

Design of Automatic Side Stand Retrieving System

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Submitted: 15-10-2021

Revised: 26-10-2021

Accepted: 28-10-2021

CHAPTER - 1

1.1 INTRODUCTION

In modern developing world, automobile plays important role especially two-wheeler i.e. (motorcycles & bikes) plays a major role. Even though they are helpful there are some sad events like accidents due to careless of rider. Major accidents occur due to forgetting of lifting side stand. To rectify this problem many advance measures have taken, but they are useless. so, by considering that it should be implemented practically in all type's bikes.

Now a day's there are so many bike users are on the road. Various motorcycle manufacturing companies have competition between them. Due to Increased percentage of biker's accidents percentage also increased, therefore every company try to find cause of accidents and eliminate this cause, however there is one problem, which is unsolved up to the present day. The problem is accident cause due to un-lifted side stand. During driving very time due to early, forget next or any other such reasons, rider forgets to lift the side stand, this is very necessary to have an arrangement in the bike to prevents the accidents.

Some companies try to solve this problem, but they got success in certain extend. The reason behind making any model is to fulfil the requirements of society. Therefore, it is necessary to have a separate attachment, which can be

connected to attach to the bike for automatically lifting the stand and this can be possible with DC motor connected with Arduino in addition, this is easily welded or connected to most of bikes. As we all know that today's generation is quicker. The bikers are always in hurry this will cause bikers will forget to lift the side stand and may cause the accident.

This model is new advancement in bike with the facility to lift the side stand automatically. This will reduce percentage of accidents. This is an easy model that does not affect the original stand position of the bike. This model comes at very less price to apply on the bike. It is easily acceptable in market because of its attractiveness and cheaper price.

1.2 SOURCE FOR ACCIDENTS

While the two-wheelers are concerned accidents occurs due to riding the vehicle in high speed, ignores to use helmets, does not maintain the speed limit and forgets to lift the side stand while riding the vehicles. These are the major source for accidents. Forgetting to lift the side stand causes huge accidents in rural areas partly in urban areas too, because all the other source of accident has preventive measure, but accident due to side stand do not have proper preventive measure. If you see the accident status 36% of the accidents occur due to this problem.

S.NO	DURING THE YEAR	THE REASON FOR THE ACCIDENT	%OF ACCIDENTS
1.	2002-2008	Forgetting to lift side-stand	36%
2.	2002-2008	Does not maintain speed limit	38%
3.	2002-2008	Does not obey traffic rules	22%
4.	2002-2008	Other problems	04%

Table 1.1

1.3 SIDE STAND

A side stand is a device on a bicycle or motorcycle that allows the bike to be kept upright without leaning against another object or the aid of a person. A side stand is usually a piece of metal that flips down from the frame and makes contact with the ground. It is generally located in the middle of the bike or towards the rear. Some touring bicycles have two: one at the rear, and a second in the front.

The side stand plays major roll while the vehicle is in rest position. The side stand is used for supporting a parked Motorcycle it has some disadvantages takes place as while the driver starting the motorcycle, there may be possibility of

forget to release the side stand this will caused to unwanted troubles. then the undistracted stand hitting the ground and affected the rider's control during the turn.

A side stand style side stand is a single leg that simply flips out to one side, usually the non-drive side, and the bike then leans against it. Side stands can be mounted to the chain stay sight behind the bottom bracket or to a chain and seat stay near the rear hub. side stand mounted right behind the bottom bracket can be bolted on, either clamping the chain stays, or to the bracket between them, welded d into place as an integral part of the frame



Fig.1.1 Side Stand

CHAPTER – 2

2.1 LITRATURE SURVEY

2.1.1 ARDUINO

• **Leo Louis**, International Journal of Control, Automation, Communication and Systems (IJCACS), April 2016.

Arduino is an open-source microcontroller which can be easily programmed, erased and reprogrammed at any instant of time. Introduced in 2005 the Arduino platform was designed to provide an inexpensive and easy way for hobbyists, students and professionals to create devices that interact with their environment using sensors and actuators. Based on simple microcontroller boards, it is an open-source computing platform that is used for constructing and programming electronic devices. It is also capable of acting as a mini computer just like other microcontrollers by taking

inputs and controlling the outputs for a variety of electronics devices.

• **Yusuf Abdullahi Badamasi**
2014 11th International Conference on Electronics, Computer and Computation (ICECCO) Year: 2014 | Conference Paper | Publisher: IEEEET

The working principle of an Arduino. These days many people try to use the Arduino because it makes things easier due to the simplified version of C++ and the already made Arduino microcontroller (atmega328 microcontroller [1]) that you can programme, erase and reprogramme at any given time. In this paper we will discuss the hardware components used in the Arduino board, the software used to programme it (Arduino board).

2.1.2 ULTRASONIC SENSOR

• **Stephen Joseph, Mr. K. Edison Prabhu**,
EEE, Nehru Institute of Engineering and Technology,

International Journal of Scientific & Engineering Research, 7- July-2017

Ultrasonic sensor is used in this system. This economical sensor provides 2cm to 400cm of non-contact measurement functionality with a ranging accuracy that can reach up to 3mm. Each HC-SR04 module includes an ultrasonic transmitter, a receiver and a control circuit. There are only four pins on the sensor VCC (Power), Trig (Trigger), Echo (Receive), and GND (Ground). It generates high frequency sound and calculate the time interval between the sending of signal and the receiving of echo. Therefore, ultrasonic sensor can be used to measure distance.

- **Michal Kelemen, Ivan Virgala**, Journal of Automation and Control, 2015, Ultrasonic distance sensors are designed for non-contact distance measurement and these types consist of transmitter and receiver or transceiver which is able to transmit and to receive ultrasonic sound (Figure 1). Main idea is to measure time to fly of ultrasonic sound wave from sensor to detected object. An ultrasonic transmitter sends a sound frequency of above 18 kHz in the air at the speed of 344 meter per second (at 20°C) and the receiver receives the reflected sound from the object. Distance between the transmitter and the object can be calculated by simple calculation by considering the time taken by the ultrasonic wave to travel from transmitter and received back (reflected) by the receiver. Measurement range is up to several meters. Ultrasonic sensors have variety application as distance measurement, obstacle avoiding and anti-collision detection, robot navigation, measurement in automotive parking assistance systems, measurement of air flow velocity - anemometer, medical ultrasonography, non-destructive testing, piezoelectric transducers, level measurement, pallet detection on forklifts, vehicle detection in barrier systems etc

2.1.3 DC MOTOR

- **Ratyusha Biswas Deb**, International Journal of Scientific & Engineering Research, 3-March-2017

The DC motor acts as an energy conversion actuator that converts electrical energy (of source) into mechanical energy (for load). These motors are extensively applied for robotic manipulations, cutting tools, electrical tractions, etc. The torque-speed characteristics of DC motors are most compatible with most mechanical loads. Hence DC motors are always a good ground for advanced control algorithm. The control characteristics of these motors have resulted to their immense use

and hence control of their speed are required. Speed of a DC motor depends on supply voltage, armature resistance and field flux produced by the field current. The methods to control speed of these motors are armature voltage control, armature resistance control and field flux control.

A DC motor is performed by using generalized equation in MATLAB and also analysis of its performance through a speed control using Proportional Integral Derivative controller. Basically, DC motors have some important application like electric traction, robot manipulators, and industrial applications. Due to the simplicity in operation conventional Proportional Integral Derivative controller is used as a control strategy.

- **BREAD BOARD**

- **Ashutosh Bhatt**, Engineers Garage, 23-Sep-2011

A breadboard is a widely used tool to design and test circuit. You do not need to solder wires and components to make a circuit while using a bread board. It is easier to mount components & reuse them. Since, components are not soldered you can change your circuit design at any point without any hassle. It consists of an array of conductive metal clips encased in a box made of white ABS plastic, where each clip is insulated with another clips. There are a number of holes on the plastic box, arranged in a particular fashion. A typical bread board layout consists of two types of regions also called strips. Bus strips and socket strips. Bus strips are usually used to provide power supply to the circuit. It consists of two columns, one for power voltage and other for ground.

- **Emmanuel Odunlade** circuit digest article, 24-Jul-2018

A battery is a collection of one or more cells that go under chemical reactions to create the flow of electrons within a circuit. There is lot of research and advancement going on in battery technology, and as a result, breakthrough technologies are being experienced and used around the world currently. Batteries came into play due to the need to store generated electrical energy. As much as a good amount of energy was being generated, it was important to store the energy so it can be used when generation is down or when there is a need to power standalone devices which cannot be kept tethered to the supply from the mains. Here it should be noted that only DC can be stored in the batteries, AC current can't be stored.

CHAPTER-3

3.1 COMPONENTS

- **Arduino**
- **Ultrasonic sensor**
- **DC Motor**
- **Bread board**
- **Relay**
- **Battery**

3.1.1 ARDUINO

Arduino is a tool for making computers that can sense and control more of the physical

world than your desktop computer. It's an open-source physical computing platform based on a simple microcontroller board, and a development environment for writing software for the board. Arduino can be used to develop interactive objects, taking inputs from a variety of switches or sensors, and controlling a variety of lights, motors, and other physical outputs.

Arduino projects can be stand-alone, or they can communicate with software running on your computer. The Arduino programming language is an implementation of wiring, a similar physical computing platform, which is based on the Processing multimedia programming environment.

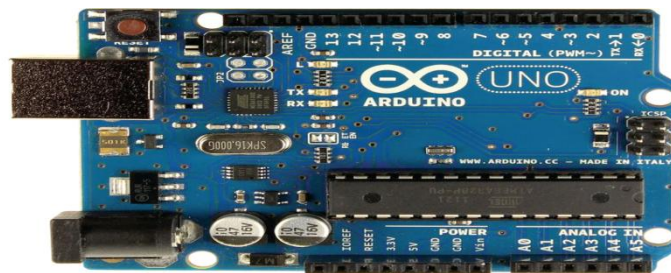


Fig.3.1 Arduino

3.1.2 ULTRASONIC SENSOR

Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound.

Our Ultrasonic sensors, like many others, use a single transducer to send a pulse and to receive the echo. The sensor determines the distance to

a target by measuring time lapses between the sending and receiving of the ultrasonic pulse.

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves.

An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.

High-frequency sound waves reflect from boundaries to produce distinct echo patterns.



Fig.3.2 Ultrasonic sensor

3.1.3 DC MOTOR

'William Sturgeon invented the first DC motor in 1886'. A DC motor is an electrical machine that converts electrical energy into mechanical energy.

In a DC motor, the input electrical energy is the direct current which is transformed into the mechanical rotation.



Fig.2.3 DC Motor

3.1.4 BREAD BOARD

The breadboard is a white rectangular board with small embedded holes to insert electronic components. It is commonly used in electronics projects. We can also say that breadboard is a prototype that acts as a construction

base of electronics. A breadboard is derived from two words bread and board. The word breadboard was initially used to slice the bread pieces. But it was further named as a breadboard for its use in electronics around the 1970s.

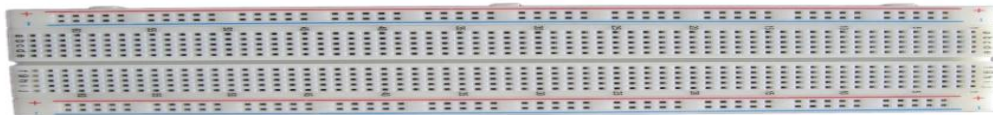


Fig.3.4 Bread board

3.1.5 BATTERY

A 12-volt motorcycle battery is made up of a plastic case containing six cells. Each cell is made up of a set of positive and negative plates immersed in a dilute sulfuric acid solution known as electrolyte, and each cell has a voltage of around 2.1 volts when fully charged. The six cells are connected together to produce a fully charged battery of about 12.6 volts.

A battery uses an electrochemical reaction to convert chemical energy into electrical energy. Let's have a look. Each cell contains plates resembling tiny square tennis racquets made either of lead antimony or lead calcium. A paste of what's

referred to as "active material" is then bonded to the plates; sponge lead for the negative plates, and lead dioxide for the positive. This active material is where the chemical reaction with the sulfuric acid takes place when an electrical load is placed across the battery terminals.

An automotive battery or car battery is a rechargeable battery that is used to start a motor vehicle. Its main purpose is to provide an electric current to the electric-powered starting motor, which in turn starts the chemically-powered internal combustion engine that actually propels the vehicle.

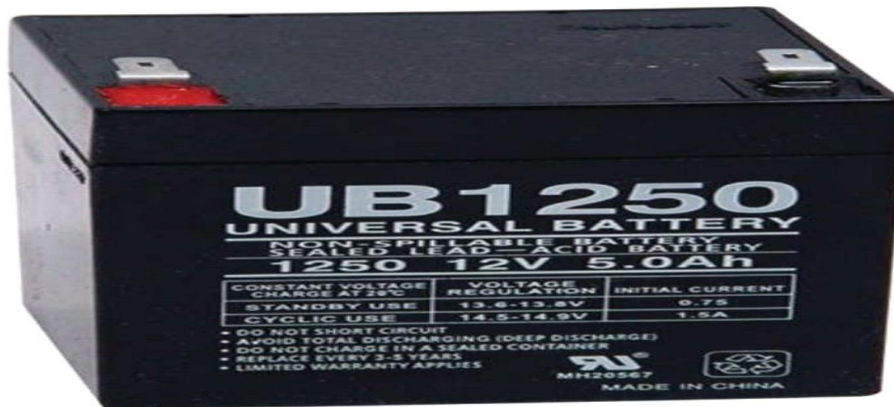


Fig3.5 Battery

3.2 CIRCUIT DESIGN

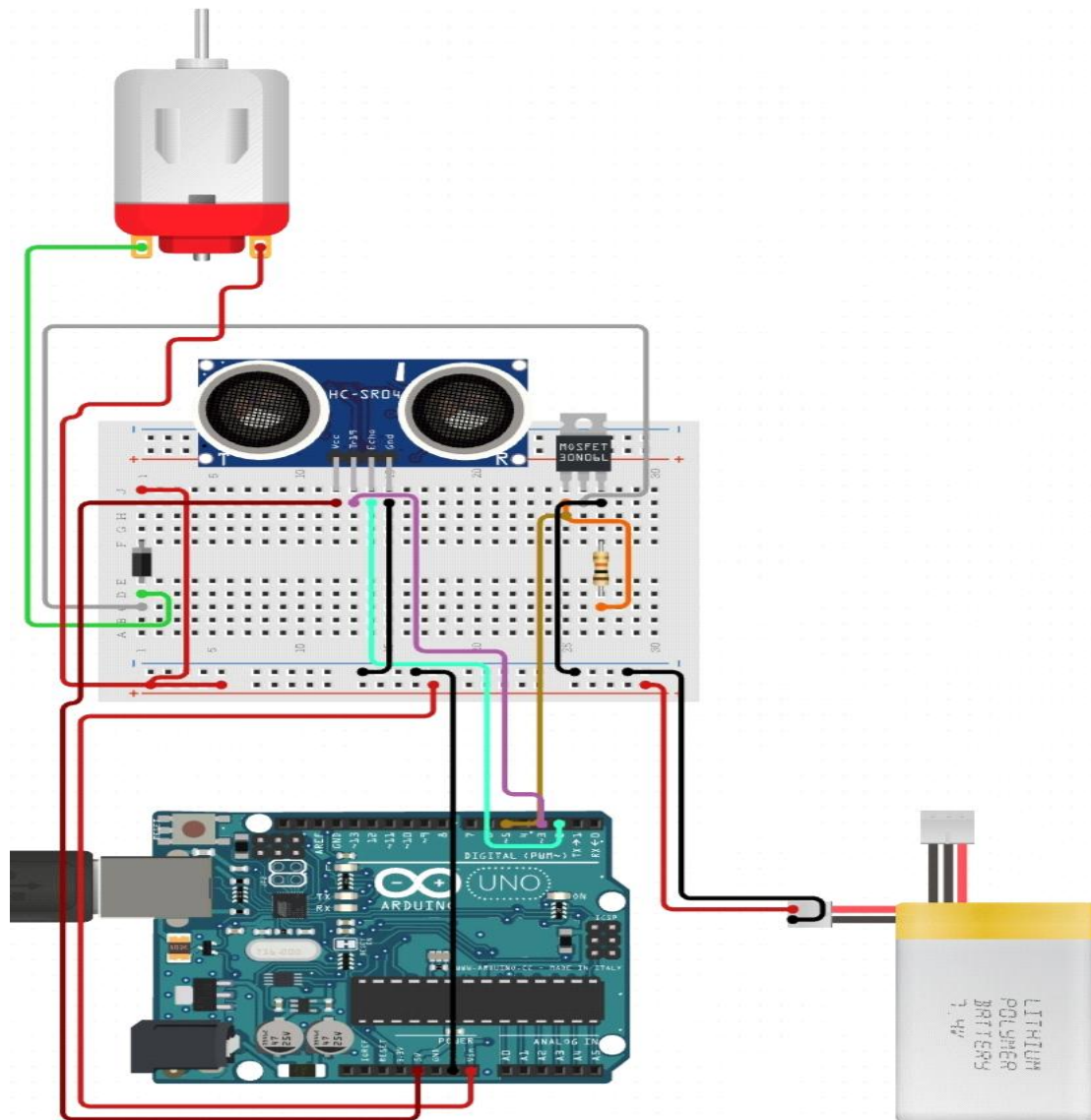


Fig3.6 Circuit

In circuit connections Ultrasonic sensor module's "trigger" and "echo" pins are directly connected to pin 18 (A4) and 19 (A5) of Arduino. A 16x2 LCD is connected with Arduino in 4-bit mode.

- The Ultrasonic Sensor's **VCC** pin that's connected to the Arduino's 5V.
 - The Ultrasonic Sensor's **TRIG** pin which is connected to the Arduino's PIN 9.
 - The Ultrasonic Sensor's **GND** pin that's connected to Arduino's GND.
 - The Ultrasonic Sensor's **ECHO** pin that's connected to the Arduino's PIN 8.
 - Connect 2 LEDs that have a 220ohm that are connected to the PIND3 and PIND12 of the Arduino module.
 - You should also consider connecting the Ultrasonic sensor directly to the Arduino using jumper wires.
 - You must never place the sensor on a metal surface to avoid a possible short circuit which might burn and destroy the sensor.
 - It's best to place the electrical tape on the sensor's backside.
- Once you're done making the connection between the DC motor and I293IC to the Arduino WIFI module, you need to:
- Connect 5V to VSS, Enable 1 as well as Vs on the L293D IC.
 - Connect the digital output pins (PIN 10 and 11) on the L293D IC's input 1 and input 2.

- Connect output 1 and 2 (**pin 3 and pin 6**) belonging to the L293D IC to the DC motor wires.
- Connect the Arduino's **GND** to two of the GND pins located on the exact side of the L293D3 IC.

After making sure all these connections are as required, proceed to add to your board an external power supply.

CHAPTER-4

4.1 Existing side stand safety

Now a days two wheelers are used very often for commuting. While driving a two-wheeler safety of the driver is very important. Most of the two-wheeler accidents occur due to improper positioning of side stand while riding the two-wheeler. It is mainly due to the lack of awareness of the driver that the side stand is not properly positioned. S.I.M.A (Side Stand Ignition Monitoring Alarm) system is designed to indicate the driver that the side stand is not properly set. This project is mainly designed for Hero Honda Splender Pro which is a very popular and highly used vehicle. The design part of S.I.M.A. System involves the change in the ignition circuit and the modification in the ignition circuit. In Splender Pro, the whole ignition circuit set up is located in the head of the bike. From this location, the circuit flows throughout the bike with many other circuits such as the indicator, lamps and the self-start. The circuit that has been drawn based on the S.I.M.A.



Fig.4.1 S.I.M.A system

4.2 METHODOLOGY

It is a sensor-based automation project. Sensor is used to detect the object for operating the DC Motor. DC Motor is powered by the battery and the relay transmits the power. Self-start is turned ON by a person during the ignition process and the battery gets ready, now the DC Motor is powered.

power supply and the joined side stand is retrieved.

Now the ultrasonic sensor has detected the object and is sensing. Then it sends a signal to the Arduino and the relay stops the DC motor.

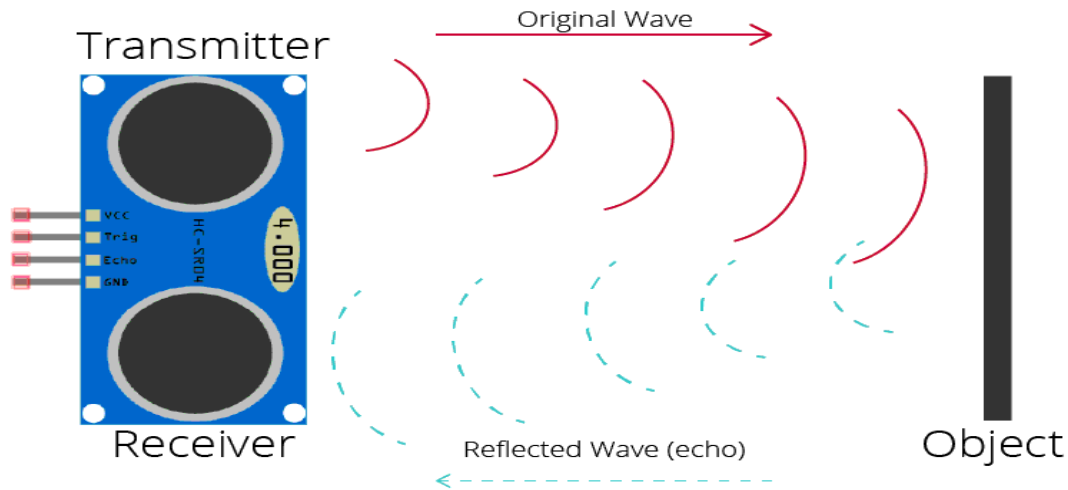


Fig.4.1 Ultrasonic Sensor working

- Power Supply: +5V DC
- Quiescent Current: <2mA
- Working Current: 15mA
- Effectual Angle: <15°
- Ranging Distance: 2cm – 400 cm/1" – 13ft
- Resolution: 0.3 cm
- Measuring Angle: 30 degrees.

- ARDUINO -
- ULTRASONIC SENSOR -
- DC MOTOR -
- BREAD BOARD -
- RELAY -
- BATTERY -
- CIRCUIT WIRING -
- TOTAL -**

COST OF PROJECT

OBSERVATION OF WORKING

OBSERVATION NO	TIME (IN MILLISECOND)
1	923
2	934
3	929
4	923
5	925

6	932
7	930

Table. Reading Of Side Stand Retrieving Time

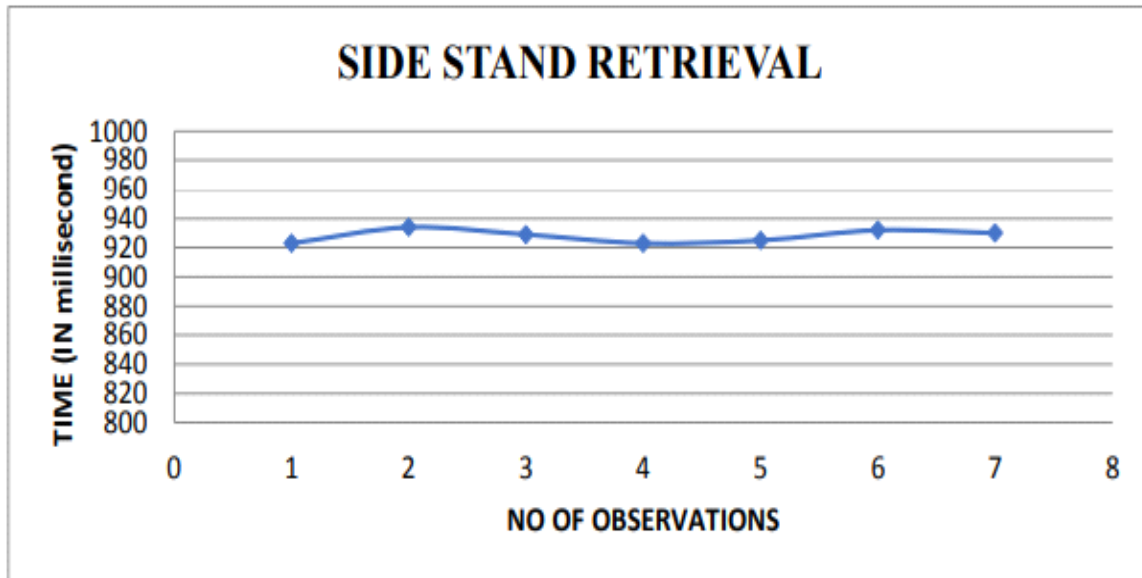


Fig. Graph Showing Side Stand Retrieval Time

Side Stand Damage Report

In last three months around 60 to 70 side stands are serviced at company. All these services are almost our careless to not retiring the side stand by manually. Damages in spring, welding, bending, etc.,

- Gather information from Mr. S. R. KARTHICKRAJ. B.E., MBA., Service Adviser, Hero Sale and Service, Mayiladuthurai.

CONCLUSION

The “AUTOMATIC SIDE STAND RETRIEVAL SYSTEM”, if integrated properly with the existing vehicles will be of great use. The problem of accidents related to side stands can be completely solved. Also, this system serves to be of major convenience for the user, and making something more convenient has been a major motivation behind all the inventions in human history, the mechanism of the project doesn't interfere with the working mechanism of the engine

and hence the efficiency of the engine is not compromised. This idea can be taken to new levels if more sophisticated design and more sensitive equipment are used.

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