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Automatic Side Stand

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Abstract— The side stand is used for supporting a parked motorcycle. If the rider may forget to retract the side stands before riding, then the undistracted stand hitting the ground and affected the riders control during the turn. Now a day's sensor are used for ensure that the stand is in released condition. The motorcycle side stand consists of a metallic rod and helical spring which is offset from the centre. Some side stand retract automatically when the motorcycle is lifted up the support some other are fit with electrical interlocks , warning devices or special retracting mechanism. In this paper there is possibility to reduce the evident which is takes place by the side stand. Side stand in two wheelers function the entire weight of the vehicle when it is parked. They are perfect on quick stop when one need to leave the vehicle for short while. They are provided with the spring that pulls it back into position to ensure extra safety. The presented mechanism consists of D.C. motor powered by motorcycles battery. Connected to the worm and worm gear mechanism for reduction of speed of motor and multiply the torque. The motor is actuated by the Rotation sensor which is mounted on the front of the wheel.

Keywords- D.C.

I.INTRODUCTION

In all over world everywhere motorcycle are used. The side stand plays major roll while the vehicle is in rest position. But 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.
This is a new type of side stand which is automatically retracting the side stand through some mechanical and electronic arrangement. In this system microcontroller, speed sensor, dc battery is used. Through the speed sensor, sensor sense the rotation of the wheel and sends the signal to the microcontroller which is actuate the dc motor which is caused the disengage the stand from the road.
A motorcycle side stand is nearly universal method of allowing a motorcycle rider to park his vehicle easily. If this stand is in the park position while the motorcycle is ridden through left turn a serious hazard exists. A new type stand side stand which is automatically retracting side stand is invented to prevent such type of accidents. Side stand mounted behind bottom bracket and can be bolted on either clamping the chain stays, or welded in to place as an integral part of the frame.
The motorcycle side stand consists of steel rod held in both park and stopped position by an over centered spring. It is to provide the stand stability and a support to the motorcycle.
Many side stand designs, attachments, mechanisms and rider warning system. Some side stand retracts automatically when the motorcycle is lifted off the support. Some retract if they contact the ground when the motorcycle is moving. Many different concepts have been applied for this hazard.

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II.COMPONENT OF SYSTEM

1) Battery
2) DC motor
3) Push button
4) Microcontroller
5) Side stand
6) Relay
7) Speed sensor

Dry cell Battery -
A dry cell uses a paste electrolyte, with only enough moisture to allow current to flow. Unlike a wet cell, a dry cell can operate in any orientation without spilling, as it contains no free liquid, making it suitable for portable equipment. By comparison, the first wet cells were typically fragile glass containers with lead rods hanging from the open top and needed careful handling to avoid spillage. Lead–acid batteries did not achieve the safety and portability of the dry cell until the development of the gel battery. A common dry cell is the zinc–carbon battery, sometimes called the dry Leclanché cell, with a nominal voltage of 1.5 volts, the same as the alkaline battery (since both use the same zinc–manganese dioxide combination). A standard dry cell comprises a zinc anode, usually in the form of a cylindrical pot, with a carbon cathode in the form of a central rod. The electrolyte is ammonium chloride in the form of a paste next to the zinc anode. The remaining space between the electrolyte and carbon cathode is taken up by a second paste consisting of ammonium chloride and manganese dioxide, the latter acting as a depolarizer. In some designs, the ammonium chloride is replaced by zinc chloride.

D.C. Motor -
DC motor is designed for two speed operation. It consists of three brushes namely: common, low speed, high speed. Two of the brushes will be supplied for different made of operation. The DC motor does not oscillate back and forth, it rotates continuously in one direction like most others motors. The rotational motion is converted to the back and forth wiper motion by a series of mechanical linkage. This type of motor is called a gear head or motor end has advantage of having lots of torque. The dc motor works on 12volt D.C. battery.

Powering the motor -

Voltage- the standard voltage requirement for the motor is 12v DC. The electrical system in a running automobile usually puts out between 13 and 13.5 volts, so it's safe to say the motor can handle up to 13.5 volts with no problem. I wouldn't recommend any voltages higher than that.

Current -

The minimum required current for the motor is 1.6 amps 70 rpm, 0.9 amps at 41 rpm. These current ratings are for the motor spinning with no load. As you add mechanical load, these numbers can increase dramatically, doubling or even tripling under a heavy load. This factor must be taken into account when selecting a power supply. Since the motor will only use what it needs when it comes to current, it's best to provide a source with a higher current rating than you think you might need.

Switch Button -

In electrical engineering, a switch is an electrical component that can break an electrical circuit, interrupting the current or diverting it from one conductor to another.

The most familiar form of switch is a manually operated electromechanical device with one or more sets of electrical contacts, which are connected to external circuits. Each set of contacts can be in one of two states: either "closed" meaning the contacts are touching and electricity can flow between them, or "open", meaning the contacts are separated and the switch is nonconducting. The mechanism actuating the transition between these two states (open or closed) can be either a "toggle" (flip switch for continuous "on" or "off") or "momentary" (push-for "on" or push-for "off") type.

A switch may be directly manipulated by a human as a control signal to a system, such as a computer keyboard button, or to control power flow in a circuit, such as a light switch. Automatically operated switches can be used to control the motions of machines, for example, to indicate that a garage door has reached its full open position or that a machine tool is in a position to accept another workpiece. Switches may be operated by process variables such as pressure, temperature, flow, current, voltage, and force, acting as sensors in a process and used to automatically control a system. For example, a thermostat is a temperature-operated switch used to control a heating process. A switch that is operated by another electrical circuit is called a relay. Large switches may be remotely operated by a motor drive mechanism. Some switches are used to isolate electric power from a system, providing a visible point of isolation that can be padlocked if necessary to prevent accidental operation of a machine during maintenance, or to prevent electric shock.

An ideal switch would have no voltage drop when closed, and would have no limits on voltage or current rating. It would have zero rise time and fall time during state changes, and would change state without "bouncing" between on and off positions.

Practical switches fall short of this ideal; they have resistance, limits on the current and voltage they can handle, finite switching time, etc. The ideal switch is often used in circuit analysis as it greatly simplifies the system of equations to be solved, but this can lead to a less accurate solution.

Microcontroller -

A **microcontroller** (sometimes abbreviated **µC**, **uC** or **MCU**) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications. Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems.

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 "smaller, more convenient" kickstand was developed by Joseph Paul Treen, the father of former Louisiana Governor, Dave Treen. A kickstand 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 bikes have two: one at the rear, and a second in the front.

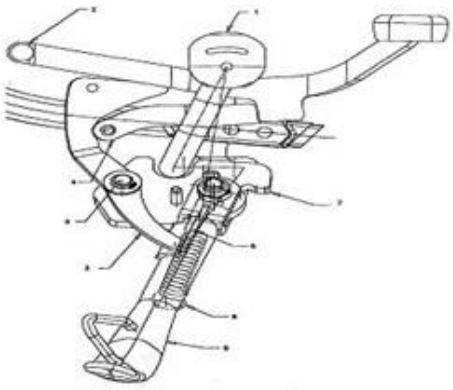

Fig 2.2 - Side stand

A side stand style kickstand 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 stays right behind the bottom bracket or to a chain and seat stay near the rear hub. Side stands mounted right behind the bottom bracket can be bolted on, either clamping the chain stays or to the bracket between them, or welded into place as an integral part of the frame.

Speed sensor -

The KMI 15/X and KMI 16/x are magneto resistive sensor modules with an integrated signal conditioning electronics to provide a simple and cost effective solution for rotational speed measurements. Due to their compact design, they are simple to design-in and therefore time-to-market is significantly reduced.

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The KMI sensor modules consist of the magneto resistive sensor element, a permanent magnet fixed to this sensor and the integrated signal conditioning circuit designed in bipolar technology. Compared with other sensing techniques, the magneto resistive technology has a number of practical advantages such as:

- Wide air gap due to high basic sensitivity of the magneto resistive effect
- Wide operating frequency range, including zero speed detection
- Insensitive to vibration
- Wide operating temperature range

Relay -

A **relay** is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching.

IIISTEP INVOLVED FOR MAKING AUTOMATIC SIDE STAND FOR TWO WHEELER-

STEP1 - CONSTRUCTION OF FRAME

Firstly we are made a general layout of side stand frame according to dimension given in present time of two wheeler. for making frame, we are used mild steel rod and with the help of manufacturing process be prepare a rectangular frame the manufacturing process include for making side stand frame are cutting, welding , grinding ,and super finishing .this figure shows the mild steel rod for making side steel frame.

STEP 2 - MAKING PLATE FOR PIVOTED SIDE STAND FROM FRAME

In this stage we are made plate on which side stands are pivoted. The dimension of this plate is given according to motorcycle specification. The plate consists of hole for bolted the side stand and a upper hook are welded to connect the one end of the spring. This plate is welded with the frame inclined to the frame axis.

STEP 3 – MAKING A TENSION SPRING

In this step we take a spring wire and with the help of lathe machine we form a tension spring. The material of the tensile spring is stainless steel. After lab test we found the stiffness of spring. 1.732 N/mm.

STEP 4 – MAKING A MECHANICAL BUSH

In this step we make we make a mechanical bush from a solid rod of stainless steel with the help of of the lathe machine. Firstly we have done turning operation for finding the desire dimension and after that we have made a hole with the help of drill bit. The main function of mechanical bush is to connect the motor shaft to the pivoted bolt of side stand.

STEP 5-FINAL ASSEMBLY

In this step all the component of side stand are assembled in proper manner.

the presented mechanism consist of a D.C motor powered by motorcycle's battery ,connected to the side stand through a worm and worm gear mechanism to gain speed reduction of motor and multiply the torque . The motor is actuated by the sensor mounted on the front wheel through the microcontroller. A presser switch is also mounted on the stand bracket to sense full disengagement of stand. When the vehicle starts moving the sensor on front wheel sends a signal to the microcontroller to actuate the motor causing them to move disengaged position. When the stand is fully disengaged it presses the pressure switch which again sends a signal the microcontroller which stops the motor.

Fig 3.1-final assembly

IV.SYSTEM ANALYSIS

Calculation -

Wire diameter = 3 mm = 0.003 m
Coil outer diameter (d) = 27 mm = 0.027m
Coil inner diameter = 21mm = 0.021m
No. of coils (n) = 17
Free length of spring (L) = πdN
3.14x0.027x17=1.44126 m
Span weight = 0.056+0.400 kg
= 0.456 kg
$F = K \times X$
F = 1.732x1.21536
F = 2.105 N

TORQUE –

T = FXR
T =2.105X0.11
T =0.2315 N-m
Torque due to stand weight
Stand weight = 400 gm
Spring weight = 56 gm
Combined weight of spring and stand = 400+56 gm
= 0.456 kg
Force due to stand weight =

$mg \sin\theta = 0.456x9.81x\sin 50^0$
= 3.4267 N
Torque due to stand weight
= F x R
= 3.4267x0.11
= 0.3769471

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Total torque (T_a)
= 0.2315+0.376947
= 0.6087 N-m

V.CONCLUSION

We observe that from the design and analysis D.C motor and other component like as microcontroller and speed sensor ,switch are occupies less space and this space is easily available into the mechanical frame of the motorcycle . After analysis of torque the required torque to raise the side stand is 6076 N-m. So after calculation of torque we determined the power required to raise the side stand which is 19.078 Watt. So we design automatic side stand for maximum frictional torque. Hence we used 12V DC geared motor which draws 2 amp current and 24W power.

Automatic stand is presently in use and quite successful. Although it has certain disadvantages.

1) When the rider pushes the button then the kick stand is disengage from the road.
2) And secondly the stand is not engage with road by the use of push button.

We are working to remove this two disadvantages. For removing these two disadvantages we use the speed sensor and microcontroller and push button, when bike take some RPM then the sensor sense the signal and sends to the microcontroller and according to the C programming the microcontroller actuate the DC motor, and the dc motor automatically disengage the side stand from the road.

Through this arrangement the both disadvantages are removed.

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