

The Design of Seat Belts used in the Front Row of Cars

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Abstract: In today's world, there are new breakthroughs in the area of transportation, which is to make people feel secure. At the same time, people have been pursuing high speed, time and time again to break the limit of traffic safety, of course, those behaviors are also to pay great price. On the highway, many people get injured or disabilities or even lose their lives because of not wearing seat belts in the traffic accidents. To make people wear seat belts, the market sold in the interior of the car is equipped with pressure sensor and safety belt alarm device. But even so the importance of wearing seat belts has not been able to cause people's full attention. The behavior of not wearing the safety belts on the highway will not be severely punished, which is not responsible for their life's safety or to other people's life safety. We travel is to pay attention to efficiency, both to fast travel, also safe travel, so that our life will be more beautiful. If a device is designed to integrate the existing pressure sensor and the role of a safety belt warning system, a new type of safety belt is added to ensure that the safety belt is taken from the front of the body. So, to make people's life much more convenient, to have safety and harmony traffic, we are based on the sensor working characteristics, the vehicle motion trigger system and the safety belt motion trigger system and so on and we have made some researches on the safety belts, this study is a device for the safety belt in the front row of the vehicle. Through this study, we must come from the technology to force the front seats of the car to be able to further enhance the awareness of the safety belt, to further reduce traffic accidents caused casualties. Therefore, the research and design of safety belt device which is directed against people in front of the vehicle is a big project.

Keywords: Fasten seat belts; Safety belt alarm system; Pressure sensor; Infrared detection device for safety belt

1. Introduction

In recent years, with the traffic conditions of the increasingly mature, infrastructure is perfect with each passing day, more and more people prefer to travel by private car travel, but most people does not have the enough sense of safety, even in the event of a highway or not safety belt, not knowing that security zone is related to the life safety of the personnel on the car, especially in front of the staff is will have a significant impact, if encounter unexpected events, the driver when the emergency brake front personnel is possible in the role of inertia is from the front of the cab glass thrown, such consequences would be unthinkable. Therefore, we should not ignore the important significance of the safety belt.

Now at home and abroad for this phenomenon is very serious, which reminds people to wear safety belt device research project based on also has a lot of, such as in the domestic have safety belt warning device member detection system. The device consists of an electronic control unit (ECU), safety belt reminder device (SBR) and safety belt lock catch can detect seat member uses objects and non occupancy, and decide on whether to turn on the lights along with the sound of warning, to remind the passengers to fasten their seat belts. And through the

study of domestic experts, the warning device is also effective in reducing the mortality of traffic accidents. At the same time, there have been about the ARM car safety belt alarm system, the system can be in the car after a good ride, to remind the passengers to buckle on the safety belt to drive, in order to let people wear the seat belt. These two devices are now in the majority of the car after the combination, but the former only to remind people, is a non compulsory behavior, the Department of safety belt or not mainly depends on the consciousness of the car, although the latter with a mandatory role, but in order to allow the car to start, the majority of people will be directly from the back of the seat belt buckle to remove the alarm. In summary, although the opportunity to fasten the safety belt device has reached a higher level, but the two systems can still keep people in opportunistic, so on the basis of the two, design a forced people to wear a seat belt device is very necessary. We can design a device to connect the control of automobile safety belt and gear box and a hand lever, if there is no front personnel corresponding fasten the safety belt, car hand lever is can not control, of course, this series of complete also need to multiple conditions can be achieved to meet at the same time. The research of this project is to simulate the actual

life of the private car and taxi in the use of the safety belt, the simulation system to simulate the establishment of the physical simulation system, the design conditions of the system and the control part of the system, through the analysis of all possible experimental results, and constantly improve the whole system. This project will be introduced in detail and the results of the experiment will be presented in detail.

Through the study of effect of the seat belt, we can design a device to connect the control of automobile safety belt and gear box and a hand lever is, if there is no front personnel corresponding fasten the safety belt, car hand lever is not can be manipulated, of course, this series of complete also is need multiple condition are satisfied simultaneously can be achieved. The research of this project is to simulate the actual life of the private car and taxi in the use of the safety belt, the simulation system to simulate the establishment of the physical simulation system, the design conditions of the system and the control part of the system, through the analysis of all possible experimental results, and constantly improve the whole system.

2. The Introduce of the Main Project

2.1. The Research Content

Main research: in the technical requirements of the front line of the safety belt device, through the passengers on the train to the Department of safety belt process analysis, only need to meet the following three conditions: 1. the seat on the pressure sensor can feel the pressure; 2. in front of the sensor device on the front of the sensor can feel the front seat belt system in the body; 3. Security belt buckle, the security alarm system is no longer issued an alert, signal receiver to receive the relevant signal (that is, the security belt is indeed a system); All three met at the same time, through the gate circuit to control lever of the automobile gearbox and meet at the same time that, hand lever can be controlled, otherwise another judge seat on whether the object or other aspects of the problem, ultimately through the circuit control the maneuverability of the transmission lever.

The device mainly studies on the front row personnel in the technology on the problem of compulsory system security, in view of the majority of people on the train without wearing a seat belt behavior will cause unnecessary traffic accidents, we can through the device on the technical requirements of the front row Xi An full, as long as meet the three conditions, the car can start:

- The pressure sensor on the front seat is detected by a pressure sensor on the front seat. It may not be a person or an object, and the signal is transmitted to a receiving device via a transmitting device.
- The special material of the sensing device on the front of the rear view mirror and a certain section of

the seat belt is detected to detect the real presence of people, and then transmit the signal to the receiving device through the transmitting device.

- After the security belt buckle, the security alarm system is no longer issued an alert, through the signal generating device to send the signal to the receiving device.
- Finally meet the above three conditions, circuit is switched on, hand lever of the gearbox can be manipulated, if only to meet the first pressure condition, namely the front seat may to an object and is not human, automobile gearbox can be manipulated and other conditions are not start the device.

2.2. The Significance of this Project Research

Today, with the development of traffic, the vehicle will become more and more popular. At the same time, this time is a time of traffic accidents. Many of the traffic accidents are caused by the safety belt. In some western countries, people on the bus are not in a hurry to start the car, but the first to fasten the safety belt, and in China, people do not have this kind of consciousness, or even the existence of some people not wearing a seat belt of high-speed car chases, often will therefore lead to a huge accident, through the device, the technical mandatory requirements in front of the personnel department of safety belt, avoid traffic accidents, cherish life, building a harmonious society.

2.3. Route of the Project Research

A. Survey of small vehicles in today's society

First of all, we do a random survey and understanding of private cars, small buses and taxis in today's society. For daily travel of the type of vehicles, we can get through to the surrounding regular car to get more clear understanding and awareness, understanding of the car driver's daily travel habits, such as whether to start the car before whether there is a system of safety belt, whether there is a reminder of the people in the car on the train after the safety belt and other people in today's traffic travel habits. Finally, through the observation on the inside of the car, we can measure a series of related data and then be integrated so as to establish a precept for the internal by detecting the front staff whether security system with the conditions to control the automobile gearbox and a hand lever to further control the automobile travel security system SS (security system).

B. Study the system of the front seat to detect whether someone sitting on the seat

Through the pressure sensor device under the seat, we can clearly determine whether the seat is a person, we can imitate the safety belt alarm system in today's private car to set the work of this sensor, for example, in the automobile panel display box in the design of a display

lamp, when no one is sitting on the lamp is not bright, once a person sitting on the top, lights will be lit up. The Conditions of all parts of the investigation of wearing the safety belt is shown as Figure 1.

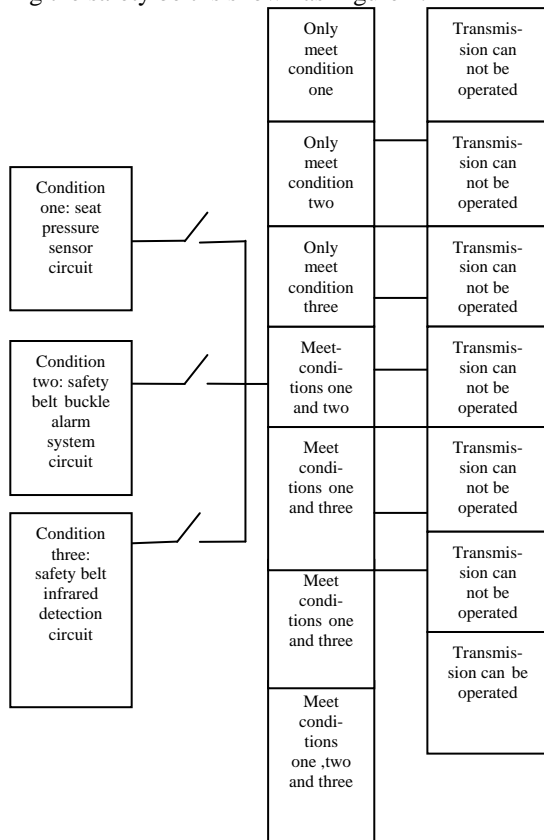


Figure 1. Conditions of all parts of the investigation of wearing the safety belt

Table 1. Technical route diagram

		Beijing	Shenyang	Chengdu	Nanjing	Shanghai	Guangzhou	Total
Sex	man	146	126	249	121	46	220	908
	woman	35	36	37	20	15	30	173
Age group	Teenagers	1	10	10	7	3	28	59
	Youth	139	111	226	93	45	196	810
	The middle-aged	41	41	50	41	13	26	212
Drive or not	yes	132	86	226	77	44	158	723
	no	49	76	60	64	17	92	358
Habit of wearing a safety belt	always	31	25	49	56	16	52	229
	sometimes	106	56	195	45	35	161	598
	never	44	81	42	40	10	37	254
Total number		181	162	286	141	61	250	1081

3. Control Circuit Analysis

The research and development of this project is mainly focused on the design of the circuit of the system, which is mainly used to control the above mentioned conditions. In general, the circuit mainly includes three parts, the first is through the control of the seat pressure sensor further through the circuit to the physical signal such as a sound or a specific color of the display light; The second

Of course, this will still be involved in different people's weight is not the same situation, the second we can design a minimum weight limit value, once more than this limit display lights will shine, otherwise it will not shine, that is to say, we are the default weight is not caused by human body weight, but by other objects, so that we can pass the circuit system and then design a judge whether the front seat on the seat of the system.

C. Develop a system for detecting whether the front row personnel system is safe.

According to the survey results, we can apply to all the false and the design scheme before the actual. Through comprehensive analysis, we can put forward the implementation plan, and establish the three-dimensional model in AutoCAD system to analyze, according to the functional requirements of the model material, making the physical model. By measuring the length of the front of the body when the seat belt is on the body, the central position of the central position of about 2/3 is selected as the infrared light emitting diode, And then, in front of the sub driving position to install an infrared emitting light emitting diode, and the emission light access circuit, through the actual test of human experiments, to ensure that the power is provided as long as the safety belt on the part of the infrared receiving device corresponding to the front of the infrared emission lights, the circuit can work properly.

D. Project Roadmap

The technical route diagram is shown as Table 1.

one is to further control the electrical signal by controlling the security of the card with the card, This part of the circuit control system in the current social life has already been listed, it is through the design of the seat belt in front of the car show, people drive when you see this sign will know that they are not wearing a seat belt; The third one is to complete the final condition of the control system by controlling the signal transmitting and receiving device on the front of the vehicle and the safety belt,

To do so is to prevent opportunistic people of life safety belt from behind around the card into the buckle this act. In this way we can from the technical level the control circuit system of several important conditions and controlling part.

3.1. Circuit Running Test Analysis

The research of the project is mainly to the strict requirements of the vehicle front personnel to force the safety belt, the key to achieve the goal is to achieve through several circuit conditions, that is to say whether these conditions will determine the car's progress, and the car's travel is controlled by the gearbox. If people only seat and did not fasten safety belt, then just pressure sensor reaction, therefore at this time of the gearbox and a hand lever is locked or gearbox is beyond the control of; If only the safety belt buckle plug, the car no personnel aboard, so at this time of the gearbox and a hand lever is locked or gearbox is beyond the control of; The car can't be started if only the safety belt infrared detection circuit has a response; If the pressure sensor circuit and the security belt buckle alarm are normal work, that is to say that there are people on the ride and the seat belt buckle also plug, but not through the body in front of the seat belt system, this car gearbox and a hand lever is locked or gearbox is beyond the control of; if seat pressure sensor circuit and the safety belt of infrared detection circuit were normal for working, that is to say, people ride and safety belt is through the front of the body, just the safety belt buckle no plug, perhaps, on the side or sitting just in order to prevent inspection, this car gearbox and a hand lever is locked or gearbox is beyond the control of; If the seat belt infrared detection circuit and the safety belt buckle alarm circuit are working, and pressure sensor did not work, that is to say at this point the car internal personnel take, but the safety belt right system in the car seat. This, of course, a car gearbox and a hand lever is locked or gearbox is beyond the control of; If the seat pressure sensor circuit, a safe with infrared detection circuit and the safety belt buckle alarm circuit works normally. That is to say the car seat on the ride, and safety belt is through the body in front of the correct insertion into the card slot of, this car gearbox and a hand lever is not locked or gearbox is steerable.

3.2. Units

The pressure sensor on the front seat is detected by a pressure sensor on the front seat. It may not be a person or an object, and the signal is transmitted to receiving device via a transmitting device.

The special material of the sensing device on the front of the rear view mirror and a certain section of the seat belt is detected to detect the real presence of people, and then transmit the signal to the receiving device through the transmitting device.

After the security belt buckle, the security alarm system is no longer issued an alert, through the corresponding signal generating device to send the signal to the receiving device.

3.3. Working Circuit Equations

The Working circuit diagram is shown in Figure 2.

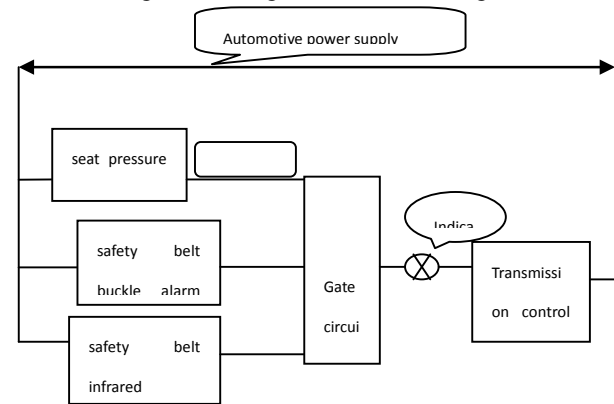


Figure 2. Working circuit diagram

3.4. Innovative Features Innovative Features

This research can be said to be another big innovation in the traffic area, the importance of the safety belt is a very important position, the use of special infrared sensing material as the latest material of the safety belt and the use of infrared sensing system to sense and determine whether the seat is on the seat, the technology can be said that there is no modern vehicle at present. This part of the signal into the electrical signal in the circuit connected to the circuit, combined with the safety belt alarm system circuit and seat pressure sensor circuit as an important part of the integrated control of the vehicle's travel is a big innovation. Sensor induction circuit to control the transmission of the car, whether it is a car or a manual gear can be used to apply this technology. Therefore, the application of the technology is still in the face of universal car, convenient, fast, safe, energy saving, environmental protection, people-oriented is the principle of its application, the basic purpose of the research is to create a harmonious transportation, green transportation and safe transportation.

4. Application Prospect

Through the research of group members on the theory, the research of this project is to combine the pressure sensor, the infrared sensor and the safety belt buckle sensor and the transmission, which can effectively alleviate the traffic accident when the passenger is not wearing a seat belt and bring harm as long as this devices are widely applied on cars. Meanwhile, contemporary passengers could gradually develop a good habit of fastening the seat

belts as long as they get on the car. If the device can be further improved, which is in order to protect the safety of passengers better. At last, we can achieve the goal of auxiliary driving and prepare for further research in the field of traffic safety.

In highly developed modern society, the car gradually replaces the people's walking, and it becomes more and more important. Though the cars industry are getting better development, however People's driving skills and safety awareness are not able to keep pace with the times. As for the present's development, It will be a long way to go for People's driving skills and safety awareness to keep up with the development of science and technology. So it is necessary to ensure the safety of the people who is in the course of driving. The design of the device used for the front seats of the car can guarantee the safety of the drivers to a certain extent.

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