WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

BABY CARE ALERT SYSTEM FOR CHILD LEFT IN PARKED VEHICLE

G.Vani[1], B.Umamaheswari[2], B.Dhanalakshmi[3], R.Pavani[4] and U.Keerthi [5]

[1,2,3,4,5] Department of Computer Science, Santhiram Engineering College, Nandyal
E-mail: amar.cse@srecnandyal.edu.in

ABSTRACT

As science and innovation has progressing to be essential for our lives, a large portion of regular applications are currently associated with one another virtually. By incorporating the IoT generation into child protection department, this component is worth investigating into. With tense lifestyle, some mother and father have a tendency to leave their kids inside the parked vehicle. The research is to design a notification or an alert to parents by using the most essential device that everyone has at least have one, smartphone. The design consists of two main parts which are safety pad and keychain alarm device. For the primary part, the safety pad consists of load sensor to sense the presence of child within the toddler vehicle seat and notify mother and father via smartphone. For the second part, the keychain alarm devices use Radio Frequency (RF) transceiver that will act as backup safety features for children in case when the parents' smartphone is missing or run out of battery. This device will set off the caution alarm when mother and father walking outdoor the RF sign range of the safety pad. The device turned into correctly used the most important tech gear and not directly provides this BabyCare protection feature to the cellphone.

Keywords*: arduino, vehicle, hyperthermia, sensors, IoT.*

1. INTRODUCTION

Recent traits in Internet of Things (IoT) have caused a renewed hobby in baby protection department. Time magazine`s Techland department has directed a huge, fascinating global survey on 5,000 humans from special countries, and determined thechance that you have been subconsciously fall after cell telecellsmartphone enslavement iswhen you aren't capable of simply depart the mobileular telecellsmartphone of their pockets. eighty four percentage of respondents stated that they couldn't pass an afternoon with out their cell phones[1]. Since humans in in recent times are an increasing number of related to their private clever tool, incorporating a protection tool that would secure a baby`s lifestyles is really well worth investigating into.

There are a excellent deal variety of instances that diagnosed with the demise of youngsters which are left in a motors due to warmth stroke and hyperthermia [2]. Hyperthermia is an excessive situations that take place whilst the frame keeps greater warmth that it may deal with [3]. Kids seem like greater willing to have hyperthermia than grown-united stateswhen the motors is stopped and window close closed [2]. There are factors make youngsters greater willing to skilled hyperthermia than grown-ups: youngsters have a greater distinguished floor variety frame mass percentage contrasted with grown-united statesand their thermoregulation is much less talented than grown-ups [2]. Studies have tested that the temperature interior a halted automobile can swiftly upward push to a risky stage for adolescents, pets or even grown-ups [3].

Based on Figure-1, the yellow wave that transmitted immediately to the window`s automobile will warmth the air with inside the automobile adjacently thru conduction and convection. This occasions will brought the air stuck with inside the automobile to heats up rapidly [4]. Even the window is partly near can not lower the warming price of the automobile`s inner air because the our bodies of toddlers or babies heat at faster price than grown - ups [3].

Figure-1. Temperature's reading for a tight and closed vehicle in 60 minutes [4].

The implication of this have a look at will stored from those unlucky incidence takes place wherein the automobile want to be ready with a device that alert the mother and father or caretaker from leaving their children in the back of withinside the automobile that may jeopardize their lives.

2. LITERATURE REVIEW

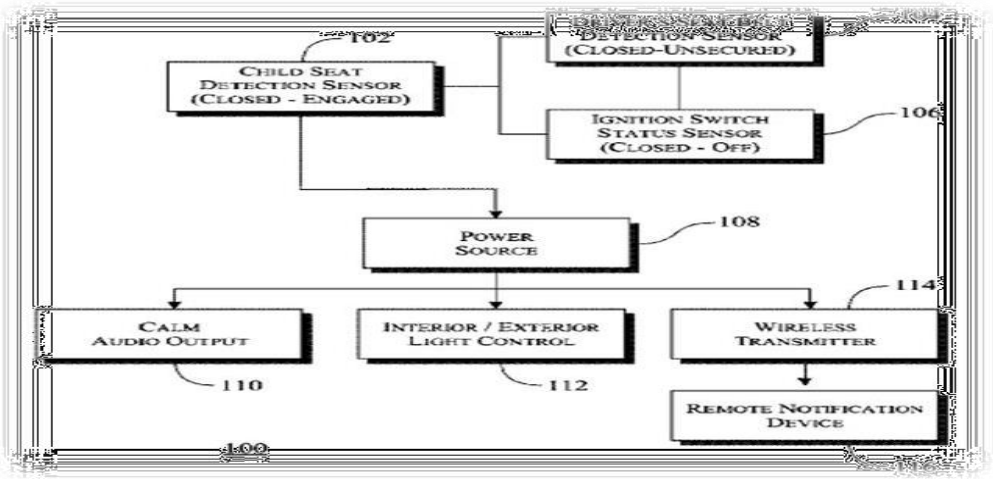
According to the statistic with inside the US, 10% of toddler`s deaths are because of warmth stroke because of negligence because of mother and father or caretaker. A lion`s percentage of the instances appear whilst parents get diverted from their anxious lives and that they do not found out that the kid turned into in a death-defying situation. Busy individuals who have a tendency to place their toddler with inside the returned of the automobile and will cause them to forget about that they may be wearing their toddler along. They may want to probably pass approximately their recurring and depart kids secured with inside the close window`s car. The influences from paintings pressure related are one of the cause why maximum of human beings have a tendency to forgot [2]. This clarifies that individual's daily lifestyles may want to have an impact on their behavior and make a contribution to one`s choice toleave their toddler unattended with inside the car due to distressing and paintings load. There are several studies paintings in this subject [5]-[9], with inside the current years.

Table-1. Details of numbering in Figure-3

No	Details	No	Details
110	child safety seat	124	a restraint
112	a child	134	seat belt ofvehicle
114	presence sensor	150	wirelessreceiver
116	proximity sensor	154	proximitysensor
118	a transmitter	156	an alert
120	wireless signal such asradio frequency, microwaveor infrared wave signal	158	a speaker

In the patented layout through J. Morningstar [10], the caution machine will notify the mother and father straight away while the kids had been left in the vehicle.

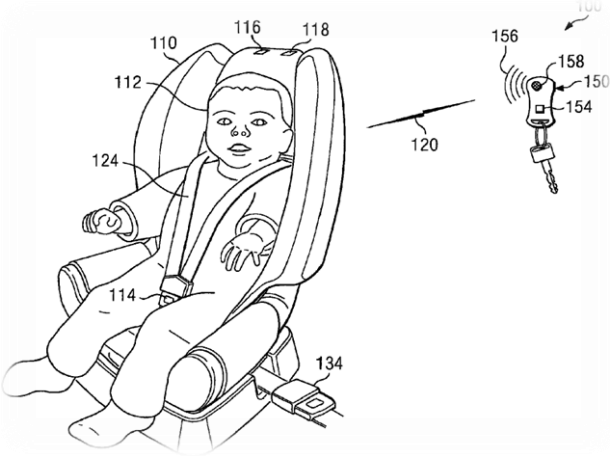
Figure-2. Block Diagram of the warning system [10].



As shown in Figure-2, after the driver releases the seat belt, the system will check the pressure pad or a Secured baby seat lap belt, whether or not the kid continues to be stay seated in his automobile seat. If yes, it'll notify the caregiver instantaneously. The alarm could consist of a relaxed audio output which includes a lullaby, a song, or a story. The device may be included into the OEM capabilities to offer an alert escalation procedure the usage of a neighborhood alert, a car alert, a Wireless alert and particularly a 911 alert.

For C.Owens [6], the operation for this layout is the use of the presence sensor that take a look at at the presence of infant with inside the safety, at the same time as the proximity sensor will take a look at at the variety distance among wi-fi receiver and infant`s seat. If the proximity sensor sensed the gap are out of variety and the kid continues to be on the automobile seat, wi-fi sign will alert wi-fi receiver to provide an alarm to inform mother and father or driver. With a temperature manage unit and thermoelectric introduced with inside the layout, it detects the temperature of the kid whether or not the temperature is secure or not. This benefit can lessen the chance of heatstroke amongst infant.

Figure-3. Layout of child safety seat system equipped with sensor and notification setting proposed by C. Owens [6].



In the paper of S. Davisson et al [12], the machine is designed to a child seat occupant detection that signals the caregiver whilst the child remains of their seat, the caregiver has travelled to an unacceptable distance from the automobile and the inner temperature of the automobile is elevated to unwanted temperature range.

The toddler seat occupant detection device consists of a far flung unit for a caregiver and a base unit constant to a toddler seat which communicates with the far flung unit. As the distances are out of range, the alarm activated the far flung and the bottom unit. The base unit and the far flung unit may be programmed to pick out and talk with as a minimum one far flung unit or with a couple of far flung units.

Same with preceding layout, a temperature detector is brought into the layout to video display units the inner temperature of the automobile. The alarm will set off on the faraway unit and base unit if the temperature at caution range. This layout is portable, mild weight, and may be without difficulty moved from one automobile to another.

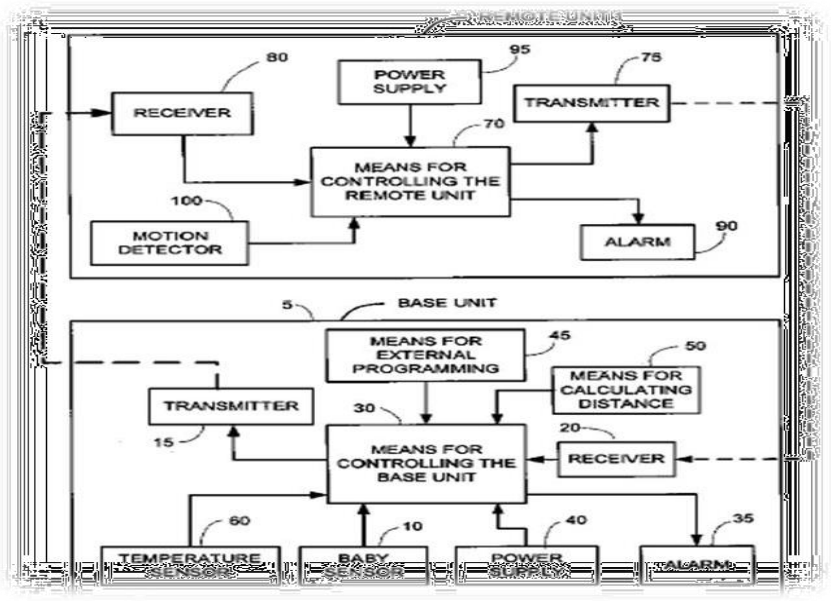
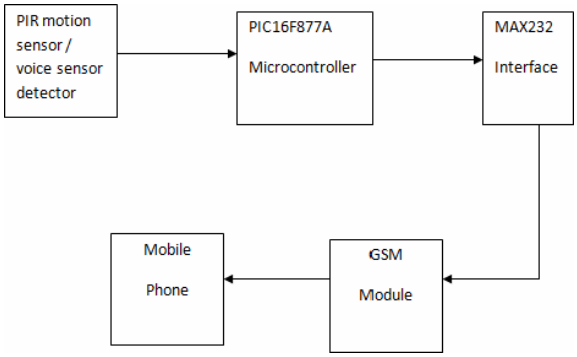


Figure-4. Block diagram of the baby seat occupantdetection system consist of one remote unit and one base unit [12].

Based on block diagram in Figure 3, the device has as a minimum one far flung unit and base unit. The base unit is portable, mild weight, waterproof and may be moved from car to every other and may be region below the child`s vehicle seat. The far flung unit is typically connected to vehicle keyor another available region.

In N.M.Z. Hashim et al [13], the machine became layout to stumble on any sound and motion within side the vehicle while the youngsters are left at the back of withinside the vehicle and gave and alert thru Short Messaging machine (SMS).

Figure-5. Detection system flow diagram [13].



According to Figure-5 above, this system involved two parts of the operation; hardware and software development. A microcontroller, a motion detector and a GSM module are the main component used in this design.

The signals have been given as soon as there are motions or voice detected. The microprocessor robotically obtained the sign from the sensors to offer an education to the GSM module in which the caregiver gets the caution SMS.

It may also but be cited that maximum of the research had been aimed at the alert machine the usage of sensors that detected the kid presence with inside the vehicle. In addition to those number one data [5]-[13], the incorporation with cutting-edge generation that person pleasant and transportable has now no longer been very well investigated.

3. METHODOLOGY

To accomplish this goal and to reply to a latest name for research, an alert machine the usage of the modern-day generation such Arduino and additionally smartphones are designed. The machine includes parts, protection pad and keychain alert. Each of this component may be divided into hardware and software.

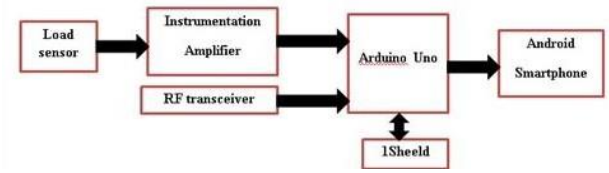


Figure-6. Block Diagram for the safety pad.

The waft diagram above indicates how the device labored after the load of the child is detected. The Safety pad is proposed to be positioned below the child vehicle seat`s cover. There are 3 foremost additives withinside the protection pad which might be the weight sensor, Arduino UNOTM and 1Sheeld.A load sensor is used to converts a load or pressure stress on it into an digital sign. Depending at the form of load mobileular and circuitry used, the digital sign obtained may be both a voltage alternate, contemporary alternate or frequency alternate [14]. However, adjustments in voltage produced are so little, consequently it required to apply an instrumentation amplifier to make bigger it into the ideal value. For this research, TEM01052B form of load sensor is used wherein it stages as much as 50kg. Since it's far a half-bridge form of load sensor, whilst it's far being stretched, the sign may be ship through the purple wire [14]. After the alerts are amplified, Arduino will serves as platform that compiled the coding and study the analogue values from the sensor itself

Next, is 1Sheeld. It acts as an interpreter of the sign acquired from Arduino to the Android Smartphone. When the toddler is positioned at the seat, the voltage modifications in which Arduino will ahead the data to 1Sheeld and supply notification to the tele cell smart phone indicating that the toddler is in the car.

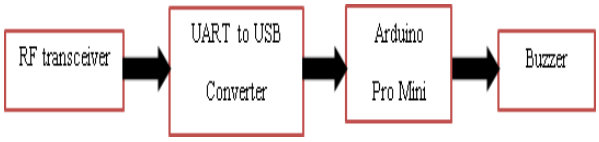


Figure-7. Block diagram of Keychain Alarm device.

For Radio Frequency (RF) transceiver, its paintings with the Keychain alarm tool through RF indicators as proven in Figure-7 above. Based on parent above, the important thing additives used are Arduino Pro Mini as the principle controller in conjunction with NRF24L01 transceiver so one can paintings as proximity sensor so one can end result as backup protection once they their unique RF indicators are out of range (this means that the dad and mom farfar from the unique RF transmission range). Arduino Pro Mini is chosen due to because of the little sizing to feature within the Keychain alert tool. As for UART HARDWARE converter is used for compiling codes from the Arduino purposes. The keychain alarm will a protection tool for this assignment that useful resource to alertthe dad and mom through beeping the alarm while a infant is left within the car.

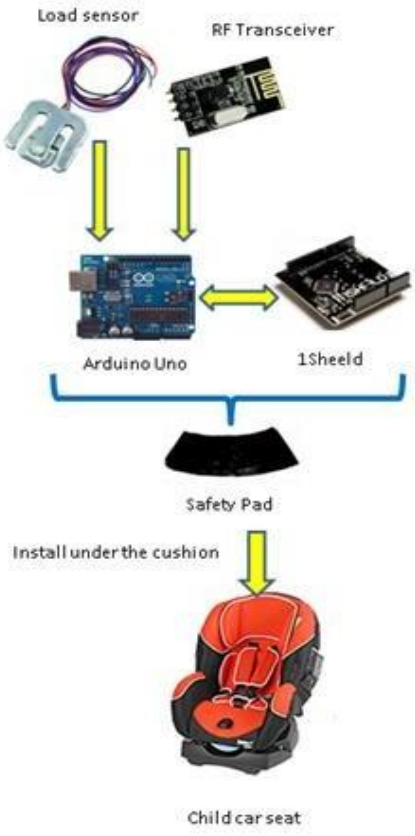


Figure-8. The overview of safety pad's design

Figure-8 presents,

a) The input signals as discussed earlier will from the load sensor and Radio Frequency (RF) transceiver that goes into the Arduino platform

b) The system will be activated as the child placed onto the car seat.

c) Primarily, the presence of the child is continuously checked by Arduino. As the load sensor detected the load of child, the alert are send to the parent's smartphone via 1Sheeld communication in every few minutes. While RF signal from the transceiver checked any signal that comes from the transceiver of Keychain alarm device still in ranges.

d) When destination is reached and the parent start to leave the car without the child, the load sensor will still detecting the load of the child. Hence, the notification will alert to the smartphone.

e) But when the parent start walking away from the baby itself, the RF signal from the Keychain Alert device will lost its signal and start beeping to alert that the baby are left behind.

f) The keychain alert system are also as backup system if the parent's smartphone are either out of battery or left behind as well.

The overviews of the notification system areshown in Figure-9.

Figure-9. The overview of the notification system

4. RESULTS AND DISCUSSIONS

To display the capacity of this technique and its suitability for the application, the structures are investigated into parts, hardware and software.

4.1 Hardware

In growing the hardware for the protection pad, load sensors, INA 125P Instrumentation Amplifier and few resistors and Arduino UNO are used. The modules used are proven in Figure-10 below.

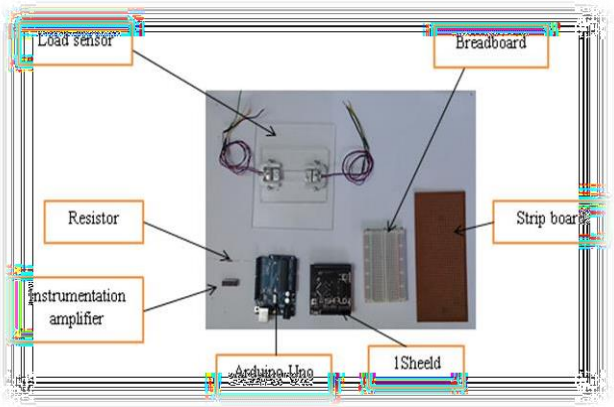


Figure-10 Components for the Safety pad circuit.

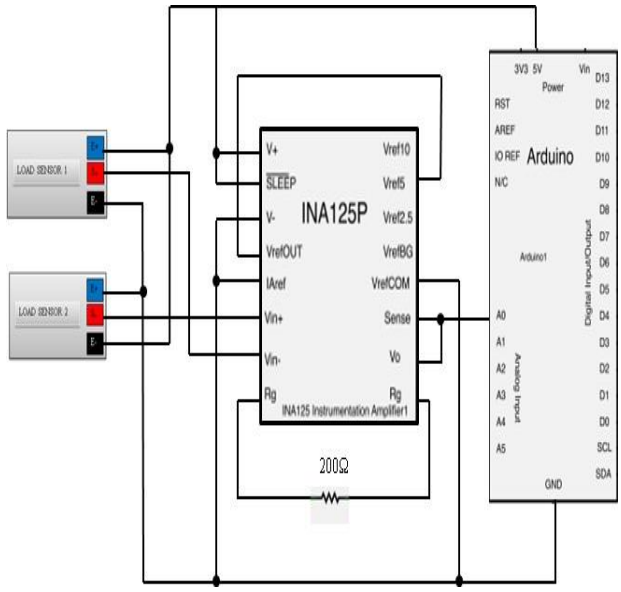
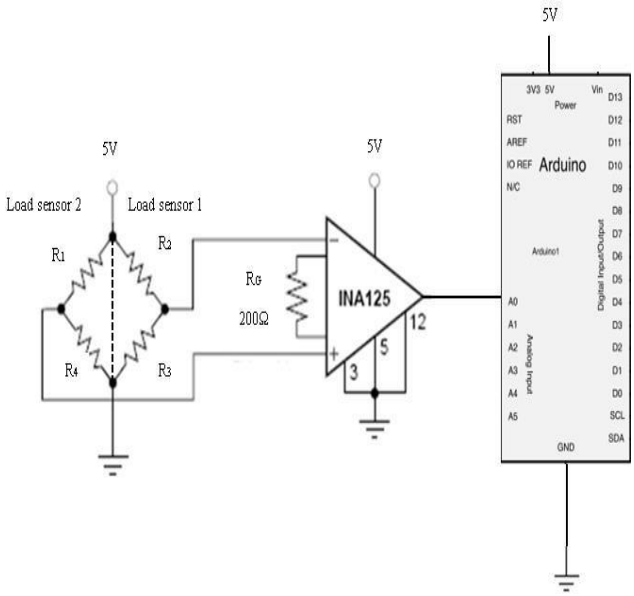


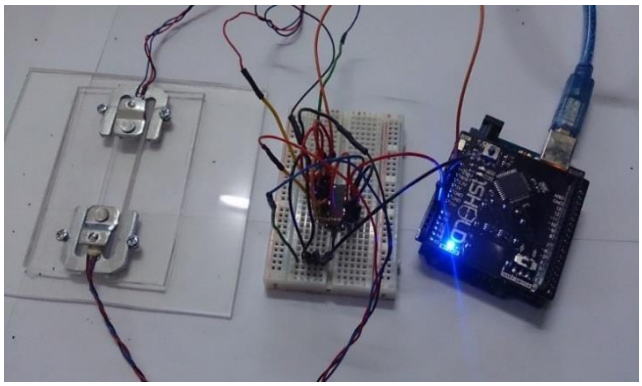
Figure-11. (a) Equivalent circuit



(b) Schematic circuitdesign for the Safety pad.

The purpose INA 125P Instrumentation Amplifier is used, to heighten the output of the burden sensor and come to be readable to Arduino.

Figure-12 The constructed Safety pad circuit using breadboard



As for the keychain Alarm`s hardware, the module consist male to male jumper and UART to USB converter is used for coding compilation functions as visible in Figure-13

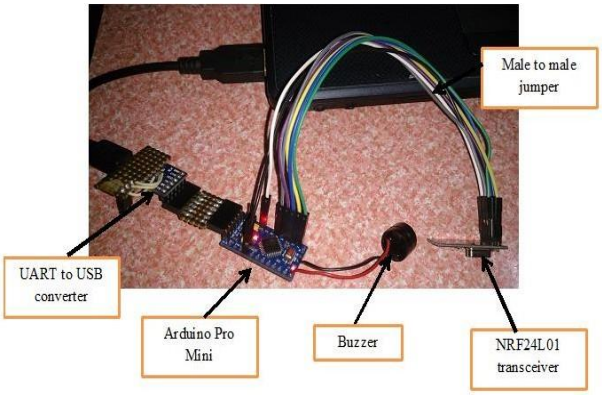


Figure-13 Connection of keychain alarm device (client)

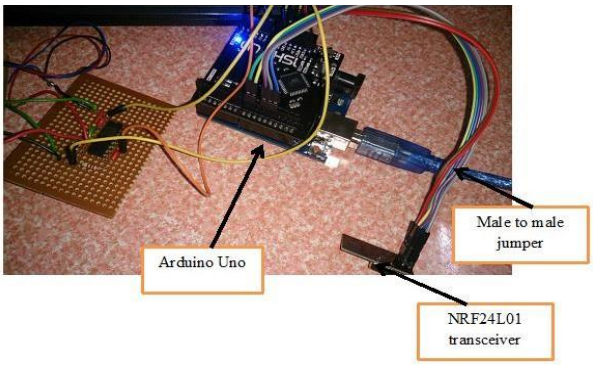


Figure-14 Connection of Safety pad (server).

Figures 13 and 14 suggest the relationship among NRF24L01 transceiver from the keychain and the transceiver on the protection pad. As noted earlier, the buzzer will alert the figure as they strolling farfar from the car without the baby.

4.2 Software

For software program analysis, each programming for keychain and protection pad are made the use of C programming written in Arduino IDE software program. The device has included with a 1Sheeld device which incorporate of a defend this is bodily connected to Arduino board. 1Sheeld coping with dataand it serves as wi-fi medium among Arduino and any Android phone through Bluetooth [15].

Figure-15. (a) 1Sheeld's notification apps (b) 1Sheeldhardware that connected to Arduino

The software program platform on 1Sheeld enables join the Arduino to 1Sheeld`s very own apps on Android smartphones wherein it manages the conversation among the any sensors from Arduino to the phone itself. For this system, `Notification Shield` is used because the load sensor discover any weight at the protection pad. This notification function will maintains giving alert for each couple of minutes as lengthy because it discover any weight at the protection pad.

As for the keychain alarm, NRF24L01 transceiver is used with Arduino Pro Mini. The coding for NRF24L01 transceiver will constantly test whether or not the load from the burden sensor continues to be detected at the protection pad. If yes, whilst the mother and father nevertheless shifting out of variety from the transceiver, the beeping alarm will alert the discern via the keychain.

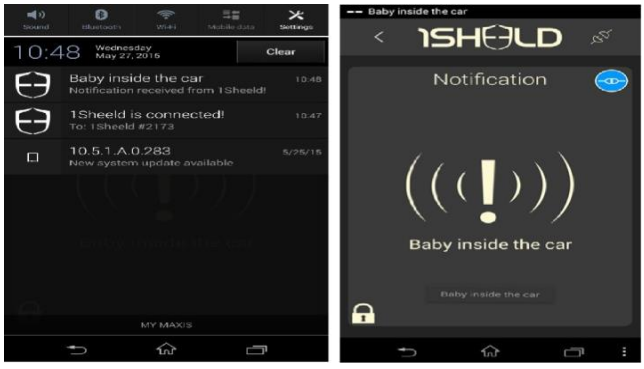


Figure-16. Notification received when the baby isdetected on the safety pad.

5. CONCLUSION

In this investigation, the goal changed into to layout and put into effect a wi-fi tool so that it will triggers an alarm and ship an alert to inform the dad and mom if the kid changed into left withinside the car. The gadget changed into correctly used the maximum crucial tech tools for humans nowadays that is the smartphone. This challenge in a roundabout way provides this BabyCare protection feature to the smartphone.

This alert machine will warn the determine thru telephone and alarm the determine the usage of keychain alarm tool after they go away the automobile with out the child. There are 3 essential additives for this machine which might be load sensor, 1Sheeld and RF transceiver.

The outcomes right here might also additionally facilitate development in preceding layout supplied in in advance literature evaluation however it additionally offer the subsequent insights for destiny research. The enhancement for the battery used for this machine may be extrade to piezo-electric powered effect. This weight detected from the protection pad may be harvest to generate electric electricity in reaction to the implemented mechanical strain given to the piezo material. This will lead in the direction of battery-much less layout this is a great deal greater environmental friendly.

REFERENCES

[1] J. Gilbert. Smartphone Addiction: Staggering Percentage Of Humans Couldn't Go One Day Without Their Phone. The Huffington Post.

[2] P. Ferrara, F. Vena, O. Caporale, V. Del Volgo, P. Liberatore, F. Ianniello, A. Chiaretti and R. Riccardi. 2013. Children left unattended in parked vehicles: a focus on recent italian cases and a review of literature. Ital. J. Pediatr. 39(1): 71.

[3] M. Luethi, B. Meier, C. Sandi, T. W. Buchanan, S. Louis, and J. F. Dominique. 2009. Stress effects on working memory, explicit memory, and implicit memory for neutral and emotional stimuli in healthy men. Vol. 2, no. pp. 1-9.

[4] Clarksville. 2011. Baby Alert International - Child Safety Devices. Clarksville Online. [Online].Available: http://www.clarksvilleonline.com/2011/07/02/too- much-time-in-the-heat-can-kill/.

[5] F. R. M. Rashidi and I. H. Muhamad. Vehicle's Interior Movement Detection and Notification System. pp. 139-144.

[6] J. K. Lee, D. R. Spach, P. Srinivasan and D. P. Umstead. 2010. Wireless system to detect presence of child in a baby car seat. Google Patents.

[7] F. Mesina. 2005. Baby seat belt alarm system. Google Patents.

[8] M. A. Rossi. 2000. Warning system for detecting presence of a child in an infant seat. US 6104293 A.

[9] G. C. Kautz. Method and system for preventing leaving a child in an unattended vehicle. US 7786852 B2, 2010.

[10] J. Morningstar. 2007. Warning System For Child Left Unattended In Vehicle. US 7714737 B1.

[11] C. Owens. 2008. System and method for a child safety seat having sensing and notification abilities. US8038213 B2.

[12] . N. M. Z. Hashim, H. H. Basri, A. Jaafar, M. Z. A. A. Aziz, A. Salleh and A. S. Ja. 2014. CHILD IN CAR ALARM SYSTEM USING VARIOUS SENSORS. ARPN Journal of Engineering and Applied Sciences. 9(9): 1653-1658.

[13] Loadstars Sensors. 2015. What is a Load Cell? How do Load Cells Work? [Online]. Available: What is a Load Cell? How do Load Cells Work.

[14] Integreight. 2015. 1Sheeld. [Online]. Available: http://1sheeld.com/.