Faculty of Electrical and Electronic Engineering Technology

THE DESIGN OF IOT BABY CAR SEAT WITH UNFASTENED ALERT WITH IOT

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Bachelor of Computer Engineering Technology (Computer Systems) with Honours

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A project report submitted
in partial fulfillment of the requirements for the degree of
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I declare that this project report entitled "THE DESIGN OF IOT BABY CAR SEAT WITH UNFASTENED ALERT WITH IOT" is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Date : 01/11/2022

APPROVAL

I hereby declare that I have checked this project report and in my opinion, this project report is adequate in terms of scope and quality for the award of the degree of Bachelor of Computer Engineering Technology (Computer Systems) with Honours.

Signature : 

Supervisor Name : NIZA BINTI MOHD IDRIS

Date : 11/1/22

Signature :

Co-Supervisor :

Name (if any)

Date :

DEDICATION

To my beloved parents,

Sabarudin Bin Sayet & Halijah Binti Harun

My Supervisor

Ts. Niza Binti Mohd Idris

and

my helpful friends

ABSTRACT

The Design of IoT Baby Car Seat with Unfastened Alert with IoT project is designed with a device and system that can generate an alert system and to notify the via android application to the parents when their child unfastened the seat belt of the baby car seat, exposing to the danger. This is why "The Design of IoT Baby Car Seat with Unfastened Alert" concept was created. This system includes a magnetic switch sensor that is fitted inside the seat belt buckle of the baby car seat to determine the status of seat belt, a force sensing resistor that is installed under the seat of the baby car seat to detect pressure also act as system trigger, and a voice alert that warns the parents if the seat belt is loosened, a notify message to the parent smartphone. In this project, Node MCU ESP 8266 is used as the main controller for the system, which will communicate with other components such as a magnetic switch that detects the position of the seat belt buckle, a force sensing resistor that detects the weight or pressure on the baby car seat, an LCD display that displays status of seat belt, a speaker that produces a voice alert and a notify message to parents or guardian smartphones using Blynk application via Wi-fi.

ABSTRAK

Projek Reka Bentuk Kursi Kereta Bayi IoT dengan amaran suara dikembangkan dengan alat dan sistem yang dapat menghasilkan sistem amaran dan untuk memberitahu aplikasi melalui android kepada ibu bapa ketika anak mereka membuka tali pinggang keledar tempat duduk kereta bayi, sehingga terdedah kepada bahaya. Inilah sebabnya mengapa konsep " Reka Bentuk Kursi Kereta Bayi IoT dengan amaran suara". Sistem ini merangkumi sensor suis magnetik yang dipasang di dalam tali pinggang keledar dari tempat duduk kereta bayi untuk menentukan status tali pinggang keledar, perintang pengesan daya yang dipasang di bawah tempat duduk kerusi kereta bayi untuk mengesan tekanan juga bertindak sebagai sistem pencetus, dan amaran suara yang memberi amaran kepada ibu bapa jika tali pinggang keledar dilonggarkan, maklumkan kepada telefon pintar ibu bapa. Dalam projek ini, Node MCU ESP 8266 digunakan sebagai pengawal utama sistem, yang akan berkomunikasi dengan komponen lain seperti suis magnet yang mengesan kedudukan tali pinggang keledar, perintang pengesan daya yang mengesan kehadiran anak pada tempat duduk kereta bayi, paparan LCD yang memaparkan status tali pinggang keledar, pembesar suara yang mengeluarkan amaran suara dan mesej pemberitahuan kepada ibu bapa atau penjaga melalui telefon pintar menggunakanaplikasi Blynk melalui Wi-fi.

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LIST OF SYMBOLS

δ - Voltage angle

LIST OF ABBREVIATIONS

V	-	Voltage
LCD	-	Liquid crystal display
IR	-	Infrared
DC	-	Direct current
GPS	-	Global positioning system
LED	-	Light-emitting diode
RF	-	Radio frequency
UART	-	Universal asynchronous receiver-transmitter
RPM	-	Revolutions per minute
GPIO	-	General-purpose input/output
NPN	-	National producer number
GSM	-	Global system for mobile communications
USB	-	Universal serial bus
IC	-	Integrated circuit
mW	-	Milliwatt
W	-	Watt
Cm	-	Centimeter
S	-	Second
Kg	-	Kilogram

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

1.1 Background

According to a recent study, accidents are one of the main causes of mortality and injury in youngsters. According to the World Health Organization [1], road accidents involving children have become a severe epidemic in both developing and industrialized countries. With the increased number of vehicles on the road, traffic accidents are becoming more frequently. In reality, road traffic accidents have now surpassed infectious diseases as the leading cause of death.

The best way to protect a baby or toddler in a car is to place an appropriate baby car seat, also known as a kid safety seat in the vehicle. It is critical that parents or guardians use the appropriate child car seats for their children. However, determining which one is ideal for them is dependent on a number of criteria, including their size, age, and the sort of vehicle you drive. Because some toddlers have a habit of slipping out of their child seat harnesses or loosening the buckle while travelling. This is both concerning and frustrating for parents. It is really tough to stop a youngster once they have learned how to do this. Parents must set a positive example for their children by always wearing their seatbelts whenever they are in the car. Children learn from their elders all the time. The implications of this behavior will be kept from these unpleasant occurrences, where the baby car seat needs to be equipped with a system that alerts the parents or guardians if their children behind in the car are unfastened, putting their lives in jeopardy.

1.2 Problem Statement

- The previous system does not available with IoT based on baby car seat to alert the parents or guardians.
- Absence of voice alert with LCD equip to alert the parents or guardians in case of unfasten belt.
- No notifications message through smartphones to alert the parents.

1.3 Project Objective

- To develop IoT based baby car seat system equip with LCD display.
- To design a system using node MCU to detect the status of seat belt.
- To analyse the system responsive and reliability.

1.4 Scope of Project

The scope of this project is made to inform the feature and components that are being used for this project. This project will use Node MCU as a main microcontroller which will control other components to function. Voice module will also be added to the project the alert the parents in case of unbuckle belt. Magnetic switch will be used to detect the belt status and equip with an LCD display if it fastened or unfastened. 9V battery will be used to powered up the circuit and other components. IoT will be used as a communication to send notification to the parents or guardian smartphones regarding the belt status. Lastly, this project aim is to ensure the safety of toddler or baby in a car seat.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter investigates and examines earlier research, projects, and journals that are relevant to this subject. This chapter contains theoretical topics as well as some practical project ideas. Furthermore, these connected works were carefully assessed in order to increase the project's quality and reliability. Therefore, this will contribute to make sure a proper plan to implement this project.

2.2 Statistic

Seat belts save lives, according to statistics in the United States [2]. Of the 22,215 passengers died in passenger vehicles in 2019, 47 percent were not using seat belts. Seat belts saved an estimated 14,955 lives, with another 2,549 individuals potentially saved if they had been wearing them. Seat belts can reduce the probability of fatal injury to front seat passenger car occupants by 45 percent and the risk of moderate-to-critical injury by 50 percent when used appropriately. In the event of a car accident, rear seat belts are 73 percent more effective at preventing fatalities for the passenger in the back vehicle. In addition, in more than half of all fatal auto accidents, the victims are not adequately strapped. Furthermore, when adults in the automobile use seat belts, children are more likely to be fastened 92 percent of the time; yet, some parents or caregivers overlook the need of a baby car seat belt. Always keep in mind that children will not buckle up if their parents do not, so having a good role model is essential. Buckling up keeps the passenger safe and secure inside the car, whereas not doing so can result in the passenger being completely ejected from the

vehicle in a crash, which is almost always fatal. Air bags are insufficient to protect the passenger; in fact, if not correctly strapped up, the force of an air bag might gravely hurt or even kill the passenger. In contrast, improperly fastening a seat belt, such as placing the strap below the arm, puts children at risk in the event of a collision.

2.3 This importance of seat belt

As shown below, the percentage of seat belt usage affect the rate of passenger fatality injury. In early 2000s the chart shows that less than 75% of passenger or occupant are using seat belt therefore the rate of fatalities is more than 50%. However, over year the importance of seat belt and how it can prevent fatality injury is being aware by the vehicle user.

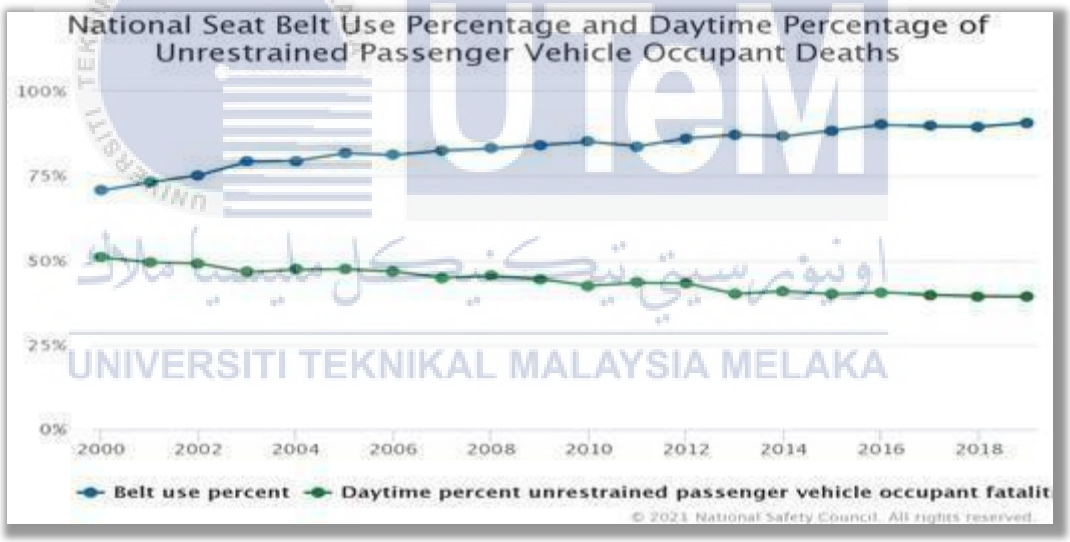

Figure 2.1 Percentage of unrestrained passenger

National seat belt use and daytime percentage of unrestrained passenger vehicle occupant fatalities

Years	Belt use percent	Daytime percent unrestrained passenger vehicle occupant fatalities
2000	70.7%	50.9%
2001	73.1%	49.4%
2002	75.2%	49.1%
2003	79.2%	46.5%
2004	79.5%	47.3%
2005	81.7%	47.4%
2006	81.2%	46.7%
2007	82.5%	44.9%
2008	83.1%	45.4%
2009	84.1%	44.5%
2010	85.1%	42.5%
2011	83.8%	43.4%
2012	86.1%	43.2%
2013	87.2%	40.1%
2014	86.7%	40.9%
2015	88.5%	40.0%
2016	90.1%	40.6%
2017	89.7%	39.8%
2018	89.6%	39.4%
2019	90.7%	39.3%

NSC analysis of NHTSA FARS data and Enriquez, J., & Pickrell, T.M. (2019, January). Seat belt use in 2018 - Overall results. (Traffic Safety Facts Research Note. Report No. DOT HS 812 662). Washington, DC: National Highway Traffic Safety Administration.

Figure 2.3 Seat Belt Usage Fatality Chart

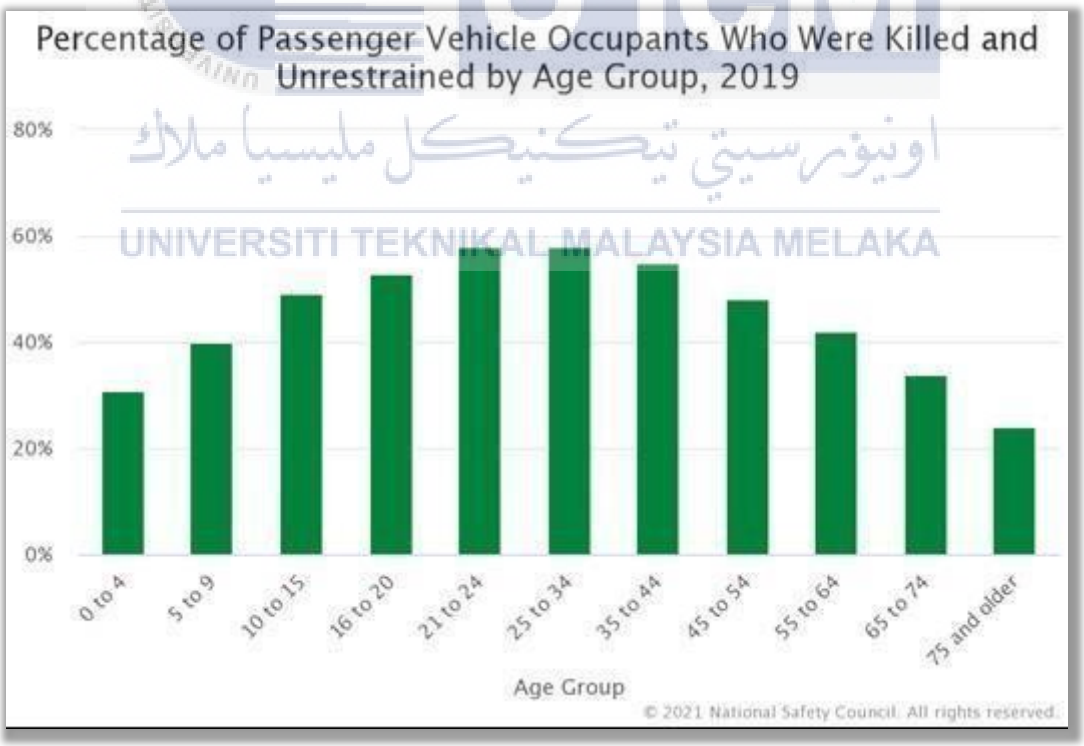

Figure 2.2 Age Group Chart

2.4 Past Research on Related Project

2.4.1 "Developing safety system for monitoring seat belt and controlling speed accordingly to avoid fatal injuries" by Priyal Sheth and Dr. Amarish Badgujar

In this paper that was proposed by a group of researchers[3]. This paper explains a safety system that guarantees the driver and co-passenger wear safety seat belts when driving an automobile. The researchers hope to develop a safety system called "Driver Assistive Safety System" (DASS) that includes ways for teaching mandatory safety precautions through the use of an alert, visual indicator, speed control, and ignition. According to the researchers, fatal injuries from front-seat passengers can be minimized by using a seat belt, citing a study conducted in the United Kingdom.

Figure 2.4 Flow chart of the process of Driver Assistive Safety System

The flowchart above depicts how the system works, as the driver and passenger enter the vehicle, the system will question and display whether they want to drive in highway or city mode. If highway mode is selected, the system will check the engine status. Next, if the

engine is running, the system will monitor the position of the seat belt, while if the engine is not running, the system will check the ignition stage. In addition, the system will monitor the car's seat belt and speed in city mode.

2.4.2 "Babycare Alert System for Prevention of Child Left in A Parked Vechile" by Khairun Nisa Khamli

This research was proposed by [4]. The goal of this study is to create and test a wireless gadget that would sound an alarm and send an alert to the parents if their child is left in the car. The safety pad and the keychain alarm device are the two essential components o f this design. The safety pad's first component is a load sensor that detects the presence of a child in a newborn car seat and alerts parents via smartphone. Second, the keychain alarm devices employ a Radio Frequency (RF) transmitter, which serves as a backup safety feature for the youngster in the event that the parent's smartphone is either not working or lost. When parents walk outside, this device will sound the warning alarm.

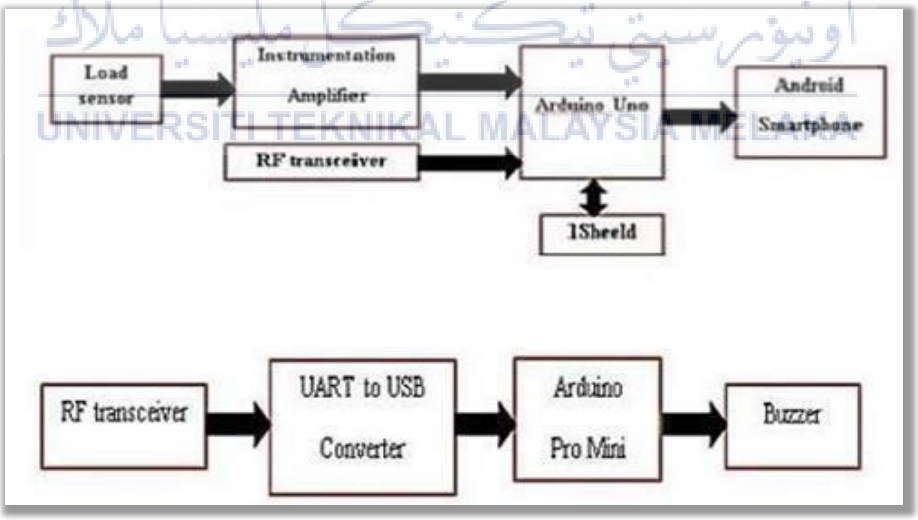

Figure 2.5 Block diagram of safety pad and keychain alarm device

Above is the block diagram for safety pad and alarm device. This system's operation is depicted in the block diagram. Initially, a load sensor was employed to identify the presence of a child in a baby car seat, which triggered the system. The signal from the sensor