

## DESIGN OF AUTOMATIC MOTORBIKE STAND SLIDER

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**Abstract** - In this modern developing world, automobiles plays a very important role especially motorcycles and bikes. These are mainly used for travelling from one place to another. Even though they are helpful in many ways there are some sad events such as accidents mostly due to carelessness of rider. Many of the accidents occur because of not lifting the side stand. To solve this problem many advance measures has been taken, but they are useless. So, by keeping all this in mind that it should be implemented practically in all types of bikes. The AUTOMATIC SIDE-STAND SLIDER is to be designed based on the working principle of bikes. As all type of bikes transmit power from engine to rear wheel through chain drive. Since the present design setup is to be placed in between of the chain drive, then sprocket rotates and then the side stand retrieves automatically. This automation is extremely useful at the time of parking. This is the only method and may be suitable for various types of two wheeler vehicle. The present design consists of sensors, regulators and relay switches which are connect to a Micro-controller called Arduino UNO. There is no requirement of any additional energy source as the designed system uses the necessary power from the motor bike battery.

**Key Words:** Manual side stand, Automatic side stand, Lever mechanism, Arduino pro mini.

### 1. INTRODUCTION

The early history of the automobile are often divided into variety of eras, supported the prevalent means of propulsion. Later they were defined by the trends in styling of the exterior, body size, and utility preferences. In 1768, the primary steam powered automobile capable of human transportation was built by Nicolas-Joseph Cugnot In 1807 François Isaac de Rivaz designed the primary car powered by an indoor combustion engine fuelled by hydrogen. In 1886, the primary petrol or gasoline powered automobile was invented by Karl Benz this is often also considered to be the primary "production" vehicle as Benz made several other identical copies. At the turn of the 20th century electrically powered automobiles appeared but only occupied a distinct segment market until the turn of the 21st century. In times the living status were developed and developing more equipped. The automobile takes an excellent part within the development, since it plays one among a serious key in lifestyle. An automobile (or automotive) may be a vehicle that's capable of propelling itself. Since seventeenth century, several attempts are made to style and construct a practically operative automobile.

The side stand plays an important role while the bike or motorcycle is in rest position. The side stands works as a support for a parked vehicle. It has some disadvantages takes place as while the driver starting the motorcycle, there may be possibility of forget to release the side stands this may caused to unwanted troubles. Then the undistracted stand hitting the bottom and affected the riders control during the turn.

There are number of reasons for the accidents caused, internally and externally. Ignores to use helmets, doesn't maintain the regulation and forgets to lift the side stand while riding the vehicles. Forgetting to lift up the side stand is one among the explanations and it might be avoided by certain technical aspects. 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 opposite source of accident has precautions, but accidents due to side stand don't have proper precautions.

In order to scale back accidents due to carelessness in lifting the side-stand, many advance measures are introduced like ECU, the fashionable ECU contains a 32 bit and 40 MHz processor. It will be fast as PC's microprocessor. The Electronic Control Unit (ECU) decides timing and functioning of engine and its parts. This play its role in dashboard, this means the gear shifting, side stand, to wear helmet in alphanumeric display E.g., Hero Honda's Karizma ZMR. But the people ignore to concentrate those indicators and safety rules. So for safe guard many mechanical projects are found to retrieve the side stand automatically.

### 2. LITERATURE REVIEW

Bike Side Stand Unfolded Side Lock Link is the work of Sanjeev N K. In this system the side stand lock link makes the contact with the gearshift thereby indicating the person handling the vehicle about the unreleased side stand when the rider tries to use the gear in unreleased state of stand and stop him from being endanger or to possess unsafe ride of motorbike . The bike side stand unfolded side lock link for two- wheeler is one among the life saving mechanism which prevents the ride from riding the bike in unreleased position of the ride stand. This prevent rider also the vehicle to lose the centre of gravity by imbalance or surface hindrance thanks to retracted position of side stand and thereby saves life of the rider. The developed side stand lock link are often fitted to any motorcycle with slight dimensional changes within the link.

Vishal Srivastava et al. used sensor and micro-controller unit to lift the side get up. A speed sensor is mounted on the

front wheel and therefore the motor works consistent with the signals send by it to interact and disengage the side stand. This process has the same problem of retrieving of side-stand when the bike comes to neutral gear in signal lights, since the wheel won't move. The working of side-stand supported by start button control or speed sensor control isn't clearly discussed here.

Amit Singh et al. have designed a side stand lifting mechanism supported by the key on position of the motor bike. If the key's turned on, the side stand is going to be lifted. But the scenario of retrieving the stand isn't discussed here. Also if a child accidentally activates the key, the side stand is going to be lifted and motor bike will fall down. So, accompanying of these problematic situations, this research work administered and resulted in an improved system.

According to the data provided by World Health Organization, in 2013 alone there were more than 286,000 deaths that were caused by road accidents. In India 20% - 22% of bike accidents occurred because of not lifting the side-stand while riding the bike. Selvendran et al provided a detailed survey about deaths caused from motorbike accidents from 2012-15 and 36% of total accidents caused by not lifting the side stand while riding. The detailed percentages are mentioned below.

Sl. no	Year	Reason for accidents	% of accidents
1	2012-15	Forgetting to lift side-stand	36%
2	2012-15	Doesn't maintain speed limit	38%
3	2012-15	Doesn't obey traffic rules	22%
4	2012-15	Other reasons	04%

Table-1: Reasons for accidents and their percentages.

### 3. OBJECTIVES

- The main objective of our project is to supply a security measure in bikes to avoid unwanted accidents and damage caused by not lifting off the side stand by providing automated side stand lifting system.
- Here we propose a concept for automatic side stand which is totally mechanical and electronic circuit and without using any external power.
- To study the method of fabrication side stand removal system.
- To fabricate according to selected method.
- To study the future implementation on the system.

- Making the total prototype as cost-effective as less expensive as possible.

## 4. METHODOLOGY

### I. COMPONENTS USED

COMPONENTS	SPECIFICATIONS
Arduino pro mini	AT mega 328
Inductor	LED 2.2V,20mA
Buzzer	5V, 200mA
Limit switches	SPDT
Motor	12V,17W,24Nm
Motor Control drive	12V,15A, H-Relay bridge
12V to 5V converter	LM7805,1A
Ignition switch	2 Position, 4 wire
10k resistor	10kV, 1W
Current sensor	ACS 712,30A

Table-2: Components used.

The pictures of the used components are given below:

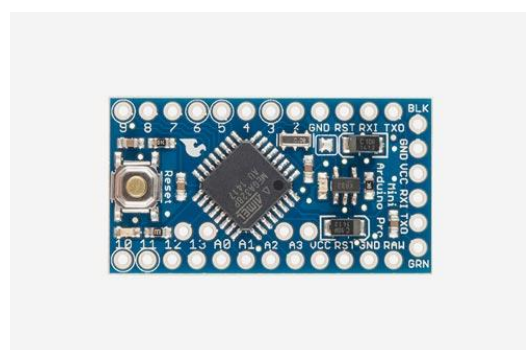


Figure 1: Arduino pro mini.



Figure 2: Inductor and 10k Resistor.

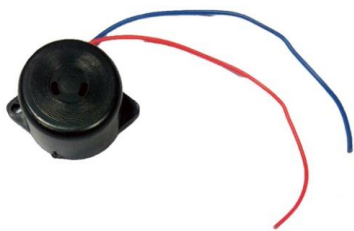


Figure 3: Buzzer.



Figure 4: Limit switch & Motor.

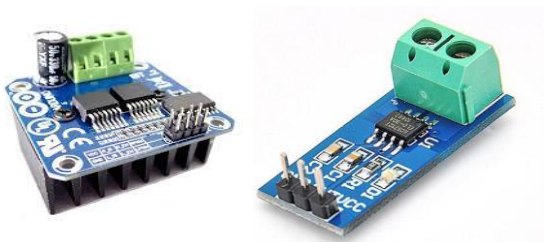


Figure 5: Motor control drive & Current sensor.



Figure 6: 12V to 5V converter & Ignition switch.

## II. MECHANISM AND WORKING

The proposed automatic side stand slider for the motorbikes has two major components, a mechanical design & an electronic control. To put this in other words control the normal bike side-stand by micro-controller through programming the Arduino board is discussed here.

Figure 7 shows the circuit diagram for the design set up. One of the limit switch is fixed at upside of the side-stand and another one is fixed at the bottom of the side-stand. By these limit switches, the Arduino pro mini get the signal. Also the signal sent by the ignition switch to the Arduino pro mini through 10K resistor. Using converter, current is reduced from 12V to 5V, because the micro-controller (Arduino pro mini) requires 5V for its working. Arduino pro mini process the signals given to it by the code and processed signals are sent to the current sensor, motor control drive, indicator and to buzzer. The items used and their specifications are mentioned in table-2.

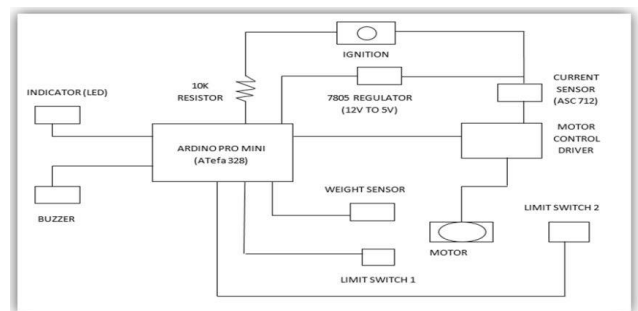


Figure 7: Circuit Diagram.

If the switch is turned ON, the signal is given to the micro-controller by the 10K resistor. According to the written code, the input signals are processed and output is going to be given to the control driver. The control driver will ON/OFF the motor & modifies the rotational direction of the motor shaft base on whether or not to lifting up or retrieving the side-stand. The side stand is programmed to be lifted up once the motor bike key is turned on. If the side stand goes to the upper limit, the upper limit switch sends the signal to the Arduino pro mini. Consistent with the coding and command, the motor will shut down and further lifting the stand is prevented.

If the switch is off, the side-stand retrieve to bottom level and connect with lower limit switch. In the same way, after connecting with limit switch, the motor is turned OFF automatically and further movement of side-stand is prevented. If there is any disturbance on the way of lifting-up or retrieving the side-stand, the motor is turned OFF automatically and the buzzer rings an alarm. More power is required to lift the side stand, if there is any hindrance on the way of lifting-up or retrieving down. It needs more volts and

amps to complete that certain task. If this current exceeds the prescribed limit supported the coding, the motor is turned OFF automatically and therefore the buzzer rings an alarm and indicates the user by LED light. Since 7805 regulator can act as a step down transformer, it's wont to convert 12V motor bike battery voltage into 5V system operating voltage. Excess voltage may damage the system. Once after fixing the regulator, the power in wire can be connected to the battery directly. So, there will not be any other changes in the electrical system after installing this new device with existing system. Safety of the new attachment is another concern. The new system must be resistant to water. As the side-stand is in bottom part of the bikes, there is high possibility of getting wet in rainy days. It is obvious that the system won't work properly under such situation. All the electronic accessories are placed in a separate box and kept under the seat to eliminate the above mentioned problem. If the system did not work due to any problem, it might be indicated by an indicator light and an alarm sound. The system must be reset under such circumstance. Turn off and switch on the beginning key within few seconds is how the reset is programmed. If it's not working even after resetting, as like other systems during a vehicle, the assistance of a technician is required. In case of emergency, as like normal motor bikes, the side stand are often lifted up and retrieved back manually.

**III. DISADVANTAGES OF EXISTING SIDE-STANDS**

- Accident prone.
- Maximum Fatigue.
- Only indicate the position.
- Expensive To be imported – (Fully Automatic Stands)
- It is not suitable for auto transmission vehicle.

**IV. ADVANTAGES OF PROPOSED SYSTEM**

- It is easily installed.
- It is rigid versatile.
- It is low cost application.
- Near about less maintenance.
- It is light in weight.
- Electrical supply not required.
- It does not affect the structure of a vehicle.

**5. RESULT & OBSERVATIONS**

The side stand of the motorbike will be lifted up if both the conditions - turning the key on and rider sit on the seat are fulfilled. In the similar way the stand is going to be retrieved, if both the conditions key off and weight is taken off the seat are fulfilled. The required conditions for the working of the side stand are given below in table 3. The system won't work

if any of the condition is missed. And also if any resistance is detected while the motor is working, the system automatically switches off. Usage of sprocket, gear system or speed sensor to attain the automated functioning of side stand isn't recommended during this research work.

The observations are mentioned in the table below:

CONDITIONS	OUTPUT
Key on and weight on the seat	Side stand will be lifted up
Key off and no weight on the seat	Side stand will be retrieved
Key on and no weight on the seat	No movement of side stand
Key off and weight on the seat	No movement of side stand

**Table-3:** Observations and Results.

**6. CONCLUSION**

- Not only lifting up of side stand while start riding the motor bike, but also retrieving it to the normal position once it stopped is designed here.
- Along with the turn on/off of the motor bike key, another condition is introduced to ensure that motor bike is moving only when the rider is on the seat.
- Usage of speed sensor is uninvolved. The speed drops to zero when traffic light is red and there is no requirement to retrieve the side stand at that moment.
- It can be installed to any kind of motor bikes irrespective of the gear system, since it works on sensor and not connected to the gear system or sprocket.

**7. FUTURE SCOPE**

The present project can be alternated by using speed sensor. The KMI 15/X and KMI 16/X is magneto resistive sensor modules with an integrated signal conditioning electronics to provide a simple and cost effective solution for rotational speed measurement .Due to their compact design-in and therefore time to market dis-significantly reduced. The KMI sensor modules consist of the magneto resistive sensor element, a permanent magnet fixed to his sensor and the integrated signal conditioning circuit designed in bipolar technology.

It is applicable to all type of two-wheeler whether it is costly or cheaper motorbike. In future there is a possibility for

some advanced modifications basis of the sensors and more. In this project, we dealt with the mechanism of lifting off the stand in the very smooth way. Possibly within the future, to stop deaths and injuries caused by motor bike accidents, airbag system could be installed as like in other vehicles.

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