- 0.38 V	0.58 V

Sound sensor measurements are carried out several times when there is sound and there is no sound in conducting experiments. So, we get the following measurements.

Table 3. Measurement of sound sensors before and after sound

No	Component	Pin 6 of LM 741 condition	
		Before sound	**After sound**
1.	***LM 741***	- 0.03 V	- 0.1 V
2.	***LM 741***	0.51 V	0.60 V
3.	***LM 741***	0.50 V	0.59 V
4.	***LM 741***	0.50 V	0.59 V
5.	***LM 741***	- 9.73 V	0.72

2.4 Analyse result

From the measurement results above, it is obtained an analysis of the results that can work / saturation so as to make the relay work. If there is sound, the sound circuit will saturate the NPN transistor so that the relay works to play CD ROM. The conclusion is that the NPN transistor must get a minimum voltage of 0.70 V to be saturated.

3 Result and discussion

3.1 Sound sensor

Before the sound is captured, the 1st LM741 condenser is the Pre-Amp frame where the input from the condenser enters the LM741 no2 foot where it is a negative input from LM741 so that it outputs an output on foot no. 6 that is equal to -0.03V, then enters the amplifier circuit where the input is from Pre. - The amp enters the LM741 no2 foot which is a negative input but because this is the amplifier circuit the settings can be adjusted via the existing VR so that the output at the no6 foot is 0.50V.

3.2 Filter and inverting

In the filter circuit where there are 5 capacitors that function as filters so that the current flowing becomes stable which is then inserted at foot LM741 no3 which is a positive input so that the output from the filter circuit at foot no6 is 0.50V, then it enters the inverting circuit where the output from the circuit The filter was put on LM741 no3 which is a positive input and issued an output on foot no6 of 0.50V.

3.3 Comparator

In the comparator circuit where there is a comparison between positive and negative currents, where the positive current is the output of the inverting circuit from foot no6 which is inserted in the comparator circuit on LM741 no3 which is a positive input and compared with the input from VR entering the foot LM741 no2 which is a negative input and when there is no sound current flowing from VR that enters the no2 foot in the comparator circuit so that the output on foot no6 is -9.73V which cannot saturate the TR NPN so the relay cannot work to sound the music .When there is noise in the comparator circuit there is a comparison between the no2 foot which is a negative input and the no3 foot which is a positive input so that the current from the no3 foot is the input of this comparator circuit whose output at no6 foot is 0.50V so compared to no2 foot which is negative input. Because the negative input setting is greater than the positive input then this tool does not work as long as there is no sound and with no noise the positive input is greater than the negative input, issuing a positive input that can saturate the NPN TR which causes the relay to work and turn on the music.

3.4 Wet sensor

When both electrodes are still not exposed to water, the base of TR1, TR2 current flowing on the base is still small at TR1 of -0.32V while TR2 of -0.38V. And when TR1 and TR2 are not working, TR3 is already working because on the TR3 base it has a current of 0.72V enough to saturate the NPN

transistor, with TR3 saturated the automatic relay also works so that the contact relay moves to NO (Normally Open) on the relay.
And when the two electrodes are exposed to water, the resistance of the two electrodes is small so that it will saturate the base of TR1 because the current entering on the TR1 base is 1.15V causing TR2 and TR3 to not work because the current owned from the TR2 base is 0.58V and at TR3 amounting to 0.57V resulted in a relay that was working when TR3 saturation now relayed back to normal state by switching the contact relay from NO (Normally Open) to NC (Normally Close) where in the NC an LED was installed which functioned as an indicator that the two electrodes in a connected state which is caused by wetting the baby.

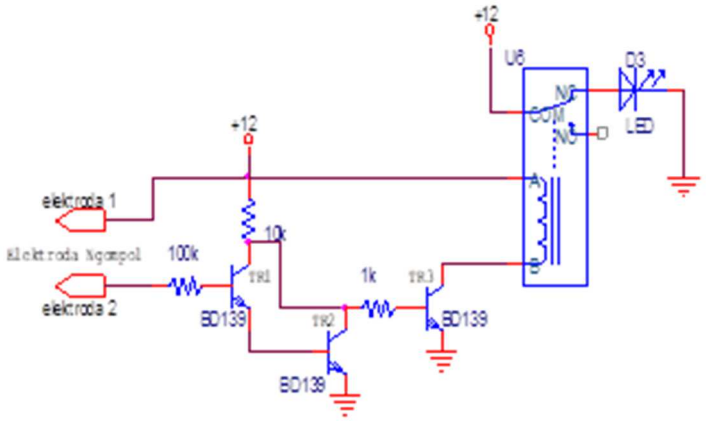

Figure 3. Wet sensor schematic

3.5 Driver relay

The relay driver circuit is used as an on and off switch. to activate it, logic must be given high or low based on the transistor used. After the transistor is ignited the relay works so that the relay contacts will move from normally close to normally open then the led can light up, when the transistor is not ignited the relay cannot voltage so that the relay contact will move from normally open to normally close then the led goes out. Besides the relay driver circuit on the sound sensor is used for the switch to activate the CD ROM.

4 Conclusion

After going through various processes in making modules, the authors conclude that:

a. The results obtained from the design of baby boxes with this early detection are able to make a comfortable baby box as a means of baby bedding.
b. With the bedwetting sensor, it can immediately follow up on the baby whether in the wetting state or not according to the indicator.
c. With a sound sensor at least even though no one is crying when the baby will hear the music being played.
d. From the results that the NPN transistor must get a minimum voltage of 0, 70 V to be able to work / saturation so as to make the relay work.
e. With the sound, the crying sensor circuit will work and run the CD ROM.

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