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Utilization of Stabilizer Technology in Lights for Motorcycle

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Abstract. The purpose of this research is to design a tool to solve a problem where motorcyclists are often distracted by other motorcyclists' lights that go directly to the face/eyes so, that it can result in disruption of visibility at night which is not uncommon to cause accidents. The usual stabilizer consists of 2 servos that are used to move objects vertically and horizontally which are used to stabilize the movement of objects or to direct objects to the desired position such as an optical stabilizer on a cellphone camera or like a CCTV camera that can adjust the direction of the camera's view, stabilizer can also be applied to LED lights or flashlights that are used to direct the lights to the desired position, so if the tool is applied to motorcycle spotlights it can prevent the lights from pointing to the faces of other riders by adjusting the position of the spotlights. The method used in this research is an experimental research method where we will test this stabilizer in several road conditions such as inclines, derivatives, turns, and so on. After that we will compare the results of applying stabilizer technology to motorcycle lights and without using a stabilizer, whether using a stabilizer will reduce the impact of spotlights that directly hit the face/eyes which can interfere with vision or not. The results show that the application of a stabilizer on a motorcycle can reduce the impact of spotlights that directly hit the face/eyes. This is because the stabilizer can adjust the tilt angle of the lamp automatically so that the lamp lighting remains facing the road. So, it can be concluded that the stabilizer on the motorcycle lights can reduce the impact of spotlights that directly hit the face/eyes resulting in impaired vision of other motorists. This research is expected to create a useful tool for motorcyclists to prevent unwanted things from happening.

Keywords: stabilizer, comfort, motorcycle, lighting.

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1. Introduction

Driving at night is a scourge that is less wearable, it can be seen that the rate of accidents at night is more frequent. Traffic accidents are more common at night, about 32% of traffic accidents occur at night compared to 20% in the morning [1]. There are many factors that lead to a higher accident rate at night, some of the factors that influence this include lack of visibility and are often disturbed by other drivers' spotlights which directly point at the driver's face/eyes which can be dangerous and can cause accidents. One of the factors that can solve the problem above is the use of stabilizers in lights for motorized vehicles because stabilizers on motorcycles can reduce the impact of spotlights that directly hit face/eyes. This is because the stabilizer can adjust the tilt angle of the lamp automatically so that the lighting is still facing the road. The way this tool works is that it detects the distance between the motorcycle and the road using an ultrasonic sensor, which if the ultrasonic sensor detects an incline then the ultrasonic sensor will send data to the microcontroller while waiting for the change in the tilt angle of the motorcycle detected by the gyroscope sensor, when the motorcycle is uphill or tilted up the microcontroller will send a command to the servo motor to change the angle of the spotlight so that the spotlight will still face the road [2], and this tool also uses an LED lamp above the lamp there is a barrier so that the light does not radiate upwards so it will not hit the face or eyes of other riders.

In designing this tool, several sensors are used, namely ultrasonic sensors and gyroscope ultrasonic sensors, ultrasonic sensors can assist in detecting distance positions in space, and gyroscope sensors can assist in detecting the tilt of an object [3-7]. In research on 2-Axis Camera Stabilizer conducted by Pratama and others. In that study, the stabilizer function is used to adjust the tilt angle automatically by utilizing the gyroscope sensor and with the addition of the servo motor application, it can adjust the camera movement adaptively [8]. Based on the source of the study above, the tool to be designed uses a 1-Axis stabilizer which is added with a gyroscope sensor and an ultrasonic sensor.

The purpose of this research was to design a motorcycle lamp stabilizer device that serves to clarify the visibility of motorcyclists without disturbing other motorists so as to minimize accidents. The research method used in this study is a survey method.

2. Method

This research method uses a survey method (random sampling), where we will conduct interviews and also fill out questionnaires to motorcyclists who often drive at night to find out the difficulties of motorcyclists in seeing the road at night and the disturbance of motorcyclists who are highlighted by other motorists' motorcycle lights, From the results of interviews and questionnaires, he made a prototype of a motorcycle spotlight tool with a stabilizer added. In designing the tool, we used Arduino as a microcontroller and ultrasonic sensor and gyroscope sensor with prototyping development method. The development method of this tool is to use the prototyping method and requires communication from the motorcycle users who were interviewed to get more input so that an efficient and effective prototype tool will be produced. Therefore, good communication between developers and motorcyclists is very important so that the tools made are more specific [9] which can be seen in Figure 1.

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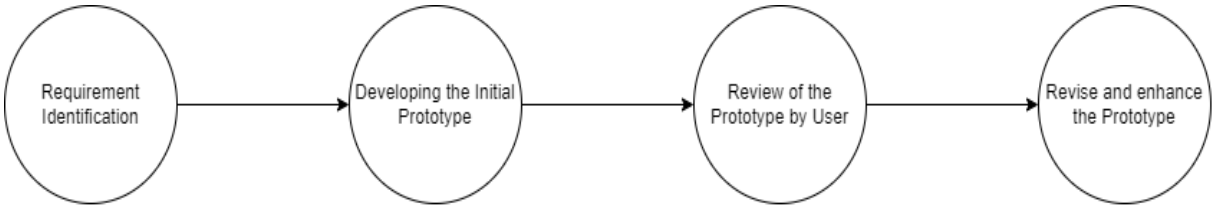

Figure 1. System Development Life Cycle Prototype [10].

Tool identification is carried out for the beginning of the prototype tool. At this stage, user interviews are conducted to obtain input information from the prototype tool. After that, the development will create an initial prototype tool that will be used as a discussion material for users to develop better tools. After the initial prototype is successfully made, a review will be carried out by motorcycle users in order to provide input in the form of suggestions and criticisms of the initial prototype design so that developers can improve the prototype according to the input until the prototype is completed [10].

3. Results and Discussion

This tool is designed as an additional lighting tool for motorists. Simple research was conducted to make a solution to the driver's problem, which was in accordance with the existing regulations in Law No. 22 of 2009 concerning Road Traffic and Transportation, which discussed the prohibition of adding additional lights to vehicles because it could create glare for other motorists. Therefore, this tool is made to add lighting to the motorcycle but does not dazzle other riders, which is estimated to be a prototype image that will be made as shown in Figures 2 - 4.

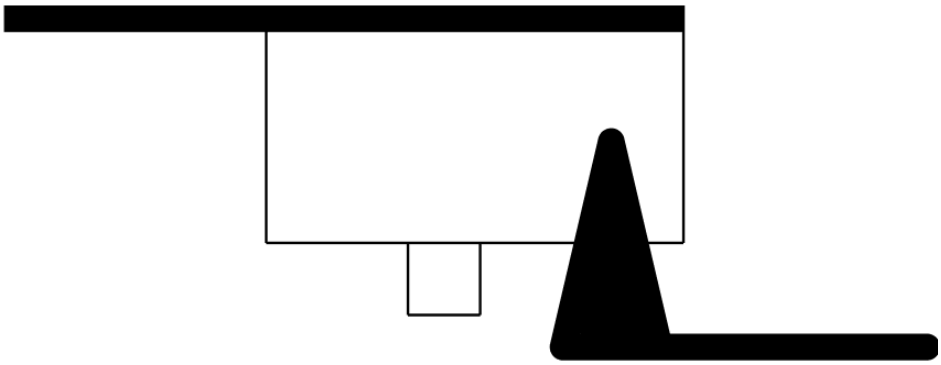

Figure 2. Side View

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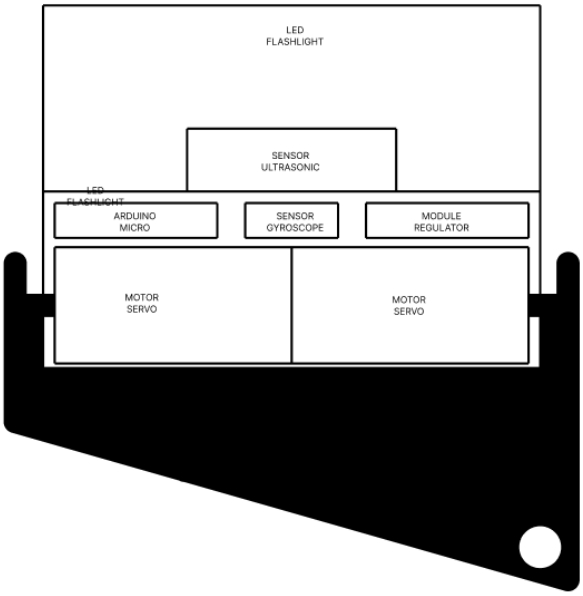

Figure 3. Top View

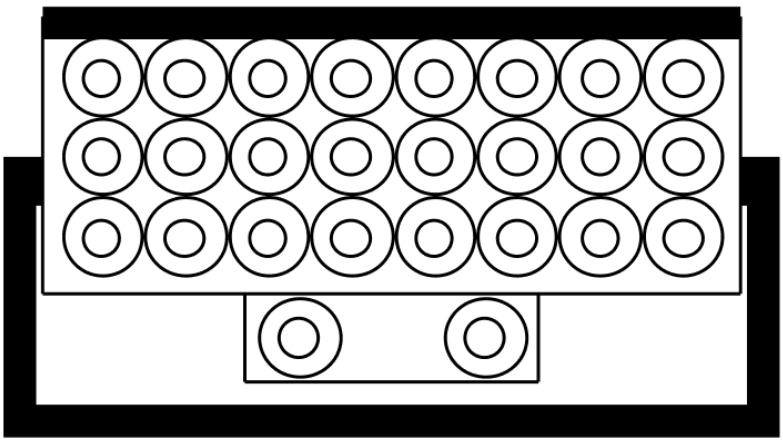

Figure 4. Front View

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Based on the approximate description of the prototype that will be made as shown in Figures 2, 3 and 4, it will also explain how the tool works as shown in Figure 5, when the position of the motorcycle is approaching an incline then the tool will detect a change in distance which is then read by the ultrasonic sensor, then the tool will wait for data from the gyroscope sensor to detect the slope of the motorcycle which is also used to determine whether the data from the ultrasonic sensor only reads the presence of another object in front of the vehicle or an incline and when it detects the motorcycle is going uphill, this tool will increase the angle of the beam so that the visibility of the driver remains far away as illustrated in figure 5.

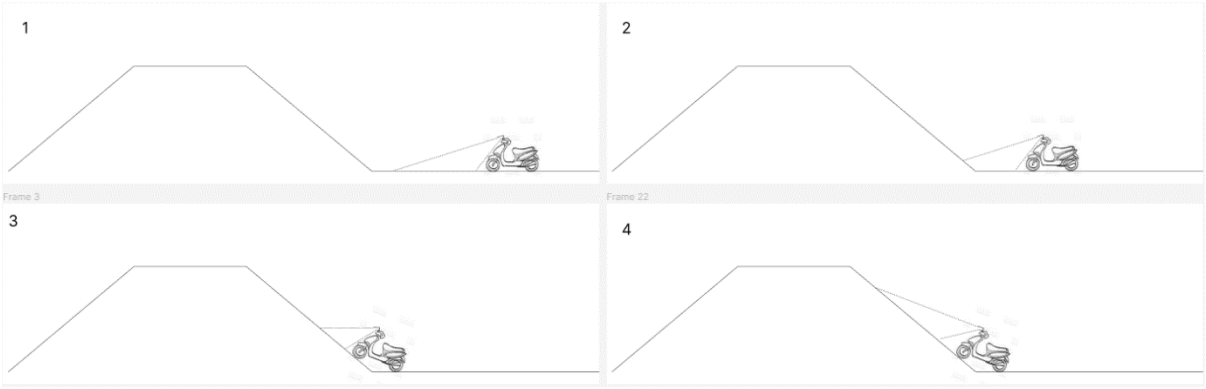

Figure 5. The tool follows the movement of the motor when going uphill

When the motorcycle is in an uphill position this tool will change the angle of the lamp tilt as illustrated in figure 6.

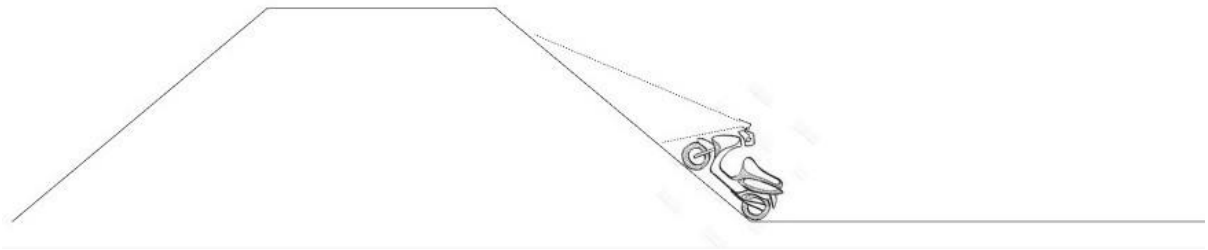

Figure 6. Tool adjust the tilt to the slope of the motorcycle

When the motorcycle is about to go to the top of the incline, the tool will detect that there is no more uphill road which is taken from the ultrasonic sensor which does not detect the distance, then this tool will change the angle of inclination so as not to interfere with drivers who are in the opposite direction or in front of it. When the motorcycle is about to come to the end of an incline, as described above, this tool will lower the angle of the lamp's slope again and when the motorcycle is about to reach the end of the incline, this tool will raise the motorcycle's lights again according to the predetermined distance that comes from the value ultrasonic sensor readings so that the driver's visibility increases as shown in Figure 7.

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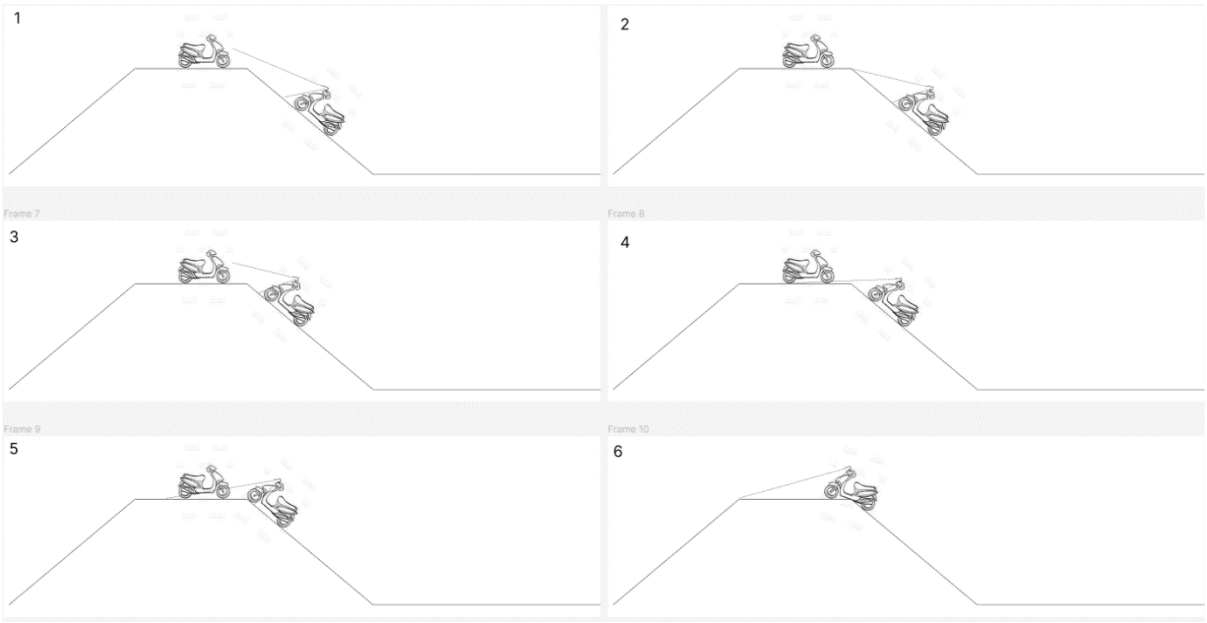

Figure 7. The tool adjust the slope according to the road ahead

When the motorcycle is on an incline as shown in Figure 8, when the ultrasonic sensor has detected a long descent and when the motorcycle wants to go through the descent, this tool will lower the angle of the lamp so as not to disturb the rider on the other side or in front and when the motorcycle is going down, this tool will increase the angle of inclination of the lamp as illustrated in figure 8.

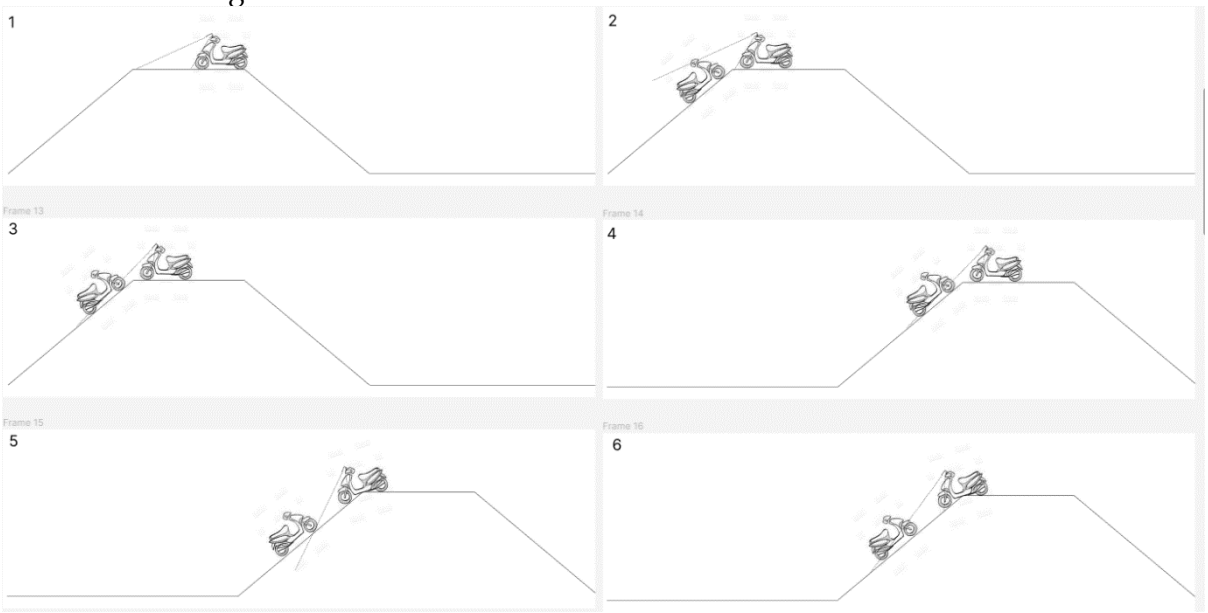

Figure 8. The tool will adjust the angle of inclination when the motorcycle wants to pass through the descent

When the motorcycle is on a derivative road, this tool will increase the angle of inclination again so that the rider's visibility increases and when it is between the flat and descending

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road, this tool will increase the angle of the lamp tilt, when the motorcycle arrives on a flat road, the light will return to its initial position as shown in figure 9.

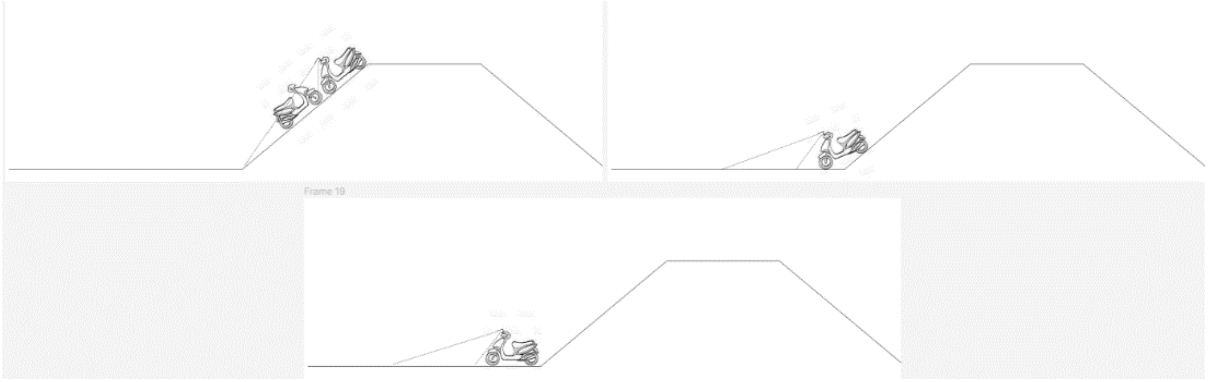

Figure 9. The tool will move to adjust the slope of the motorcycle when in descends

Based on the explanation above, this tool is able to adjust the tilt angle of the lamp based on the road that is passed because this tool has an ultrasonic sensor and a gyroscope sensor where these two sensors help the microcontroller or arduino micro to determine the movement of the servo motor which functions to move the spotlight onto or to the side lower, which works when the ultrasonic detects a change in the distance that is read, then the microcontroller or arduino micro will wait for changes in the tilt angle of the gyroscope sensor and how much is the slope of the motorcycle to determine how much movement the servo must make, if the ultrasonic sensor detects a distance that is too far or too close but the gyroscope sensor does not detect a change in the slope of the motorcycle then the microcontroller or arduino micro will command the servo motor down or up.

4. Conclusion

The conclusion obtained from this research is that this tool is proven to be able to help lighting motorized vehicles efficiently, because this lamp is reactive to the distance and slope of the road which causes this lamp to continue to illuminate the road in accordance with the lighting distance that is in accordance with the wishes of the user and also helps reduce light interference for other motorists. Therefore, the tool from this research that the author has researched will be very useful for every motorcyclist, especially motorists who often travel at night.

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