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AUTOMATIC MIRROR FOLDING DESIGN ARDUINO-BASED

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Abstract. The rear-view mirror is one of the main devices found in cars. A mirror is a mirror used to see the traffic of a vehicle behind when it is about to veer, stop or change lanes. The purpose of this study was to design a pre-crash performance test of the rearview mirror. That is a system that will automatically perform mirror folding automatically based on the distance of the object in front of it. The system will reduce the risk of broken or scratched due to driver negligence. The research method at a time when the barrier is 30cm (±20cm) away from the front or back of the rearview mirror will read that distance which will then transmit to the Arduino. Arduino will process the data and send data for the speed reduction process by warning that there is an object in front or behind the rearview mirror and when the distance is <30cm from the barrier object, then the Arduino will order to fold the rearview mirror automatically, by activating the servo motor to fold the rear and rearview mirrors. The result of this study was to find out the performance of the GP2Y0A21 distance sensor reading and the performance of the rearview mirror pre-crash system. In this study, the bound variable was the distance measurement of the sensor's reading. The free variable used is the sensor reading metering distance displayed on the LCD (Liquid Crystal Display).

Keywords: Arduino, automatic folding mirror, GP2Y021 proximity sensor.

1. INTRODUCTION

The rearview mirror is a flat mirror in cars and other vehicles, designed so that the driver can see the traffic conditions behind the vehicle through the rear window of the vehicle (rear windshield).

Car mirrors are a very useful thing to avoid accidents. A good rearview mirror is a rearview mirror that can give us a wide vision for a fairly good left and right visibility. The car mirrors are not only useful when we are looking to move the lane left or right. The car mirror also works when we want to turn left or right. Besides, the car mirror is a sweetener and a complement to the overall shape of the car itself. Imagine if a car without a mirror, other than something strange, would be dangerous.

Now there is increasingly sophisticated technology, to arrange the glass to fit the vision by using electric mirrors. Also, the rearview mirror can now fold itself or fold automatically, often called automatic side mirror, retractable mirror, automatic car mirror [1]. This automatic folding mirror is very useful for driving, especially in big cities. Moreover, for motorists who often travel to places or locations that are crowded with traffic. In motor vehicles, rearview mirrors are one of the devices that support safety in driving. Both for yourself and other riders. The rearview mirror serves to see the situation in the back, change lanes, turn until parking the vehicle. Even car drivers still need the rearview mirror to see the situation behind them. Without the rearview mirror, you have to turn around to see what's around [2].

On the manual rearview mirror. The glass can still be moved up and down which you can arrange in such a way as to drive better and comfortable. In new cars, side mirrors generally already use electric models. The rearview mirror can be adjusted according to the needs and comfort of the driver. Besides the glass can be set from the cabin just by pressing the control button, in some models of vehicles, the entire rearview mirror can be folded automatically either when parking or when passing through narrow streets.

The development of science and technology in the field of industry is never separated from the demands in terms of seeking convenience and comfort. People are always initiated and innovate in technology, for example in transportation, safety and in terms of daily needs. In transportation, especially in the automotive field, we can see the many brands of vehicles circulating with various comfort and safety facilities provided.

The automotive field is now inseparable from the so-called auto-folding rearview system or auto re-actable. Mirrors are mirrors used in car vehicles, motorcycles and other vehicles to see the difference or traffic that is behind the vehicle or at the time of reversing the vehicle, the rearview mirror can also be used to look back at when going to turn, stop or change lanes. The case of the rearview mirror on the car is hit or collided with another car when passing on a narrow road or often hit by a pole or tree on the side of the car that is often not visible on the other side of the driver, this causes the cover or head of the rearview mirror on the right or left side of the car to be scratched or resulting in a broken rearview mirror.

Please note that many modern cars are equipped with electric folding mirrors or called auto re-actable, by simply pressing the button near the driver or dashboard, the rearview mirror automatically folds or closes. But often some riders will be troubled by having to press the button first to close or open the rearview mirror first at the driving position. So this is less effective on motorists who are in a hurry or not enough concentration and so far there has been no barrier object detection tool from the front or back of the rearview mirror to close the rearview mirror automatically [3].

This problem can not be allowed to protract, there must be a concrete solution in solving this problem, one way to solve this problem is to design an automatic folding mirror with a micro-controller, this tool aims to make it easier for the driver and provide comfort while driving. The system works as a distance sensor detecting objects in front of or behind the rearview mirror, then the sensor signals the micro-controller then sends a command signal to the actuator that is the servomotor, to move the rearview mirror to fold forward or backwards with the advantage of being able to fold in the opposite direction from the direction of the object displayed in the 16x2 LCD screen [4][5] [6]. Therefore, an Arduino-based automatic rearview mirror folding tool is designed.

2.METHODS

How the rearview mirror folding performance test tool works is:

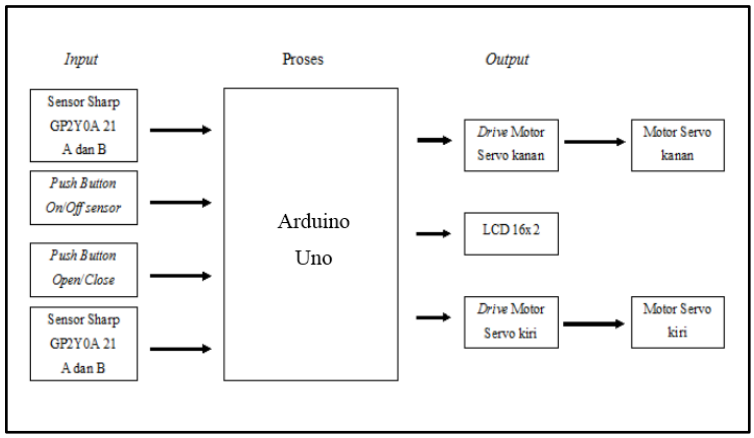

Figure 1. Electronic Circuit Diagram Block

This tool is made using infrared signal waves. The module on the Sharp GP2Y0A21 sensor consists of a transmitter and a signal receiver. This tool will work when the object of barrier A or B approaches sensor A or B, then automatically the sensor will read the direction of the barrier that will come and then provide information to the Arduino. The Arduino will process the input signal from the sensor, then the Arduino will move the servo motor that fuses with the rearview mirror and folds in parallel from the direction the barrier comes [2][3].

Data retrieval plan in this research activity as data collection works accurately or not sharp sensor GP2Y0A21 at the distance specified. The processed data is displayed in the following table:

Table 1. LCD Testing and Actual

MEASUREMENT TESTING 30 CM										
Measurement	1	2	3	4	5	6	7	8	9	10
LCD										
REAL										
STD DEVIASI										

Based on the Table 1 above shows the results of measurement tests with a specified distance of 30 cm. Tests were taken i.e. LCD and REAL tests, each conducted 10 times [7]. The type of testing obtained standard deviation according to the table above.

3. RESULTS AND DISCUSSION

Based on data retrieval shows the results of measurement tests with a specified distance of 30 cm. Tests were taken i.e. LCD and REAL tests, each conducted 10 times. From the type of testing obtained standard deviation according to the table above.

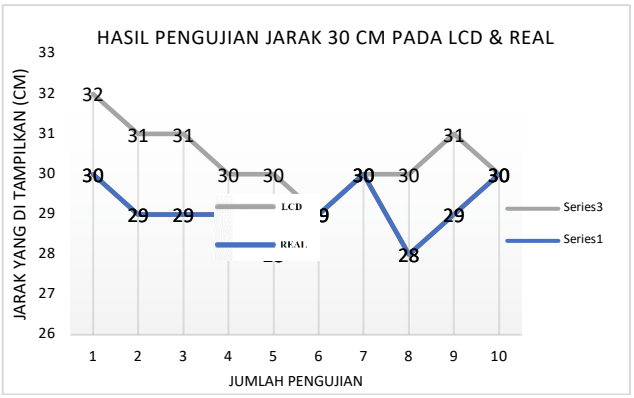

Figure 2. LCD and Real Testing Charts

The graph above shows the setting distance of 30 cm on each of the LCD and Real tests. The results of the test are relatively consistent between LCD and Real testing.

Output Capability Process

Based on datasheet or specifications sharp distance sensor GP2Y0A21 can measure with a distance of 10-80 cm. At the time of application to the tool is only able to measure with a distance of 10-30 cm. from the description can be known USL is 50 cm and LSL is 10 cm.

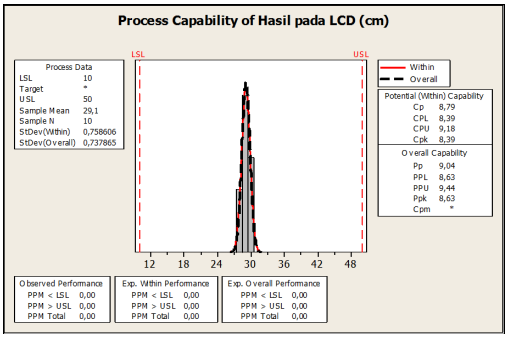

Figure 3. Output *Capability Result Process* on LCD

The figure 3 it can be known the CP value is 8.79. This output predicts that the tool made meets the needs by the specified distance of 10-30 cm. However, the tool does not meet the initial specifications specified as 10-80 cm.

Testing criteria:
CP<1 value then the tool does not meet the needs.
CP>1 value then the tool meets the needs.

Output *Capability Process* Results at Actual Distance

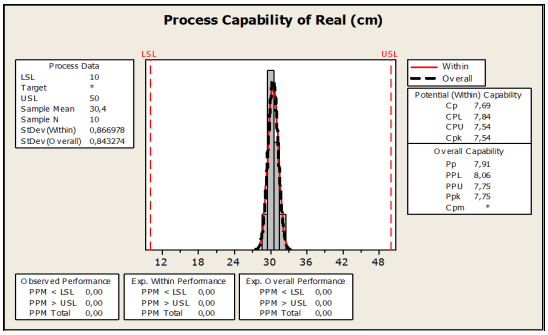

Figure 4. Output *Capability Process* Results on LCD

From figure 4 it is known that the CP value is 7.84. This output predicts that the tool made meets the needs by the specified distance of 10-30 cm. However, the tool does not meet the initial specifications specified as 10-80 cm.

Testing criteria:
CP<1 value then the tool does not meet the needs
CP>1 value then the tool meets the needs.

By testing a distance of 30 cm the result of the LCD reading and is relatively constant and precise. The two types of test scores of the results have a difference or standard deviation of ±2. From figure 3 and figure 4 CP values are not too much different in each test and remain according to the needs of the distance of 10-30 cm.

4. CONCLUSION

Based on the results of testing and analysis that has been done, it can be concluded that the design of the rearview mirror folding props with a table height of 80 cm, frame width of 40 cm, length of the frame stamping 18 cm. The performance of the sensor readings is not under the specifications of the proximity sensor which is 10-80cm. At the time frame on the tool can only read 10-30 cm. The mechanism of the servomotor as the rearview mirror drive on the right and left responds to barrier objects. The rearview mirror will move forward and backwards according to the object. The sensitivity distance to the object is too low.

The precision of the sensor readings meets good specifications. This is because the test results of the tool show CP>1.

6. REFERENCES

[1] Rusamadi, Dedy. 2007. Belajar Elektronika Tanpa Guru. Bandung: Del Fajar Utama.

[2] Fadel, Achmad A. 2015. Analisis Pengaruh Kecepatan Terhadap Jarak Pada Perancangan Spion Lipat Otomatis Mobil Listrik Tunas I-SECP Menggunakan Sensor Jarak Berbasis Arduino. Malang: Politeknik Negeri Malang.

[3] Budhiarto, Widodo. 2009. Membuat Sendiri Robot Cerdas Edisi Revisi. Jakarta: PT Elex Media Komputindo

[4] Eka Marliana, Arif Wahjudi. Rancang Bangun Perangkat Lunak Unit Kontrol Alat Ukur Sudu *Cross Flow Water Turbine* Berbasis Pengolahan Citra. Jurnal Teknik Pomits Vol. 3, No. 2, (2014):6.

[5] Andrianto, Heri dan Aan Darmawan. 2006. ARDUINO Belajar Cepat dan Pemrograman. Bandung: Informatika.

[6] Andrianto, Heri. 2015. Pemrograman Arduino AVR Atmega16 menggunakan bahasa C (*CodeVisionAVR*) revisi kedua. Bandung: Penerbit Informatika.

[7] Harinaldi. 2005. Prinsip-prinsip STATISTIK untuk Teknik dan Sains. Jakarta: Penerbit Erlangga.