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CASIC – Children Assistant System in Car

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ABSTRACT

A hectic daily existence in which both parents work, requiring the children to be transported to a nanny's residence or nursery for care. Parents' condition, such as excessive exhaustion, forgetfulness, and out from their daily routine, are among the variables that contribute to incidents of children being left in cars for an extended amount of time, resulting in death. To combat this 'forgetfulness' element, a mechanism has been devised to warn parents when children are brought together in a car, which serves the primary objective of this innovation. This device is aimed to detect the high temperature, body movement and crying sound from sensors to activate the fan and motor for side windscreen hence alarm the user about the unattended children in the car. The system is divided into three sections: input sensors, the system brain, and the outputs. There are 3 sensors used named as heat sensor, sound sensor and movement sensor. The second section is the system's brain, which uses the Arduino UNO to regulate the system's operation based on the several conditions. The last section shows the outcome of the brain system's instruction to turn on the fan, forcefully to slightly open the side windscreen, and then transmit a warning to the parents via mobile phone using the Bluetooth platform. This situation provides an opportunity to lower the temperature in the car while the parents get into the scene. This device is expected to have a significant influence on parents, particularly in terms of kid protection, enhancing its economic potential. This invention can provide parents with peace of mind and assist them in overcoming the problem of 'forgetfulness', particularly when it occurs outside of their usual routine.

Keywords: child heatstroke prevention; car safety mechanism; parental alert system.

1. INTRODUCTION

More than 1000 children have perished because of the heatstroke from being left in the car for an extended period. Negligence of an individual leaving a child in a car unattended is an offense under Section 31(1)(a) of the Children Act 2001. If convicted, they will face a fine of no more than RM50,000, imprisonment for no more than 20 years, or both (Mokhtar N.A., 2021). Since 1990, around 1,000 children have perished due to heat stroke (Ghafar N., 2023). This indicates that one child was murdered in a heated car every ten days. Children aged one to five years suffer more heat transfer from their surroundings than adults. The sweating system in the body is not developed enough to protect them from extreme heat. Babies and small children are more likely to die when left in a hot car, with 87% of children dying under the age of three (Ghafar N., 2023). If the temperature outside is 32 degrees Celsius, it may increase to 55 degrees Celsius in 10 to 15 minutes inside the car. Such a high heat can cause the internal temperature of the

body to increase to 41 degrees Celsius, resulting in heatstroke. The heat in the car can quickly grow to an alarming degree, leaving the body unable to cope. Heat stroke can occur in a hot environment, causing a significant rise in body temperature and collapse of the central nervous system (Mahdin H. et. al., 2017). According to (Ambroce A. M., 2024), various methods have been developed to lessen the probability of this sad incident. Besides, parents can start the practice of checking the rear seat, putting the child's items in the front seat, and downloading the Waze app to aid remind you of the child's presence in the car.

1.1 Problem Statements

Children's deaths in parked cars with the engine and windows closed and locked are common, whether due to parents who want to leave the child in the car for a moment while running errands or forget to bring the child out. Parents believe that leaving their kids in the car is safe. The scenario worsens when parents forget and leave the children in closed car, since the temperature inside can rise from 16 to 40 degrees Celsius in minutes (Ghafar N., 2023) especially leave the child in the car for an extended amount of time. Besides, this type of occurrence might occur when a child enters an unlocked car alone, without the knowledge of their parents. Several variables lead to this type of occurrence, including old parents, many children, suffering from 'forgetfulness syndrome', acute exhaustion, the task of sending children outside of regular responsibilities or routines, and educational level (Dusuki F.N., 2023). To combat this sad incident, a mechanism has been devised to warn parents when children are brought together in a car, which serves the primary objective of this innovation. The system is split down into three sections: input sensors, the system brain, and outputs.

1.2 Objectives

The objectives of this innovation are: -

- i. to develop the circuit with sensors that can detect the high temperature, body movement and crying sound.
- ii. to operate the fan and motor for side windscreen when receiving signals from system's brain in various conditions.
- iii. to alarm the user about the unattended children in the car.

2. METHODOLOGY

As mentioned in earlier part, this innovation consists of 3 sections: input sensors, the system brain, and outputs. The input of the system will receive signals from the sensors; the heat sensor to determine the temperature inside the car, the movement sensor to detect any movement or gesture from the unattended children in the car while the sound sensor to detect sound or crying frequency from the children. These three inputs will send the positive signal to the brain of the system, which uses the Arduino UNO to control the system's functioning depending on a variety of parameters. The final piece depicts the brain system's directive to turn on the fan, quickly open the side windshield, and then send a warning to the parents via cell phone utilizing the Bluetooth platform. This condition allows you to reduce the temperature in the car while the parents attend the scene. This idea can provide parents with peace of mind and help them overcome the problem of 'forgetfulness', especially when it occurs outside of their normal routine. The block diagram of the system and the prototype of the innovation are shown in figure 1 and figure 2 respectively.

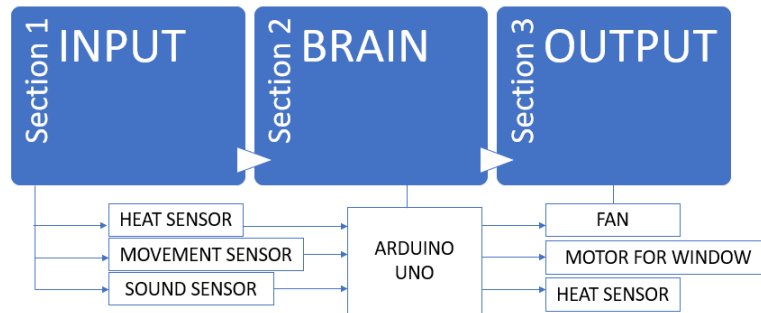


Figure 1. Block diagram of the system.



Figure 2. Prototype of the developed system.

3. RESULTS AND DISCUSSION

The Arduino UNO is used to control the system's functioning depending on a variety of situations. The situation is tabulated in table 1.

Table 1. Various situations for system to response.

Heat Sensor	Movement Sensor	Sound Sensor	Fan	Motor for side windscreen	Alarm via Bluetooth
0	0	0	x	x	x
0	0	1	✓	✓	✓
0	1	0	✓	✓	✓
0	1	1	✓	✓	✓
1	1	1	✓	✓	✓
1	0	0	✓	x	✓
1	0	1	✓	✓	✓
1	1	0	✓	✓	✓
1	1	1	✓	✓	✓
1	1	1	✓	✓	✓

When all the sensors have negative input, the system will not operate as expected. The system is programmed to respond if even one sensor detects positive input, activating the fan, motor, and alarm system via Bluetooth. This is owing to the fact that the ages of children who may be left unattended range from newborn to infant to toddler, each of which exhibits a unique response to the scenario. If just the heat sensor has a positive input, it is possible that the car has been left in the sun, raising the temperature inside, causing it to only activate the fan and

send an alarm to the user in case there is still have a children left unattended and the children are asleep at the time.

4. CONCLUSION

The CASIC - Children Assistant System in Car was designed to combat this sad incident, unattended children died in car due to heatstroke. Many factors that lead to this incident such as negligence, old parents, many children, suffering from 'forgetfulness syndrome', acute exhaustion, the task of sending children outside of regular responsibilities or routines, and educational level. As a result, the development of CASIC can provide parents with peace of mind and assist them in overcoming the problem of 'forgetfulness', particularly when it occurs outside of their usual routine. Due to this, it is believed that CASIC has high potential to be marketable and compete with other method of resolving this problem.

However, there is still have a wide room of improvement for this product before it is ready to commercialize. One of the improvements that can be done is to embed the system with the IoT platform which give more convenience to the user. GPS also can be included for easy tracking for the position of the car.

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