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Analysis and Characterizes of Steering Wheel Alignment Tracking System

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ABSTRACT

Steering wheel alignment is the main process of the driving skills; driver wants to understand about the alignment present between the steering Mechanism and a steering wheel. In the present commercial cars, there is no indication about the Present any changes in the alignment system. This will lead to some accidents and may also lead to the any material wear. By using a accelerometer Sensor and with potentiometer this problem will be neglected. This will Track the current position of the steering alignment system with accordance with steering wheel.

Wheel alignment, also commonly known as car tracking alignment, is an important part of car maintenance. It refers to the angle and direction at which your tyres are set Maintaining proper wheel alignment is essential to avoid unnecessary wear on your tyres, steering, suspension and brakes. Accurate wheel alignment optimizes driving stability, maximizes tyres life and improves your vehicle's overall handling performance.

I. INTRODUCTION

Steering system, in automobiles, steering wheel, gears, linkages, and other components used to control the direction of a vehicle's motion. Because of friction between the front tires and the road, especially in parking, effort is required to turn the steering wheel. To lessen the effort required, the wheel is connected through a system of gears to components that position the front tires. The gears give the driver a mechanical advantage, i.e., they multiply the force he applies, but they also increase the distance through which he must turn the wheel in order to turn the tires a given amount. Various types of gear assemblies, none with any decisive advantages over the others, are used, although some manufacturers prefer a rack-and-pinion system. In faster, heavier cars the amount of force required to turn the tires can be very great. Many of these cars use a power-steering system. While any vehicle can react in any of these ways under extreme conditions, most automobiles are built to understeer. Racing vehicles are often designed for neutral steering; few vehicles are built to oversteer, since this is considered hazardous by many

authorities. As a safety feature in many modern cars the column on which the steering wheel is mounted will collapse if the driver is thrown against the wheel in a collision.

II. COMPONENTS USED AND DESIGN

- Arduino Uno R3.
- Accelerometer sensors (ADXL-345)
- Bluetooth module (HC05).
- Steering mechanism.

1) Arduino Uno R3.

Technical specifications:

- Microcontroller: Microchip ATmega328P
- Operating Voltage: 5 Volts
- Input Voltage: 7 to 20 Volts
- Digital I/O Pins: 14 (of which 6 can provide PWM output)
- PWM Pins: 6 (Pin # 3, 5, 6, 9, 10 and 11) EEPROM.
- UART: 1 I2C: 1, SPI: 1
- Analog Input Pins: 6
- DC Current per I/O Pin: 20 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB of which 0.5 KB used by bootloader

Communication

The Arduino/Genuino Uno has a number of facilities for communicating with a computer, another Arduino/Genuine board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .info file is required. Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1). A Software Serial library allows serial communication on any of the Uno's digital pins.

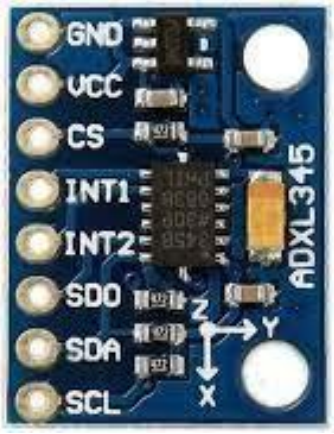
Features:

- ATMega328P Processor
- Memory
  - AVR CPU at up to 16 MHz
  - 32KB Flash
  - 2KB SRAM
  - 1KB EEPROM

2) ADXL 345 Accelerometer:

The ADXL345 is a small, thin, low power, three-axis accelerometer with high resolution (13-bit) measurement up to ±16 g. Digital output data is formatted as 16-bit twos complement and is accessible through either a SPI (3- or 4-wire) or I2C digital interface. The ADXL345 is well suited for mobile

device applications. It measures the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion or shock. Its high resolution (4mg/LSB) enables resolution of inclination changes of as little as 0.25°.



Analog configuration:

An analogue signal is one that can take on any number of values, unlike a digital signal which has only two values: HIGH and LOW. To measure the value of analogy signals, the Arduino has a built-in analogue-to-digital converter (ADC). The ADC turns the analogue voltage into a digital value. An analogue signal is **one that can take on any number of values**, unlike a digital signal which has only two values: HIGH and LOW. To measure the value of analog signals, the Arduino has a built-in analog-to-digital converter (ADC).

Digital configurations:

The digital inputs and outputs (digital I/O) on the Arduino are what **allow you to connect the Arduino sensors, actuators, and other ICs**. Learning how to use them will allow you to use the Arduino to do some really useful things, such as reading switch inputs, lighting indicators, and controlling relay outputs.

Properties of Pins Configured as INPUT_PULLUP: **These built-in pullup resistors are accessed by setting the pin Mode () as INPUT_PULLUP**. This effectively inverts the behaviour of the INPUT mode, where HIGH means the sensor is off, and LOW means the sensor is on. The value of this pullup depends on the microcontroller used. **The analog pins on the Arduino can be used as digital outputs**.

3) Steering system:

The steering system converts the rotation of the steering wheel into a swivelling movement of the road wheels in such a way that the steering-wheel rim turns a long way to move the road wheels a short way. There are two types of power steering systems:

Because of friction between the front tires and the road, especially in parking, effort is required to turn the steering wheel. Basic function of the steering system is to allow the driver to safely and precisely steer the vehicle.

III. WORKING PROCEDURE

As we discussed early about the working of a, Accelerometer ADXL 345, this is a sensor which gives the position and orientation of a desired object by analysing and comparing method.

The steering systems have a tendency to convert the rotary motion of the hand bar wheel into a linear motion. The linear motion is utilized by a wheel which moves the car in a desired path of way.

The steering system alignment is the main process to maintain a correct way of controlling the path of way. When the wheel alignment is got changed the centre of mass between the car and a wheel chassis is changed. When the alignment system is changes it makes an unusual wear in tyres and also makes some UN comfortability in driving. It is due to the centre between the car steering wheel and a wheel centre is changed and at the time of driving driver wants to makes sure and often think about the wheel centre. He wants to check the path of way by physically observing the path of way with the car's track way.

The alignment or adjustment of the front wheel suspension and steering mechanism of an automotive vehicle is known as alignment. Tires that are out of alignment tend to drag to the side, forcing the driver

to keep a hard grip on his or her steering wheel. Misalignment can adversely affect how a vehicle brakes and handles, compromising safety on the road. Tire drag from misaligned wheels could also result in the vehicle consuming more fuel. A wheel alignment isn't necessary when you have new tires installed, but it's a really (like, really) good idea. An alignment helps ensure that all four tires are correctly angled with each other and the road.

It's important that wheels and tires are aligned. If they aren't, you could be damaging your tires and affecting the vehicle's handling characteristics. If the suspension is out of alignment, there is uneven pressure on the tires that can cause your car to work harder on the tires than it needs to. Under normal circumstances, a wheel alignment will take an average of one hour, whether it's a two-wheel-drive or four-wheel-drive vehicle. If there's too much wear and tear or damage on the suspension system, steering bushing, track rod, or other parts, it'll take a longer time as some components have to be replaced.