POLITEKNIK SULTAN SALAHUDDIN
ABDUL AZIZ SHAH

JABATAN KEJURUTERAAN ELEKTRIK

PROJECT REPORT

AUTO BABY WARMER

NURZAWANI BINTI MOHD NOR	08DEU04F523
NUR DASILA BINTI NOH	08DEU04F531
MURNI BINTI TALIB	08DEU04F507
ANAS BIN MOHD NASIR	08DEU04F517

NAMA PENYELIA :

MADAM WEE SOO LEE

PUAN FARIZA BINTI ZAHARI

MISS SUBASHNEE A/P MARIMUTHU

JULY 2007

TESTIMONIAL

We are hereby acknowledge this report is our own report, only the part we have attached are from the source that we have apparent.

Prepared by,

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(NORZAWANI BINTI MOHD NOR)

08DEU04F523

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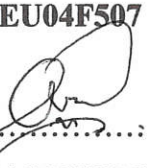
(NUR DASILA BINTI NOH)

08DEU04F531

.....

(MURNI BINTI TALIB)

08DEU04F507



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(ANAS BIN MOHD NASIR)

08DEU04F517

Authorized by,

.....

MADAM WEE SOO LEE

.....

PUAN FARIZA BINTI ZAHARI

.....

MISS SUBASHNEE A/P MARIMUTHU

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DEDICATION

We would like to dedicate this project to our families, lectures, technicians and friends whom has been giving us full support morally and physically when we are involved in this project.

Not to forget all team members for their god commitment to make this project successful.

ACKNOWLEDGEMENT

A lot of gratitude's to Allah SWT that gave our group the strength and will to finish this project and report.

A side from that, we would like to say a lot of thanks to those who are involve in this project and either direct or indirectly. Especially to those who had taught and advice me throughout this entire project.

Thousand of thanks to our lectures Madam Wee Soo Lee, Puan Fariza Binti Zahari and Miss Subashnee A/P Marimuthu. Who has helped us with our project and their willingness to guide us while undergoing this project.

Thousand of thanks to our families, who have given us the courage and support to undergone the challenging time during accomplishing this project.

Millions of thanks to those who help us during this project. The technical staff from Hospital Universiti Sains Malaysia, (HUSM) Kota Bahru, Kelantan, who help us during the duration of this project. Also not to forget the technical staff from Biomedical Department, Hospital Pusrawi, who also give us new ideas about this project.

We would like to thank to all our friends and colleagues that help us giving ideas, researching and support.

Your will and helps has been our inspiration throughout the days that we've undergone this project successfully.

Thank you.

ABSTRACT

Our project is about medical equipment especially for nurse in Labour Room at hospital. This equipment as know as Radiant Warmer in a big designed condition. But we have changed this equipment to be more relevant include sizing and classifications.

One of the changing that we have done is with change that equipment to be fully automatic equipment and its size and shape we edit and redesigned to get small from original size to easy using.

But the main function of the equipment we not change. We just create the same equipment but different in procedure and its shape and size.

And now today, we launching our new equipment with new name called "AUTO BABY WARMER".

OBJECTIVE

Through this 1 year period, while we are doing the basic of this project, our groups which are doing "Auto Baby Warmer Machine" gain us more information. This help us a lot and it help students more fully understand about new born baby physiology and medical equipment at hospital.

We were learning the main objective, expended chapter summary, discussion topics, learning activities and able learn how to communicate with group members.

We also learn a lot about physiology term of new born baby and extra information about baby and medical equipment and this project also was especially developed to promote learning and accessibility of information about baby.

Besides learning and gain knowledge of new born baby and medical equipment, we learn a lot about electrical and electronic since 85% of our project are base on technical and electrical learning.

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Chapter 1 : Introduction

1.1 Auto Baby Warmer

Auto Baby Warmer provides heat to the baby to maintain the baby's body temperature. These beds are sometimes referred to as an open warmer. Because the bed is open, a temperature probe is secured to the baby's skin. The probe measures the baby's temperature and heats up when the baby's temperature is below a set temperature. The bed stops warming once the baby's temperature is the same or above the set temperature.

1.2 Baby's Tube Heater

The controller is based on Micro computerized system. Large bright displays are easy to monitor and for viewing from a distance. Baby probe is made of highly sensitive sensor and interchangeable. Single element ceramic heater placed in a parabolic reflector. Observation lamp provided.

1.3 Auto Baby Warmer Care System

Infant Warmers are designed to provide advance warming capabilities while using one touch operations to simplify procedures. Immediately after delivery the new born baby experiences some degree of thermal instability as it comes from the mother's womb which has the stable environment to the cooler environment of the delivery room. Advance microprocessor controlled with self-check on the electronic circuit.

Digital display of patient temperature and soft touch display of control temperature. The control panel is also the heart for a completely integrated alarm system with both audible and visual indicators in the event of Probe Fail, Skin High, Skin Low, Power Fail, and Heater Fail. The Heater assembly located above the center of the support structure consists of radiant heater and reflector with inbuilt halogen examination lamp for assessment of Infant Color.

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1.4 Physiology Baby

When it comes to a baby's skin, less is best. Less moisture, less chemicals, less sun and less heat equal less worry, says Susan Bayliss, MD, pediatric dermatologist at St. Louis Children's Hospital.

Dr. Bayliss also stresses that in the first few months of life skin problems are perfectly normal and even predictable. Moreover, pediatricians have the training and knowledge it takes to assess, diagnose and determine whether treatment, precaution or a good dose of patience will clear up your baby's skin problems.

For instance, baby acne is the skin's response to the baby's natural hormonal withdrawal from the mother. Generally, no treatment is necessary, and the condition disappears in a few weeks. "The best thing to do for baby acne is to keep the face clean," Dr. Bayliss says. And, she adds, there's no need to worry that the condition is a precursor of adolescent acne. "No one has ever proven a link there," she says.

Another skin condition that appears and then goes away in a few weeks is milia, those little white bumps found on up to 50 percent of newborns. "If these little cysts persist past six months, we may consider removing them. Otherwise, we leave them alone," Dr. Bayliss says.

Because it's summer, parents of some young babies may begin to see prickly heat, those pinkish-red bumps on the neck, shoulders or other areas where skin folds. But Dr. Bayliss reminds parents that this condition can occur any time of year. "Over- bundling a baby in the winter months can bring on prickly heat." A cool, dry environment usually is all you need for relief.

Diaper rash is a common skin problem brought on by prolonged contact with a wet or soiled diaper. Sometimes, a yeast infection, common after a round of antibiotics, will trigger it. Frequent changes using super-absorbent diapers help prevent the onset of diaper rash and will keep it from worsening. Giving the baby some diaper-free time to let the bottom air-dry, while avoiding the use of diaper wipes that contain alcohol, also relieves mild symptoms. If symptoms persist, an ointment containing zinc oxide, like Desitin or Diaperderm, are recommended.

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Too much bathing, using scented lotions and soaps or a food allergy are some of the causes of baby eczema, scaly red patches on the cheeks or other areas of a baby's body. Pediatricians usually prescribe a hydrocortisone cream to clear the condition and advise parents to pat their babies dry and apply a fragrance-free moisturizer after bathing. In all cases, if a rash worsens visibly, its bumps appear pustular, and you can't identify the condition, Dr. Bayliss recommends consulting with a pediatrician.

Of course, summertime brings out the sun, and no one stands to lose more from skin-damaging sunburn than a baby does. "Sun damage is permanent," says Dr. Bayliss. She regularly advises parents to keep babies completely out of direct sunlight during the first six months of life. For all other young children, hats, umbrellas and a strong sunscreen specifically made for babies provide good protection. Dr. Bayliss also says that dressing babies in lightweight clothing in the summer and keeping a T-shirt or other covering on them when they're in the sun are important measures that contribute to the health of that precious, tender baby skin.

Dr. Susan Bayliss wants to help parents protect their children's skin from one of summer's most prevalent threats: the sun.

Skin Protection Tips

- Be aware of reflective surfaces, such as water and sand. On hazy days, ultraviolet light can penetrate the haze and cause sunburn.
- Avoid sun exposure during the hottest part of the day.
- Encourage sunglasses that offer maximum protection from harmful light.
- Protect skin with sunscreen/clothing, even when swimming.
- Use sun block, such as zinc oxide, on areas like the nose, ears and lips. For the rest, use lightweight clothing and a hat.
- Avoid sun exposure for infants less than 6 months old. If unavoidable, adult sunscreens can be used on infants. The American Academy of Pediatrics does recommend using them if absolutely necessary. Apply sunscreen to areas that can't be protected by clothing. Choose suncreen that blocks UVA and UVB. DO NOT USE combination sunscreen/insect repellant since sunscreen needs to be reapplied more often.
- Sunscreen with an SPF (sun protection factor) of 15 or higher is suggested for children 6 months and older. Follow directions. Re-apply every two to three hours. Remember that sunscreen is not fully protective.
- Consult with a physician if taking medications, especially antibiotics or psychiatric medicines, before going out in the sun.
- Actively encourage the intake of fluids, but consult with your pediatrician before offering additional fluids to infants under one year of age.

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2.4 High Risk Newborn

2.4.1 Warmth and temperature regulation

Babies are not as adaptable as adults to temperature change. A baby's body surface is about three times greater than an adult's, compared to the weight of his/her body. Babies can lose heat rapidly, as much as four times more quickly than adults. Premature and low birth weight babies usually have little body fat and may be too immature to regulate their own temperature, even in a warm environment. Even full-term and healthy newborns may not be able to maintain their body temperature if the environment is too cold.

When babies are cold-stressed, they use energy and oxygen to generate warmth. If skin temperatures drop just one degree from the ideal 97.7° F (36.5°C), a baby's oxygen use can increase by 10 percent. By keeping babies at optimal temperatures, neither too hot or cold, they can conserve energy and build up reserves. This is especially important when babies are sick or premature.

2.4.2 Ways to keep babies warm

There are several ways to keep babies warm, including the following:

- **Immediate drying and warming after delivery**
  A baby's wet skin loses heat quickly by evaporation and can lose 2 to 3°F (Immediate drying and warming can be done with warm blankets and skin-to-skin contact with the mother, or another source of warmth such as a heat lamp or over-bed warmer.)

- **Open bed with radiant warmer**
  An open bed with radiant warmer is open to the room air and has a radiant warmer above. A temperature probe on the baby connects to the warmer to regulate the amount of warming. When the baby is cool, the heat increases. Open beds are often used in the delivery room for rapid warming. They are also used in the NICU for initial treatment and for sick babies who need constant attention and care. Babies on radiant warmer beds are usually dressed only in a diaper.

- **Incubator/isolate**
  Incubators are walled plastic boxes with a heating system to circulate warmth. Babies are often dressed in a T-shirt and diaper.

Once a baby is stable and can maintain his/her own body temperature without added heat, open cribs or bassinets are used. Babies are usually dressed in a gown or T-shirt, a diaper, and a hat. A baby can lose large amounts of heat through his/her head. Often, a blanket is wrapped snugly around the baby, called swaddling.

2.2 Stable Temperature Control

The baby's temperature must be kept within the Thermal Neutral Zone to ensure that the baby's limited metabolic capacity is used for growth rather than for thermoregulation.

Research has shown that the Thermal Neutral Zone for preterm babies less than 30 weeks, is less that 0.5°C[1].

Auto Baby Warmers utilize sophisticated control algorithms to ensure the baby's temperature is continuously maintained at the desired set temperature.

2.3 Warming Without Delay and Focused Heating

The Prewarm Mode allows the warmer to be kept 'baby ready' without nuisance alarms. When needed the warmer provides safe, powerful and controlled warming to maintain the baby's temperature within the Thermal Neutral Zone.

The small heater makes it easier to work with the baby by efficiently providing even heat distribution across the mattress and not into the surrounding environment.

Figure 2.1 Body Temperature

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Chapter 2 : Literature

2.1 Auto Baby Warmer – Basic

2.1.1 What does it do?

A auto baby warmer is used to keep the patient's core temperature stable at 37C°. There are different warmers used for infants and adults.

2.1.2 Physiology

The core temperature of the human body needs to be kept at a constant temperature of 37 degrees Celsius. Premature infants need to use as little energy as possible in keeping warm or cool, using it for growth instead. If the temperature goes too high or too low, then the organs can be damaged and illness or death can result.

The auto baby warmer is used in a number of different situations: to warm a baby directly after birth, to regulate a baby's temperature during long term care in hospital, to keep the patient warm during or after surgery, to keep a patient warm when they are minimally covered (because they are having a procedure or need to be accessible).

2.1.3 How it works

The patient lies on a bed with the skin exposed. The warmer element is positioned above the patient. The warmer element emits infrared radiation, which is absorbed by the patient's skin and warms the patient. The air around the patient does not need to be warm because the radiant energy is absorbed directly by the skin.

Unit of measurement for auto baby warmer use is Degree Celsius. Typical values is 34 – 37C° skin temperature and 36 – 37C° for core temperature.

Chapter 3 Component

3.1 Timer Circuit

3.1.1 Timer Circuit Operation

3.1.1.1 The timer circuit using DC 9V to start this circuit operation.

3.1.1.2 To start the circuit operation, press start button.

3.1.1.3 The flow of 9V DC start from the positive terminal through R3. R3 functioning as to higher the voltage amount.

3.1.1.4 From start button, R4 and C3 will start the operation to combined terminal IC 1 to 2.

3.1.1.5 When DC flow through R3, R3 will cudgeled with R4 and C3, so this 3 component will continues flow the current through IC-1 which valued 555 x 1. At the same time, IC-1 will pumping rhythmically at this timer circuit. R1 will meet VR1 which functioning as preset potentiometer valve 1m and will meet with C5 which flow the current with 47μF from positive terminal which cudgeled with terminal 6 at IC-1.

3.1.1.6 Terminal 4 from IC-1 will be connected to R2 which valve 1K, and reset the button. Reset button functioning as reset the time with our convenience.

3.1.1.7 When LED start to lighting it receive energy from R5 which valued 1K. Thus R5 are connected to terminal IC-1.

3.1.1.8 LED is connected to transistor. Transistor functioning as sues for relay which valued between 6-9VAC,when timer are switched on, get from upper port will closed while get from below part a will receive the signal.

3.1.1.9 For the get upper part at relay when it switched off the get will be opened the below part get will be closed to stop the operation.

3.1.1.10 Then we off the timer circuit, the whole operation will off and circuit will flow through ground.

3.1.2 Components List for Timer Circuit

Components	Value
Resistor	▪ R1 = 3.9 K (3 Sets) ▪ R2 = 1 K (3 Sets) ▪ R3 = 68 K (3 Sets) ▪ R4 = 100 K (3 Sets) ▪ R5 = 1 K (3 Sets)
Transistor	▪ Q1 = 9013 (NPN) (3 Sets)
LED	▪ (3 Sets)
Capacitor	▪ C1 = 47 uF (3 Sets) ▪ C3 = 0.1 (104) (3 Sets) ▪ C4 = 0.1 (104) (3 Sets) ▪ C5 = 47 uF (3 Sets) ▪ C6 = 100 uF (3 Sets)
Zener Diode	▪ D1 = 4148 (3 Sets)
Relay	▪ 6-9 VDC (3 Sets)
IC	▪ 555 (3 Sets)

Table 1.3 Components List for Timer Circuit

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