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Automatic E – Bike Stand for Two Wheeler

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ABSTRACT

This paper aims to enhance the efficiency of manual actuation and automation for sliding of side-stand to increase the safety of the rider. In the modern developing world, automobile plays an important role especially two-wheeler i.e. (motorcycles& bikes) plays a major role. Even though they are helpful there are some accidents due to the carelessness of the rider. To rectify this problem many advanced measures have been taken, but they are least helpful. To overcome the limitations of the existing methods a new model of "Automated E- side stand retrieving device", an electromechanical system, is introduced by using electric circuits and gear mechanism. The automatic side stand retrieval system is powered by the same source as every other electrical component on the vehicle, namely the battery. Due to the gear mechanism, increased torque will help the motor to lift the side stand easily.

Keywords: Auto Bike Stand, Motor, Motorbike, Gear, Arduino, Fabrication.

I. INTRODUCTION

Two wheelers are most prone to accidents due to their fragile nature. One of the issues of motorbike accidents is that people forget to slide their side stands back in place on starting the bike. So here we propose an automated side stand slider system that will automatically slide the side stand back in position when user starts his/her bike. In this system e make a demonstration model with a demo starter for bike and a frame used to hold starter, demo bike and sidestand in position. The frame is used to mount bile upright using frame. The starter consists of a microcontroller circuit used to monitor the starter and then operate the stand sliding mechanism. The stand consists of a motorized system used to operate the stand. The circuit monitors the starter, on starting the bike the sidestand is operated by the motor using a shaft to slide from a vertical position to a horizontal position. On turning off the key in other direction to lock bike the system moves the motorized

stand shaft in opposite direction so as to move the stand in a direction perpendicular to the bottom frame rod which rests the motor bike on side stand. Thus we have a fully automated sidestand system.

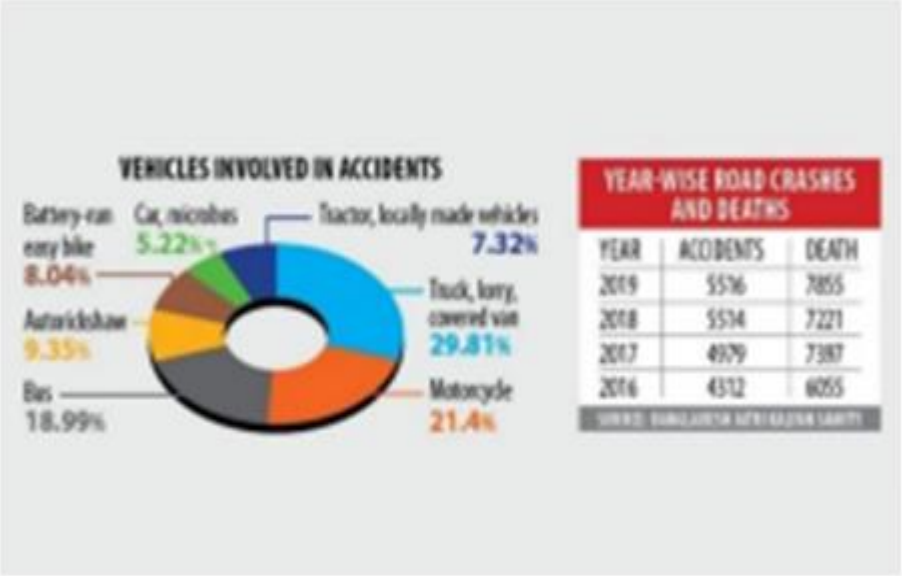

Fig.1: Types of vehicles involved in accidents

When it comes to two-wheelers, crashes happen when people ride at high speeds, don't wear helmets, don't stick to the speed limit, and fail to remove the side stand while riding. What are the most common causes of the collision? Forgetting to lift the side stand causes massive injuries in rural and urban areas alike since all other causes of accidents to have safety measures in place, but accidents caused by side stands do not. Here at the crash statistics [3], this condition is responsible for 36% of all deaths.

Table 1: Cause of Accidents During The Year 2012-2015

Serial No	The Accident's Cause	Accidents as a percentage
01	Forgetting to raise the side-stand	36%
02	Does not maintainspeed limit	38%
03	Does not obey traffic rules	22%
04	Other Problems	04%

A lot of researchers have dedicated their time to this field. We gather some information about the work of the researchers and giving them in the sequence below. Diagaraja [4] developed and filed a patent for a two wheel side stand warning device that alerts the rider to the retrieval of the side stand. The warning is used in two wheelers to warn or guide the rider to the unreleased position of the side stand while driving. It consists of the

tension spring, the touch switches, and the electrical wiring circuit. There is a tension spring in the side stand, which closes the electrical circuit for the horn supplied in the vehicle or the alarm to beep through the touch switch. It's getting its power from the battery in the vehicle. It indicates to the rider the horn or warning about the unreleased location of the side stand or side stand in use. A patent is developed and filed by Parvez [5] for a two wheel automatic stand, using a DC motor and a hydraulic pump, together with a distribution manifold and with a power pack reserve oil tank (Other choices are: a) 12 V DC actuator type or b) pneumatically motorized cylinder type or c) a hydraulically charged cylinder type. This mechanism allows the two-wheeler legs to be unfolded from their horizontal position to the vertical position and to force the mounting of the legs to a preset height that raises the two wheels and parks them up to their pre-set height, using the use of hydraulic cylinders or other methods such as Pneumatic Cylinders or Motorized Actuators. On the return path, the motor is reversed and, in the case of a hydraulically charged cylinder, the multiply inverses flow of the fluid, so the reversal of the operation sinks the stand to the previous position again and then unfolds it back to the horizontal position, which positions the two wheels ready to travel. The stand will quickly lift and unload a two-wheel when positioning it on the stand and back 7 in the riding position. It's simple to use and enables a person to park the two-wheel-drive in narrow lanes when the manual stand has no room. In this way, it can be possible to rotate horizontally across vertical positions, such as a combination of racks and pinion gears or liver systems or a hydraulic multi cylinder system. Joy [6] developed a battery-connected anti-accident ignition device that is connected to the battery, plunger. The switch system is connected on one side of the battery to the other end with the ignition body as well as with the plunger by means of the node.. With the help of a frame, the plunger is earthed. The battery used is a regular 12V battery. The plunger device is attached to the side by the coiled spring. All the appliances used are common systems used in two wheelers. The interface between a switch system and the plunger is through cables. The main feature is that the circuit will not be braked while the stand is in the OFF position so that the current from the battery passes through it directly. The earth given for it won't work in this case. All the current flows only from the created main circuit, hence the current fluctuates from the battery to the ignition coil. This current flow allows the vehicle to get started. When the stand is in the ON position, the circuit breaks and the current flows from the battery not through the ignition coil, but rather through the earthling, supplied by the plungers with the help of the chassis. The voltage-current is transferred into the rubber portion of the vehicle in which the current is absorbed and the current flow into the Earth's surface using the side stand current. Kumar [7] developed a new mechanism that is based on the simplicity and success of the trigger mechanism. The operation consists of three principal components: clutch, stand, and trigger. The pitch causes the button and the clutch triggers to raise the pitch. The stand retrieves itself as it is applied to the clutch to move the machinery. He assessed and optimized the

spring to its final design that is the most productive process. Sanjeev [8], developed a Two-wheeler Side Stand Unfolded Side Lock Link mechanism In this system the side stand lock link makes the contact with the gear lever thereby indicating the person handling the vehicle about the unreleased side stand when the rider tries to apply the gear in an unreleased state of stand and prevent him from being endangered or to have an unsafe ride of the motorcycle. The two-wheeler side stand unfolded side lock link for the vehicle is one of the lifesaving mechanism which prevents the rider from riding the vehicle in the unreleased position of the ride stand. Gulhane [9] fabricated a side stand lifting mechanism based on a simple mechanism and it is operated manually by the means on the feet power of the rider. The working consists of three mechanisms. The main mechanism is the spring mechanism by which the stand lifts up automatically without any manual effort. The second one is the locking mechanism which is used for locking and de-locking the stand. The last one is the lever mechanism which can operate the spring. As pressing the gear lever which is attached to the hook catch-lock get stretched to pull the lock by which lock gets de-locked. With this hook, it escapes from the lock and the stand gets lifted automatically by spring action manually. As pressing the lever the wire which is attached to the hook catch-lock gets stretched and pulls the lock by which lock gets de locked. With this hook, it escapes from the lock and the stand getslifted automatically by spring action. Gawande [10] developed a side stand lifting mechanism on which Electrically operated servo motor driven mechanisms are used to do the end job of lifting and unlocking the side stand and the footrest respectively. The mechanism works on the signals sent to it by a microcontroller circuit,which generates these signals based on the user code feed to it. By integrating this mechanism to the vehicle, the side stand will automatically leave off when the ignition is turned on and the footrest will automatically unlock when an adult passenger is seated on the vehicle's pillionseat Nayan[11] developed a Mechanism that retrieves side stand by Clutch. As the starter button is pushed, the electric circuit begins to operate, and when the clutch is pressed, the electric circuit receives electricity. The electric motor then rotates and applies driving power to the stand, lifting it. When the maximum of the stand is touched or pressed, the power supply for the motor's forward path is removed. Power will be sent directly to the spark plug at the same time, and the two-wheeler willrun. In line with cycling operational theory, Jichkar [12] has created a new side stand slider. With the aid of electronic components such asservo motor, engine driver,Arduino, the system operates on electronic circuits on the bike. A demonstration model with a bike demo starter and a frame is created in this procedure to preserve the starter, the demo bike, and the side stand. The frame is 9 used tomount the bike with a frame upright. The starter consists of a circuit for controlling the starter and then using the mechanism for the sliding stand. The stand consists of a motorized device used to power the stand's microcontroller. The circuit tracks the starting pad, the motor pushes the side stand from a slider to a horizontal position at the start of the bike. When the key turns off to lock the bike, the mechanism pushes the

motorized stand shaft in the opposite direction to drive the stand perpendicular to the underframe rod, which lies on the motorcycle side. We, therefore, have a fully automated motorcycle side-stand system.

The limitations of the existing methods, to say, when the rider is not paying attention, the side-stand sensor just sends a blip to the speedometer interface and is ineffectual. In mechanical projects, various difficulties such as gear wear and limb injuries are seen while actuating gears. The main disadvantage is that it cannot be used on all sorts of two-wheelers. So, in order to address this issue, this "Automated side stand retrieving device" is fabricated which can be mounted to any type of two-wheeler (mopeds, geared, non-geared, hand geared bikes). Because the assembly uses electronic components, there is no wear in the gears and no injury to the legs when actuating the gears.

The Automatic Side-Stand Retrieving system is designedto reduce the number of accidents caused by riders forgetting to recover their side-stand before starting their two-wheeler. It operates in such a way that when the vehicle rider turns on the ignition key of the two-wheeler, the side-stand of the two-wheeler is retrieved, and when the ignition key is switched off, the side-stand automatically returns to the upright position. The details are briefly explained in the Methodology sections of this paper.

II. COMPONENTS USE

- Transformer
- Starter Key Switch
- Servo Motor
- Motor Driver
- Side stand
- Arduino-Uno
- Adopter 12v-1A
- I2C Module

2.1 Frame: In Automatic side stand the frame or stand are used which is in box shaped. We have used box shaped cross section because it has good bending stiffness. The frame or stand provide base for Transformer, motor, and Switch. We have taken a from side frames of window. It bears the load of motor and side stand is bolted to it.

2.2 Transformer: A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction.

Electromagnetic induction produces an electromotive force across a conductor which is exposed to time varying magnetic fields. Commonly, transformers are used to increase or decrease the voltages of alternating current in electric power applications. A varying current in the transformer's primary winding creates a varying magnetic flux in the transformer core and a varying magnetic field impinging on the transformer's secondary winding. This varying magnetic field at the secondary winding induces a varying electromotive force (EMF) or voltage in the secondary winding due to electromagnetic induction.

Basic principles of Transformer:

According to Faraday's law of induction, since the same magnetic flux passes through both the primary and secondary windings in an ideal transformer, a voltage is induced in each winding. The primary EMF is sometimes termed counter EMF. This is in accordance with Lenz's law, which states that induction of EMF always opposes development of any such change in magnetic field.

By Ohm's Law and the ideal transformer identity:

- The secondary circuit load impedance.
- The apparent load impedance referred to the primary circuit to be equal to the turns ratio squared times the secondary circuit load impedance.

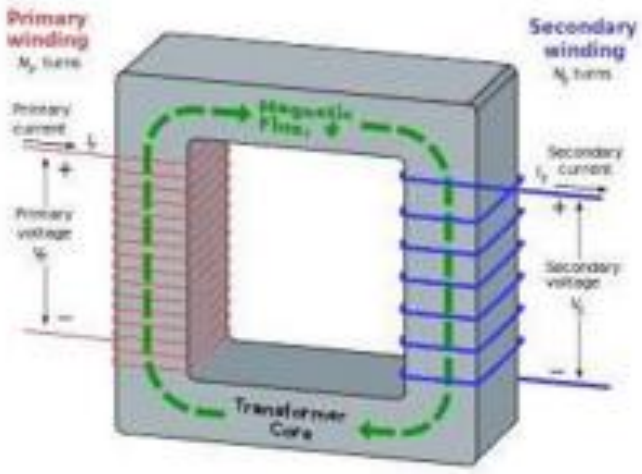

Fig 3.1- Ideal Transformer

Transformer used: The Transformer is used in the automatic side stand is12 volt or 5 ampere transformer. Transformer converts the D.C. into A.C. The power amount given to the Automatic side stand is low but from the supply power is came high, so we use the step down transformer which step down the power for usable in Automatic side stand.

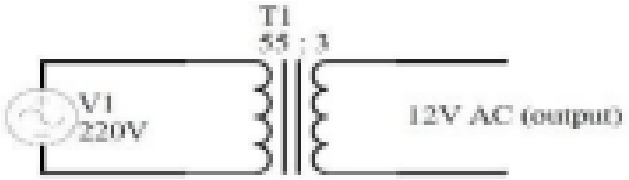

Fig 3.3 CIRCUIT DIAGRAM OF TRNSFORMER

Leakage flux

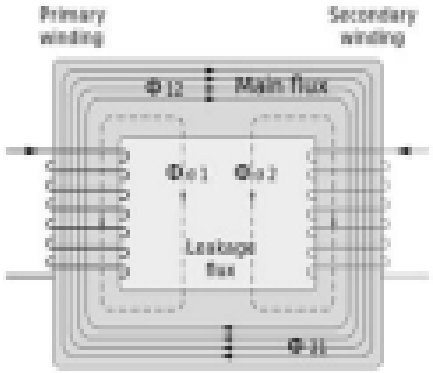

Fig 3.2 LEAKAGE FLUX OF A TRANSFORMER

The ideal transformer model assumes that all flux generated by the primary winding links all the turns of every winding, including itself. In practice, some flux traverses paths that take it outside the windings. Such flux is termed leakage flux, and results in leakage inductance in series with the mutually coupled transformer windings. Leakage flux results in energy being alternately stored in and discharged from the magnetic fields with each cycle of the power supply. It is not directly a power loss, but results in inferior voltage regulation, causing the secondary voltage not to be directly proportional.

2.3 Starter Key Switch: An ignition switch, starter switch or start switch is a switch in the control system of a motor vehicle that activates the main electrical systems for the vehicle, including "accessories" (radio, power windows, etc.). In vehicles powered by internal combustion engines, the switch provides power to the starter solenoid and the ignition system components (including the engine control unit and ignition coil), and is frequently combined with the starter switch which activates the starter motor. Historically, ignition switches were key switches that require the proper key to be inserted in order for the switch functions to be unlocked. These mechanical switches remain ubiquitous in modern vehicles, further combined with an immobilizer to only activate the switch functions when a transponder signal in the key is detected. However, many new vehicles have been equipped with so called "keyless" systems, which

replace the key switch with a push button. The ignition locking system may be sometimes bypassed by disconnecting the wiring to the switch and manipulating it directly; this is known as hotwiring.

Fig. 3.3 Starter Key Switch

2.4 Servo Motor: A servo motor is a rotary actuator that allows for precise control of angular position. It consists of a motor coupled to a sensor for position feedback. It also requires a servo drive to complete the system. The drive uses the feedback sensor to precisely control the rotary position of the motor.

Fig. 3.4 Servo Motor

2.5 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. 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.

Fig. 3.5 Side Stand

2.6 Adopter 12v-1A This Adopter is commonly used for power supplies, chargers, and other electronic devices. It means the device requires a power input of 12 volts with a current draw of 1 ampere. A "12V 1A adapter" refers to a power adapter that provides a direct current (DC) output of 12 volts and a current of 1 ampere. Such adapters are commonly used to power various electronic devices like routers, modems, small speakers, LED strips, and many other low-power gadgets. They're often referred to as "wall warts" due to their blocky shape. When purchasing or using one, it's important to match the voltage and polarity requirements of the device you're powering to ensure safe and proper operation. Voltage: The "12V" indicates the voltage output of the adapter. Voltage is a measure of the electrical potential difference between two points in a circuit, and it's typically measured in volts (V). In this case, the adapter provides a voltage of 12 volts.

Current: The "1A" indicates the current output of the adapter. Current, measured in amperes (A), represents the flow of electric charge in a circuit. In this case, the adapter can supply a current of up to 1 ampere.

Power: Power, measured in watts (W), is the product of voltage and current (P = V x I). For this adapter, the maximum power output would be 12 watts (12V x 1A = 12W).

Usage: This type of adapter is commonly used for low-power electronic devices that require a 12-volt power source. It's important to match the voltage and polarity (positive and negative connections) of the adapter with the requirements of the device you're powering to avoid damage.

Safety: When using any electrical device, including adapters, it's essential to follow safety guidelines to prevent electrical shocks, fires, or damage to equipment. This includes using the adapter only for its intended purpose,

avoiding overloading it with devices drawing more current than it can handle, and ensuring proper ventilation to prevent overheating.

: The Arduino Uno is a versatile microcontroller that provides a convenient platform for integrating sensors, controlling motors, implementing custom logic, and creating user interfaces. These capabilities make it a suitable choice for designing and prototyping an automatic bike stand.

Fig 3.6 Arduino-Uno

2.7 I2C Module: The I2C LCD component is use in application that required a visual or textual display. This component is also used where a character display is needed but seven consecutive GPIOs on a single GPIO port are not possible.

Fig. 3.7 I2C Module

2.8 Working Principle: Automatic Side Stand Braking Mechanism for Two-Wheeler is nothing but one of the braking systems in automobile at the time of vehicle switches off condition. In this braking system motorized operated one. In this project, the control unit is received the signal from the key switch from ignition and side stand. The key switch is 'ON' at the time of vehicle starts condition. The control unit will check the side stand positions, if the side stand will be released so that the motor is rotating in forward direction for 2 sec to release the break (Already wheel is on braking condition). The key switch is 'OFF' the motor is rotating in reward direction for 2 sec to applying the break.

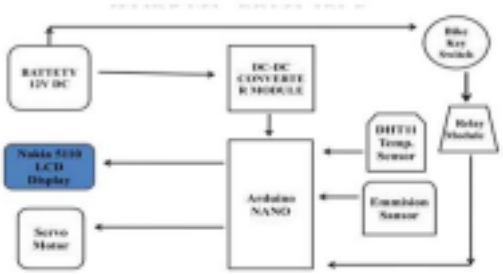

Fig. 3.8 Working Principle

III.DESIGN OF SIDE STAND

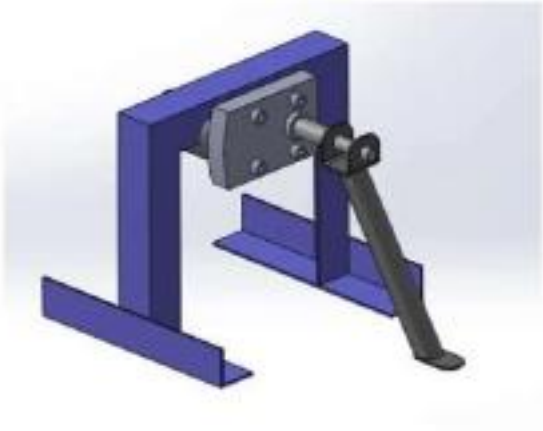

Fig. 4.1 Geometry

With the help of the 3d designing software CATIA we can prepare the side stand frame for our project according to our requirement.

Object Name: Geometry

State: Fully Defined

SourceC:\Users\PowerUser\Desktop\ayushman bhai_1simu.stp

Type: Step

Length Unit: Millimetres

Element Control: Program Controlled

Display Style: Body Colour

3.1 DESIGN AND DRAWING: Having been decided about the project to be manufactured, it must be designed. The work of the design should be done very carefully considering all the relevant factors. After designing the project, its detailed drawings are prepared so that no doubts are left for future. Detailed

specifications of the raw materials and finished products should be decided carefully along with the specifications of the machine required for their manufacture. This project work is designed by considering all the particle difficulties while fabricating, in advance.

3.2 MATERIALS REQUIREMENT: The list of the material requirement is prepared from the drawings. "This list is known as the "BILL OF MATERIALS". This can be passed to the storekeeper and the required materials are taken from the store under permission of the storekeeper.

3.3 OPERATION PLANNING Next work of planning is to select the best method of manufacture, so that wastage of raw material, idle time of the man and machinery and total manufacture time are restricted. Machine tools required to do the jobs are considered, while planning the operation. After considering the above questions, best method is developed and applied.

IV. ADVANTAGES AND DISADVANTAGES

Advantages of Proposed System:

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

Disadvantages of Existing Side-Stands:

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

V. REFERENCES

[1]. "Bangladesh Two-Wheeler Market, by Vehicle Type (Motorcycle, Scooter/Moped), by Engine Capacity (Up to 125cc, 126-250cc, 250-500cc and Above 500cc), by Company and by Geography, Forecast & Opportunities, 2025." https://www.researchandmarkets.com/reports/51 05836/bangladesh-two-wheeler-market-by vehicle-type (accessed Jul. 30, 2021).

[2]. "Road Accident in Bangladesh: 21 died on roads every day | Daily Star." https://www.thedailystar.net/backpage/road accident-in-bangladeh-21-died-every-day 1852867 (accessed Jul. 30, 2021).

[3]. H. J. Hurt, J. Ouellet, and D. Thom, "Motorcycle Accident Cause Factors and Identification of Countermeasures: Volume 1 Technical Report," vol. January, no. Contract No. DOT HS-5-01160, p. 425 pgs, 1981, Accessed: Jul. 30, 2021. [Online]. Available: https://rosap.ntl.bts.gov/view/dot/5652.

[4]. D. R, "Indian Patents. 220469:MOTOR CYCLE SIDE STAND ALARM FOR TWO WHEELERS," 220469, 2008.

[5]. P. Bharucha, "Automatic two wheeler stand," Jan. 16, 2008.

[6]. C. Joy, K. Mahorey, A. Sharma, and A. Sahu, "Anti-Accident Ignition System," Int. J. Eng. Res. Technol., vol. 3, no. 5, May 2014, Accessed: Jul. 30, 2021. [Online]. Available: www.ijert.org.

[7]. N. Kumar and S. Reddy, "Side Stand Retrieval System Using Trigger Mechanism," Int. J. Emerg. Technol. Eng. Res., vol. 4, no. 4, Apr. 2016, Accessed: Jul. 30, 2021. [Online]. Available: www.ijeter.everscience.org.

[8]. S. N. K, "Bike Side Stand Unfolded Ride Lock Link," Intenational J. Eng. Sci. Res. Technol., vol. 2, no. 9, pp. 2551–2552, Sep. 2013, Accessed: Jul. 30, 2021. [Online]. Available: http://www.premjis.com/lml/freedom_prima_1.

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