MOTORCYCLE SAFETY STAND

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JABATAN KEJURUTERAAN MEKANIKAL

JUN 2020

POLITEKNIK SULTAN SALAHUDDIN ABDUL AZIZ SHAH

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DEPARTMENT OF MECHANICAL ENGINEERING

DECLARATION OF ORIGINALITY AND COPYRIGHT

TITTLE :MOTORCYCLE SAFETY STAND

SESSION : JUNE 2020

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ACKNOWLEDGEMENT

It is always a pleasure to remind several individuals for their sincere guidance throughout completing our final year project.

First of all, thanks to our academic advisor Madam Sharniza Azwin Binti Yahya for guidance, care, helpful information and practical advice throughout our journey of obtaining a Diploma at Polytechnic.

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Thirdly, I also want to express my deepest thanks to all the lectures and supporting staff of the polytechnic that we meet throughout our time in the polytechnic. Their guidance and assistance have played major role in furnishing us with the essential knowledge and skills to take on this project.

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Finally I apologize all other unnamed who helped us in various ways to complete our project.

ABSTRACT

The scope of this study is to develop a motorcycle safety stand in order to reduce the risk of accident. In motorcycles, the side stand plays a major role while the vehicle in rest condition. One of the causes of the accidents is self-neglect where it might bring injury or fatality to the rider while they are on the road. The thing is from motorcycle side stand, which is most of the time rider tend to not pull up their side stand after they stopped riding for a while. Hence, this innovation aim to create a next level safety stand where it can pull up automatically when turn on the motorcycle. The way to develop this product by install all the electronic components such as relay module, arduino uno and limit switch on electronic board, then we connect it to the battery, key and DC motor. Finally DC motor will lift the side stand. This project is possible to reduce the neglect of accident. Future recommendation for this product is by putting an alarm sensor on the side stand whenever the side stand is not lift up when the key is turn on.

Keywords : side stands, motorcycle, accident, self-neglect

ABSTRAK

Skop kajian ini adalah untuk mengembangkan tongkat sisi pintar motosikal untuk mengurangkan risiko kemalangan. Pada motosikal, tongkat sisi memainkan peranan utama semasa kenderaan dalam keadaan rehat. Salah satu penyebab kemalangan adalah kelalaian diri sendiri di mana ia boleh membawa kecederaan atau kematian kepada penunggang semasa mereka berada di jalan raya. Punca masalahnya adalah dari tongkat sisi motosikal, dimana penunggang motosikal cenderung untuk tidak mengangkat tongkat sisi mereka setelah mereka berhenti untuk sementara waktu. Oleh itu, inovasi ini bertujuan untuk mewujudkan tahap keselamatan yang lebih maju dan pintar di mana ia boleh terangkat secara automatik semasa menghidupkan motosikal. Cara untuk mengembangkan produk ini dengan memasang komponen elektronik seperti modul relay,
arduino uno dan had suis pada papan elektronik, kami menyambungkannya ke bateri, kunci dan motor DC. Akhirnya motor DC akan mengangkat tongkat sisi. Ini projek bertujun untuk mengurangkan kemalanganyang disebabkan kelalaian penunggang motosikal. Cadangan untuk memperbaharui produk ini adalah dengan meletakkan sensor penggera di tongkat sisi, pabila
tongkat sisi tidak diangkat semasa kunci dihidupkan pengera akan berbunyi.

Kata kunci: tongkat sisi, motosikal, kemalangan, kelalaian diri

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CHAPTER 1

INTRODUCTION

1.1 Project definition

This problem may be rectified by releasing the side stand when the gear shifting. Because while gear shifting time the leg is in safe and comfortable place. This can be achieved using spring force.

Sustained economic growth have led to rapidly increasing motorized vehicles in Malaysia. There were 28,181,203 registered vehicles in Malaysia in 2017. Vehicular composition and patter of category wise growth rates have revealed the preferences of road users for personalized means of transport over public road transport. The increase in personalized means of transport and declined in share of public transport have significant implication on traffic congestion and safety.

The early history of the automobile can be divided into a number eras, based on the prevalent means of propulsion. Later periods were defined by trends in exterior styling, size, and utility preferences. Today, Motor cycles are used all over the world. Designs should design each and every component in two wheeler with very at most safe and the product should be economical. In motorcycles, the side stand plays major role while the vehicle is in rest condition. While the driver starting the motor cycle, they may be a

possibility of release the side-stand. This will lead to unwanted troubles. To avoid this driver has to ensure that the side stand is released.

This problem may be rectified by releasing the side stand when the gear shifting. Because while gear shifting time the leg is in safe and comfortable place. This can be achieved using spring force.

Sustained economic growth have led to rapidly increasing motorized vehicles in Malaysia. There were 28,181,203 registered vehicles in Malaysia in 2017. Vehicular composition and patter of category wise growth rates have revealed the preferences of road users for personalized means of transport over public road transport. The increase in personalized means of transport and declined in share of public transport have significant implication on traffic congestion and safety.

1.2 Problem statement

From the observation, most motorcyclist forget to lift up their side stand after stop for a while due to self neglect. Mostly the increase in the number of the motorcycle accidents is caused by negligence. Next, motorcycle safety stand will keep the side stand lift up while the motorcycle is turn on. This will avoid the motorcyclist forget to lift up their side stand and reducing the number of the motorcycle accidents.

1.3 Objectives

This research embarks on the following objectives:

a) To design and develop a smart side stand to help motorcyclist reduce the risk of an accidents.

b) To create a smart stand where it can pull up automatically when turn on the motorcycle.

1.4 Scope of project

The Scope and limits to this research are:

i. The side stand could not work properly if the motorcycle's battery is weak and one of the component is broken.

ii. All of the electronic component should be in covering board to avoid from water and high temperature situation.

iii. The side stand structure should be modified to install the electronic component and the new stand.

CHAPTER 2

LITERATURE REVIEW

2.1 Concept

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.

2.2 Factors of accident

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 riders control during the turn. While the two-wheelers is concerned accidents occurs due to riding the vehicle in high speed, ignores to use helmets, does not maintains 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.

2.3 History

Side Stand

The earliest known side stand was designed by Albert Berruyer in 1869, and since then side stands have been independently reinvented many times. It was mounted below the handlebars so was much longer than more recent designs. A shorter model was patented by Eldon Henderson in 1926.In the 1930s, a "smaller, more convenient" side stand was developed by Joseph Paul Treen. In 1891, Pardon W, Tilling hast patented a design for a stand which was mounted on the pedal, but folded up flat under the pedal when not in use. Side stands on bicycles fell out of fashion in the 1970s, as the bicycles became lighter, and many riders were concerned about extra weight. 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. We may have witnessed motorcycle accidents because of the surface hindrance of retracted positioned side stand. One of the most common problems that are encountered in using the side stand is negligence or carelessness to kick back the side stand The negligence may be due to absence of mind, urgency, divergence in concentration and few other reas position released position "failure to kick back the side stand for any of the reasons stated above may hit

lead to accident of the vehicle and riders involve in the accident, sometimes fatal. To ensure safety of the rider, during absence of mind, negligence, urgency or carelessness the side stand lock link help sin knowing the state of side stand prior to movement of vehicle.

2.4 Disadvantages Existing Side Stand

- Accident prone
- Maximum fatigue
- Only indicates the position

2.5 Type of Side Stand

i. Side Stand

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, or welded into place as an integral part of the frame.

Figure 2.1: Side Stand

ii. Center Stand

A center stand side stand is a pair of legs or a bracket that flips straight down and lifts the rear wheel off the ground when in use. Centre stands can be mounted to the chain stays right behind the bottom bracket or to the rear dropouts. &any motorcycles feature centre stands in addition to side stands. The centre stand is advantageous because it takes most of the motorcycle's weight off its tires for long term parking, and it allows the user to perform maintenance such as chain adjustments without the need for a motorcycles, but are omitted on most high performance sport bikes to save weight and increase ground clearance.

The side stand lock link relates to the field of automobiles industry, especially for two wheeler vehicles using side stand apart from the aim centre stand provided therein for the resting of the vehicle. The side stand lock link makes the contact with the gear lever there by indicating the person handling the vehicle about the unreleased side stand when the rider tries to apply the gear in unreleased state of stand and prevents him from being endanger or to have unsafe ride of motorcycle. This prevents the rider as well the vehicle to lose the center of gravity by imbalance or surface hind range due to retracted position of side stands and there by saves life of the rider. The side stand lock link is cheap, rugged and easier to install without traditional installations and fittings. The side stand of a motor bike can be retracted automatically.

Figure 2.2: Center Stand

2.6 Construction

Kickstands can be made of steel or cast aluminium. There may be a rubber cap on the end.

Kickstands can lock in place, either up or down, by several means

- A spring that is stretched when the kickstand is partway deployed and less stretched when it is stowed or all the way deployed.
- A detent mechanism, which usually also employs its own spring.

2.7 Existing Method

To prevent accidents occur due this side-stand many ECU and mechanical project had been found.

i. MODERN ECU

In order to reduce accidents due to carelessness in lifting the side-stand, many advance measures have been introduced like ECU, the modern ECU contains a 32 bit and 40 MHz processor. It will be fast as pc's microprocessor. The ECU decides timing and functioning of engine and its parts. This play its role in dashboard, this indicates the gear shifting, side stand, to wear helmet in digital display E.g, Hero Honda's Karizma ZMR. But the people ignore to listen those indicators and safety rules. So for safe guard many mechanical projects have been found to retrieve the side stand automatically.

ii. MECHANICAL PROJECT

In existing mechanical project many ideas had been found to lift the side-stand automatically.

- One small DC motor is kept attached between the motorcycle battery and the side stand of the bike. When the motorcycle battery is turn on the side stand get lifted automatically.

- Limit switch will be put on each ending of the side stand when their lift up or in original position, when engine is turn off the side stand will retrieve and stop at original position by touching the limit switch.These are some methods to retrieve side stand automatically when the vehicle moves but it is not implemented in practical use due to its drawback.

2.8 Drawback of Existing Method

ECU methods are implemented only in costlier bikes but it does not implemented in normal domestic bikes due to their cost. When we come across those mechanical projects we could note some drawbacks like wear out of gears, making injuries in legs while actuating gears. Major drawback is it cannot use in all type of two-wheelers. So, in order to solve this we thought and designed “AUTOMATIC-SIDE STAND” this system can be attached in all type of two-wheelers (mopeds, geared, non-geared, hand geared bikes).

2.9 Purpose Method

Based on the working principle of two-wheeler (i.e the power is generated in the engine and it transmits power to the pinion and makes it to rotate. The pinion transmits power to the rear wheel pinion and makes the vehicle to move).This is the basic principle followed in all type of two-wheelers, based on this “automatic-side stand retrieve system” is designed because this system works by getting power from chain drive. This automatic system consists of four components, which is assembled as two set up which would be explained

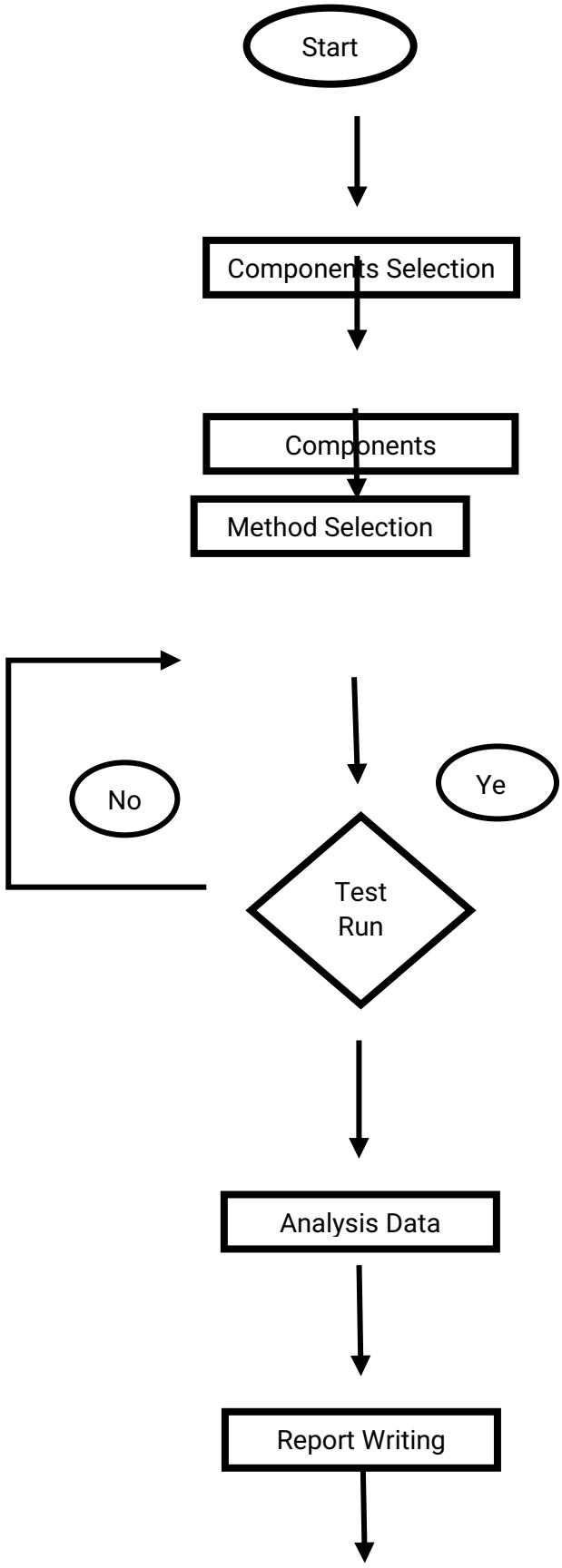
CHAPTER 3

METHODOLOGY

3.1 Introduction

In this chapter, there will be a lot of information about the process and journey through out the making of our final project. There will be flow chart showing the process of us making the whole project. This flow chart will explain the processes we took. Next, is the Gantt Chart, which will show the actual and planning throughout all the 13 weeks of our final year project journey. However, in this chapter, we also will show 3 methods we researched to carry our final year project. Although, these 3 methods have its own pros and cons and it will be explained individually by the teammates.

3.2 Flow Chart



End

Figure 3.: Flowchart of Methodology

3.3 SELECTION OF APPROPRIATE MATERIALS AND COMPONENTS

3.3.1 Detail design

Design concepts are an easier way to make the best design choices for production quality. The idea to design this project was the result of research on the disadvantages of the stand-alone motorcycle in the market. From there the idea of the project was planned. Design projects have durability, safety and low cost. Figure 3.2 shows a detailed project design.

Figure 3.2: Project Design

3.3.2 Components Selection

The process of components selection is one of the most important process in this final year project. The main factor of material selection is to discuss and finalized which materials that will be use in the project in order to avoid wasting of money and time. The components selection need to be done precisely so that the risks could be avoided.

3.3.3 Main switch key

Figure 3.3: Main Switch Key

Main switch key are one of the major component for any vehicle that include engine. It is used for vehicle safety lock engine starter. This component is also very much needed in our project and it is a key component in solving all motorcycle riders' problems.

3.3.4 Side stand

Figure 3.4: Side Stand

The side stand is used to prevent the motor from falling or to help the motor stand for easier motorcycle riders. The side stand is also used in many motors and it shows the most suitable material for use.

3.3.5 Steel shape of L

Figure 3.5: Steel Shape L

This steel was used as a pillar for the side stand during the project. This steel is made in the shape of L to facilitate the process of welding and can be made in many shape.

3.3.6 Motorcycle battery

Figure 3.6: Motorcycle Battery

Motorcycle battery will be the power source for rotating DC motor that will lift up the side stand. It also use as a power source to other electronic component.

3.3.7 Relay Module

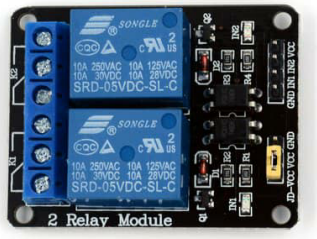


Figure 3.7 Relay Module

The relay module is an electrically operated switch that can be turned on or off deciding to let current flow through or not. They are designed to be controlled with low voltages like 3.3V like the ESP32, ESP8266, etc, or 5V such ad Arduino.

3.3.8 Limit Switch

Figure 3.8 Limit Switch

A limit switch is an electromechanical device operated by a physical force applied to it by an object. Limit switches are used to detect the presence or absence of an object. These switches were originally used to define the limit of travel of an object.

3.3.9 DC Motor

Figure 3.9 DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical **energy** into mechanical **energy**. The most common types rely on the forces produced by magnetic fields.

3.3.10 Arduino uno

Figure 4.0 Arduino Uno

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an **output** - activating a motor, turning on an LED, publishing something online.

3.4 Material Purchase

The process of materials purchasing is crucial to collect and obtains all the materials needed. In this process a lot of research on the places and suppliers that the materials are going to be purchase is done. This step is

important so that the risk of material wasting or money-loss will not happen. However, to carry out material purchasing, a well-made purchasing plan needed to be made. First, the suppliers will be contacted to make sure the availability of the materials. Then, the calculation of the amount of materials needed and also the price of the materials. After that, surveys of price must be carried out to determine the better selling prices. Then finally, the purchases could be made.

3.5 Product Design

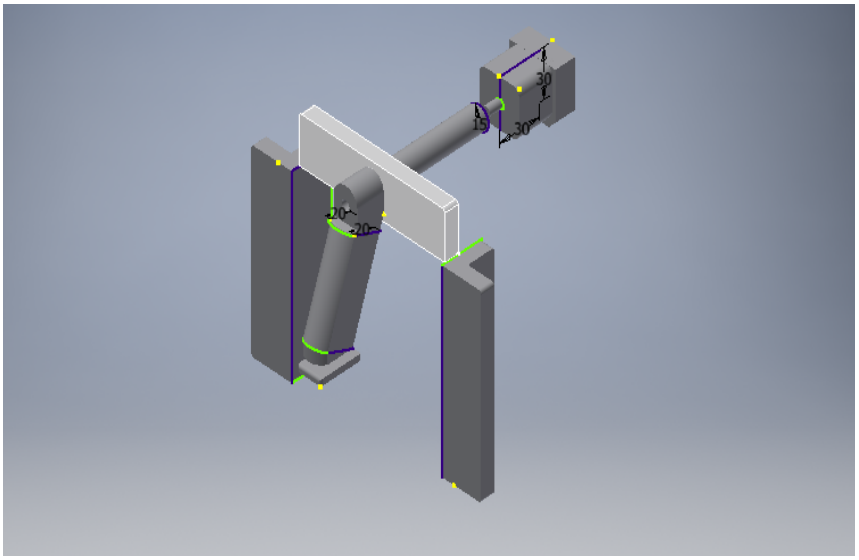


Figure 3.7: Product Design

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Function of Project

Smart stand was designed to increase the safety for the people that use two-wheeled transport which is motorcycle. This project created associated with the causes of the accidents which is self-neglect where it might bring injured or fatality to the rider while they on the road. The thing is from motorcycle side stand, which is most of the time rider tend to not pull up their side stand after they stopped riding for a while. To overcome these problems, an idea was thought and planned to create a smart stand which have the criteria of safety. This project was designed to prevent an accidents caused by self-neglect or side stand.

The function of the smart stand to the motorcyclist is when the starter button is on, the side stand gets lifted by means of electric lifter. If the motorcycle turned off the electric motor turns in opposite direction which pulls the side stand and keep in original position. This system is very useful for automation and safety for the wheeler users. This project will make it easier for motorcyclist and can avoid carelessness that can lead to accidents.

4.2 Working Principle

When the starter was on electric circuit closed and the electric gets power. Then the electric motor rotates and gives pushing force to the stand, which lifts the stand.

When it touch or press the limit switch the power supply for the forward direction of the motor is cut. At the same time reverse direction power will supply when switch on motorcycle.

If the motorcycle switch was off the electric motor turn in opposite direction which pulls the side stand and keep in original position.

4.3 Advantages of Project

- Customer safety
- Can form as a ‘Standard Feature’
- Marginal increase cost
- Improved sales : To face competition
- Ergonomic friendly
- Low maintenance : can be repaired locally

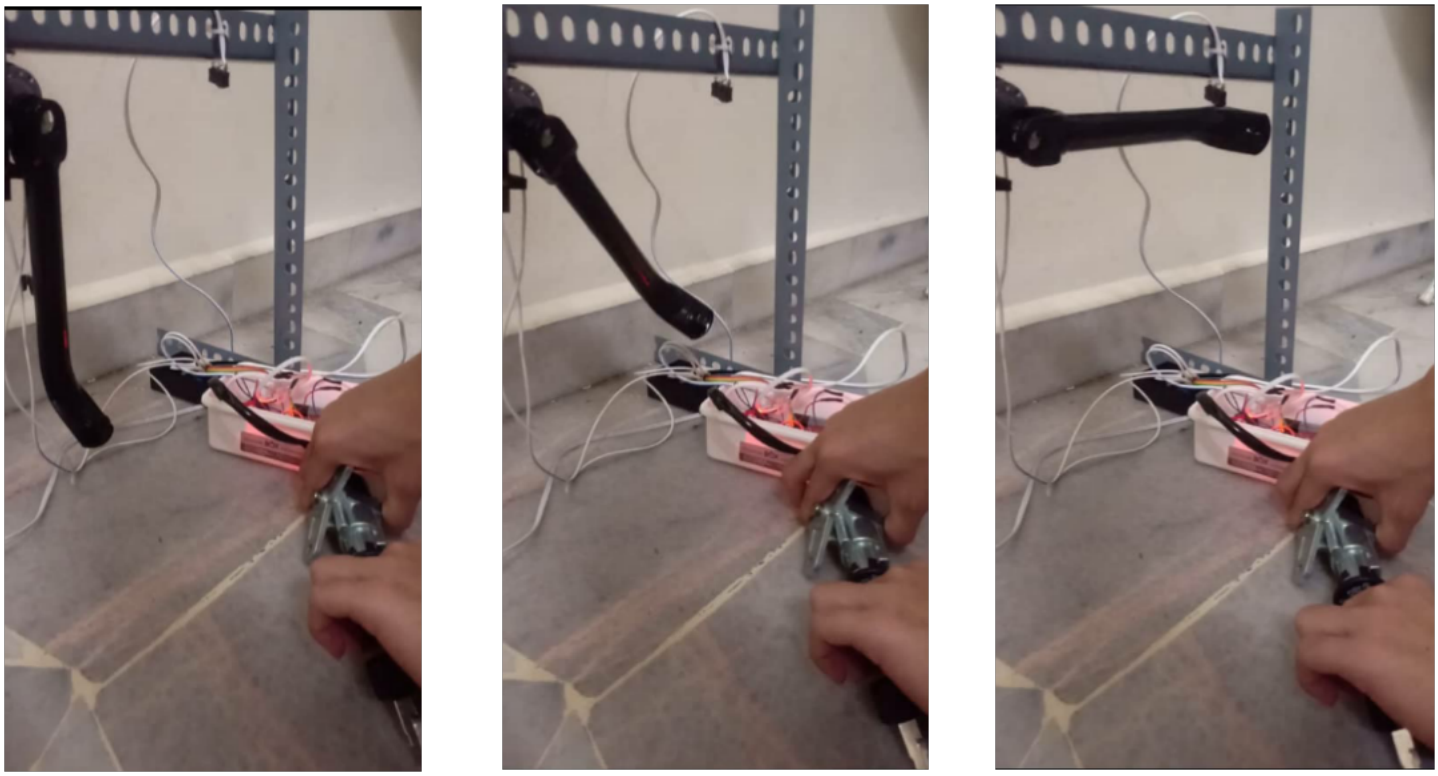


Figure 4.1 stand movement

Automatic stand can facilitate motorcycle users with just switch on lock and it will move on its own. In the diagram shows the movement of the stick before, during and after, after the key is turned on.

4.4 Comparison between Smart Stand and Existing Side Stands

The comparison between smart stand and existing side stand are tabulate

In Table 4.1. The project was designed to facilitate motorcyclist. This can be achieved with smart stand automatic reaction system that will lift up and lift down the side stand automatic.

Table 4.1: Comparison between existing side stand and smart stand

Particulars	Existing Side Stand	Smart Stand
Manual	yes	Automatic
Automatic Retraction	No	Yes
Human Error	High	Eliminated
Maintenance	Low	Low
Sturdiness	Stable	Stable
Cost	Average	Below Average
Customers Satisfaction	Average	Guaranteed
Risk Factor	High	Eliminated
Error Elimination	Not Considered	Taken Under Consideration
Manufacturing of Spares	With Ease	With Ease

Market Captivity	-	Improved Sales
Technology	Customary	Revolutionary
Comfort In Usage	Comfortable	Highly Comfortable

CHAPTER 5

CONCLUSION

During the time of riding a motorcycle with side stand in its uplift many create problems and accidents but with the help of our product we solve this problem. The objectives of this project is to provide the safety mechanism without changing in any standard design of motorcycle. It does not disturb the performance of the vehicle. Moreover, it should be economical for every class of society. It is new product it will promote employment and vast field development for new engineer in day period. By using this system we avoid the accident which happen due the side stand. Also it easy to installed in any motorcycle and economical.

In future there is also some advanced modification is possible to like on the basic of sensor. In this project, we operated mechanism of lifting of the stand in very smooth way.

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road-deaths-in-2019-involved-motorcyclists-says-deputy-minister/

APPENDIX

APPENDIX A MOTORCYCLE SAFETY STAND POSTER

APPENDIX B PITEX 2020

APPENDIX C PROJECT RELATED PICTURE

APPENDIX A

MOTORCYCLE SAFETY STAND POSTER

"MOTORCYCLE SAFETY STAND"

1.MUHAMMAD IMAN NURHANIF
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INNOVATION STATEMENT

The scope of this study is to develop a motorcycle safety stand in order to reduce the risk of accident. In motorcycles, the side stand plays a major role while the vehicle in rest condition. One of the causes of the accidents is self-neglect where it might bring injury or fatality to the rider while they are on the road. The thing is from motorcycle side stand, which is most of the time rider tend to not pull up their side stand after they stopped riding for a while. Hence, this innovation aim to create a next level safety stand where it can pull up automatically when turn on the motorcycle. The way to develop this product by install all the electronic components such as relay module, arduino uno and limit switch on electronic board, then we connect it to the battery, key and DC motor. Finally DC motor will lift the side stand. This project is possible to reduce the neglect of accident. Future recommendation for this product is by putting an alarm sensor on the side stand whenever the side stand is not lift up when the key is turn on.

INNOVATION IMPACT

- This innovation aimed at the safety of motorcycle users, to reduce cases of motorcycle accidents due to negligence.
- Market potential of this innovation very high because the motorcycle is daily transportation used worldwide.
- Motorcycle market is growing faster, especially in the developing countries due to the cost of purchasing this vehicle is much lower than other vehicles.
- An advantage to the 'safety stand' innovation concerned with the safety of motorcycle users.

PROBLEM STATEMENT

- The negligence of a motorcyclist who forgot to lift their side stand.
- The increase in the number of the motorcycle accidents i caused by negligence.

OBJECTIVE

- To design and develop a smart side stand to help motorcyclist reduce the risk of an accidents.
- To create a smart stand where it can pull up automatically when turn on the motorcycle.

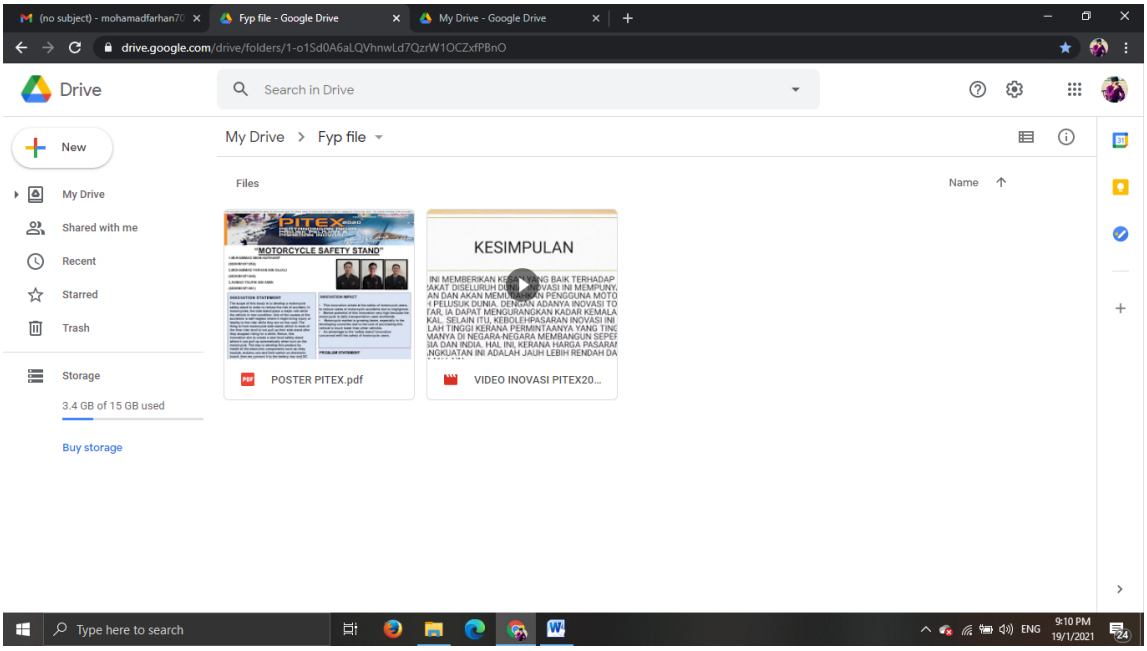
DIAGRAM

This motorcycle stick will be lifted automatically when the motorcyclist turns on the vehicle.

METHODOLOGY

APPENDIX B

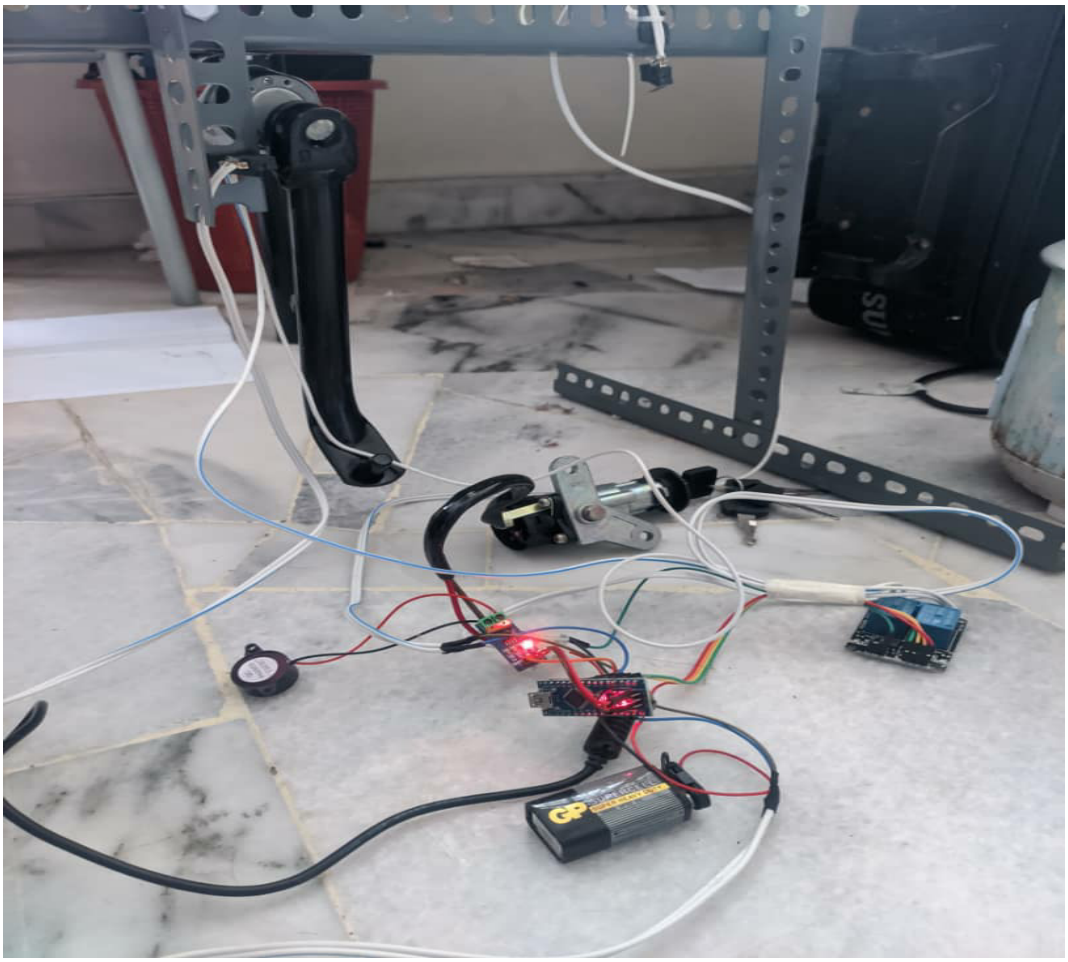
PITEX 2020



Submission of Motorcycle safety stand PITEX 2020 innovation Poster and video though Google Drive.

APPENDIX C

PROJECT RELATED PICTURE



Motorcycle safety stand product