UNIVERSITI TEKNIKAL MALAYSIA MELAKA

DEVELOPMENT OF CHILD'S CAR SEAT ALARM SYSTEM USING ARDUINO

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronics Engineering Technology (Telecommunications) with Honours.

by

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APPROVAL

This report is submitted to the Faculty of Mechanical and Manufacturing Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Electronics Engineering Technology (Telecommunications) with Honours. The member of the supervisory is as follow:

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ABSTRAK

"Child's Car Seat Alarm System using Arduino" adalah projek yang dijalakan bertujuan untuk mengesan kanak-kanak di dalam kereta yang diletakkan di tempat duduk kanak-kanak. Idea ini muncul setelah melihat pelbagai kes kanak-kanak lemas atau mati di dalam kereta yang dapat dilihat dan diiklankan di surat khabar. Oleh itu, untuk mengatasi masalah ini, projek system penggera akan dibuat untuk memberitahu ibu bapa bahawa ada kanak-kanak di dalam kereta setelah mereka meniggalkan kenderaan. Ini dapat mengurangkan pengabaian ibu bapa. Penggera rantai kunci akan menghasilkan bunyi ketika berada di luar jangkauan isyarat pemancar "Radio Frequency (RF)" dan dengan bantuan sensor daya yang diletakkan di tempat duduk kanak-kanak. Mesej peringatan dihantar untuk memberi amaran kepada ibu bapa mengenai anak mereka dengan menggunakan teknologi LoRa yang merupakan modul REYAX. Teknologi ini dapat berkomunikasi dalam jarak jauh. Mesej amaran dihantar tanpa kehadiran internet atau SMS hanya menggunakan LoRa. Projek ini diharapkan dapat mengemaskini dan mengemaskini sistem keselamatan kanak-kanak yang ada. Penggunaannya sanagt berkesan untuk melindungi kanak-kanak dari pengabaian ibu bapa dan memenuhi keperluan pengguna.

ABSTRACT

"Child's Car Seat Alarm System using Arduino" is a project undertaken aimed at detecting children in cars parked in children seats. This idea came about after seeing various cases of children drowning or dying in cars that could be viewed and advertised in newspapers. Therefore, to alleviate this problem, an alarm system project will be created to inform parents that there are children in the car after they leave the vehicle. This can reduce parental neglect. The keychain alarm will produce sound when it is out of range of Radio Frequency (RF) transceiver signal and conditions with help of force sensor placed on the children seat. The warning message to alert parents about their child is using LoRa technology which is REYAX module. This technology can communicate at long-range. The alert message was sent without presence of internet or SMS just using LoRa. The project is expected to update and update the existing child safety system. Its use is very effective in protecting children from parental neglect and meets the need of consumers.

DEDICATION

Special dedication to my beloved parents, En. Zulkefley bin Ali and Pn. Norizah bin Abdullah who always being my biggest supporter in my life that makes me to continue study further. Also not forget to my best-friend Nur Zulaika binti Zainalabidin that who never stopped giving me advice.

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CHAPTER 1

INTRODUCTION

The primary part presents brief thought of the task. It concentrated on the diagram of the venture, specifying the destinations, the issue proclamations, degree and result of the task.

1.1 Background

Nowadays, there were reported about the cases that involving the death of an infant or a child in a vehicle. It occurs almost every year because of the careless committed by guardians who always left their children alone in a vehicle. More than 1,500 children under the age of 10 died in road accidents in Malaysia from 2007 to 2017, the Malaysian Institute for Road Safety Research says. Statistically, every year 38 children die from heat stroke and hyperthermia in a hot vehicle after being trapped inside a hot vehicle. Hyperthermia is an extreme disease that happens when the body absorbs more heat than can withstand. Children seem more inclined than grown-ups towards experienced hyperthermia. A heat stroke is characterized as a body temperature illness greater than 40.6 ° C. A heat stroke occurred because in a long time a person is exposed to an ambient heat.

Based on Dr David Diamond 's article, which has been studying the brain and memory since 1998. In the article it is stated that the majority of cases were understood that it was not the act of reckless or incompetent parents. More than 300 additional children have died or sustained brain damage as a result of being left in hot cars after learning about forgotten child in cars in 2004. As a neuroscientist, David has looked at

this phenomenon from both neurobiological and theoretical viewpoints. He called the police report by doing the interviewed with the parents, filled in as expert investigator in common and criminal cases and applied the subject to television segments and documentaries. He came up with a hypothesis on how this tragedy occurred, based on his researched and skill. This form of memory loss is the result of an often occurring struggle between the "habit memory" system of the brain and its "prospective memory" system.

Therefore, to avoid this tragic event from happening, a system to prevent children from this case is needed created. The device can deal with this problem by alerting parents as they exit the car for the baby and walk away from the vehicle. Because of technological advances, the majority of the sensor is low cost and low power comsumption. The system consists of two main modules to hook on the parent car key; the Safety pad and the Keychain warning systems. The device should be placed in a protective pad and positioned in a car under a baby seat. The baby's presence will be detected via the safety pad. A safety pad consisting of a load or force sensor to detect children in the car and a smartphone serves as a conveyor of the information that the child is in the car for the first part. The alarm uses a 'Radio Frequency (RF) transceiver' for the second part which acts as a child safety device when the parent's smartphone is lost or running out of battery.

Once the system is activated, the sensor will continue to sense whether the baby is sitting or not on the baby seat. If the safety pad has detected the baby's load, the parent's smartphone will notify that the baby is in the car. As long as the Safety pad senses the baby, it will persistently offer notice to the parent’s smartphone. At the points when the parent turn off the engine and leave the car, the Safety pad continuously read and notify

parents if the gadget still sense the presence of the baby. If the parent moves beyond the range of radio frequencies between the Safety pad and the Keychain alarm system, a alert alarm will be triggered which indicates that the parent has forgotten to take their child out of the car. The coution will continue blaring until the child is taken. The project is expected to update the existing child safety system. Its use is very effective in protecting children from parental neglect and it meets the needs of consumers.

1.2 Problem Statement

In this fast-paced era, most people's daily lives are in a hurry and under pressure. They used to keep up with their daily schedule. Routine changes, interruptions or accidents are some of the main reasons why parents forget their child in the vehicle. Because of this issue, children's death is growing. To prevent this tragic event from happening, a system to prevent children from this case is needed created. The system will address this issue by alerting parents as they leave the baby's vehicle and walk away from the vehicle.

There are many existing products that use 'keychain' as an alarm to tell parents about their children in the vehicle. Because each alert will be generated through a small device that is attached to the main lock of the vehicle and can often be lost, it can be a major problem as the system cannot alert parents. To prevent unwanted incidents in children, it is suggested that the system help solve the problem by sending alarms to parents' smartphones as smartphones are an important tool for today's adult lifestyle. If parents are unable to respond within a specified time, a warning will be sent to the key chain as a warning to alert the child to the vehicle.

1.3 Objective

The objectives of this project are:

i. To study the best sensor to detect the presence of baby in car seat.
ii. To develop an Arduino application that is able to send notifications and alert users when a child is left in a car.
iii. To design a device that will trigger an alarm wirelessly to notify parents when they left their children in the car.

1.4 Project Scope

This project is aimed at designing and implementing a system that will help detect children and help parents avoid forgetting their kids in the vehicle. This section is important for understanding the limits and limitations of this project. The scope of this project consists of two main parts: hardware and software. Next is, this project uses IoT-based wireless systems that use LoRa technology and hardware only. The type of sensor that used is force sensor which is Force-Sensing Resistor (FSR). An FSR's resistance depends on the pressure applied to the sensing zone. The more pressure was put on, the lower the resistance. Most FSRs can feel force of between 100 g and 10 kg. LoRa technology type that were used is REYAX RYLR890. This LoRa module can transmit at very far range, as much as couple of kilometers with the small size and small antenna. It can be useful for long-range communication devices which is up to 15km. The LoRa technology that were used in this project is for transmit and receive warning message via smartphone wirelessly without presence of 4G/LTE/3G/GSM/Wi-Fi/SMS.

Furthermore, for the software part that were used is an open source Arduino IDE software. Arduino Ide is used for writing the codes to command. The coding is for

Arduino UNO, Arduino NANO and NRF24L01 transceiver. All of the coding is done to smooth the system. In addition, this project system also has backup system which is Keychain Alarm Device. It helps when the smartphone that were used by the parents was out of battery. The alarm will start beeping when the Radio Frequency (RF) signal from the keychain is out of range. This project target is for parents or guardians who always forget and left their kid in the car when they busy with their routine life.

1.5 Expected Result

Expected result for Child's Car Seat Alarm System using Arduino is the system that based on LoRa technology that can transmit and receive warning message without internet or SMS just using LoRa. Force sensor was used for sense the weight of the kid on the kid's car seat. The Lora module which is REYAX RYLR890 act as communication shield which is used to delivery and receive information because it can transmit across long distance. The process begins when the input signals from the force sensor and Radio Frequency (RF) transceiver that goes into the Arduino stage. The framework will be initiated as the kid put onto the vehicle seat. Then, the presence of the kid is consistently checked by Arduino. As the force sensor recognized the weight of the kid, the alarm was sent to the parent's smartphone through LoRa module. While RF from the transceiver checked any sign that originates from the transceiver of Keychain alarm device still in ranges. Then that, when the parent reached at their destination and they leave the car without the youngster, the force sensor will as yet identify the weight of the kid. Thus, the warning will make aware of the smartphone. Even so, when the parent began leaving the kid itself, the RF signal from the Keychain

Alarm Device will lost its sign and begin signaling to caution that the kid was deserted. The keychain alarm system is likewise as reinforcement system on the off chance that the parent's smartphone ae either out of battery or abandoned also.

CAHPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter which covers the element of chapter 2, the main purpose is to significantly review previous research, project, journal that can implement to this project. This chapter included previous project that needed to implement onto the project and the research in hardware part. The scope of this chapter will be on theories, hardware components, and some good idea to implement to this project.

2.2 Previous Researches on Existing Safety System

2.2.1 Design of SmartSeat Car Seat Safety System to Prevent Child Vehicular Heat Stroke by Alexis D. LaMott (2016)

According to this project, heatstroke accidents in children's cars tend to be seen annually as a preventable incident. As such, a proposed protectiondevice was designed to keep track of ambient temperatures and weight in a child seat, using Bluetooth to warn adults that a kid is at risk of death from a heat stroke or severe injury due to a heat stroke. The SmartSeat system consists of 3 main PCB that work uniformly to shape the entire system. The first step in seeking a competitive solution to prevent heat stroke in children's vehicles was to define the power source that would make the SmartSeat operating framework. In the end, a combination of vehicle helper force and lithium polymer battery was chosen to provide the SmartSeat monitoring device with continuous electricity.