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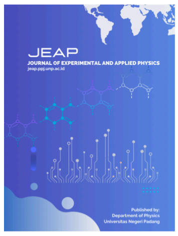

Design of Modeling Tool for Wheel Connected with Belt Using Speed and Time Control for Tracker Video Analysis

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Abstract: The influence of the advances of science produces technological innovations that leverage on education, economics, social and self-development. In education, design of laboratory experimental modeling tools continues to be carried out by researchers to improve learning effectiveness. Wheel movement experiments related to belts include one of physic learning activities. The parameter measured from the creation of modeling tool is the wheel speed and analysis of wheel motion related to the belt. The system can be controlled in speed and time using Blynk application. Video recordings are used as circular motion analysis material on Tracker applications. The design of system is a box size 35 cm in length, 20 cm in width and 18 in height consisting of one switch, LCD, and two wheels connected by a belt. Wheel 1 has a diameter of 15 cm and wheel 2 is 10 cm. Based on data analysis, the results of physical parameters were obtained with high accuracy and precision values using standard measuring instruments, namely tachometers, calculation of the theoretical formula. The system's precision was 98.84% and speed accuracy for 30 rpm, 50 rpm and 80 rpm were 99.3%, 99.19% and 99.93%. Frequency values increased according to the increase in input speed and compared to the reverse period. The angle speed will increase as the wheel spokes become smaller. So, the wheel modeling tool related to the belt using speed and time control with the Blynk application as well as the Tracker video analysis can work effectively and validly.

Keywords: Modeling tools, connected wheels, tracker video, IoT.

1. Introduction

Science become one of most influential fields in changing human lifestyles. The influence of the advances of science generates technological innovations that have an impact on the sectors of education, economics, social and human self-development [1]. Technological innovation in life is the result of research developed with scientific methods. The application of scientific methods makes research systematic, logical, objective, controlled and test-resistant. The combination of [2]

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research, scientific methods and science produces facts, concepts, symbols, theories and instruments that can be used in life [3].

Experiments are part of a phase of scientific method that has a major role to play in testing a thought or phenomenon that occurs. In education, a student-centered learning model based on experiments becomes a strategic and innovative choice [4]. Practical learning experience with instruments to prove the truth of the existing theory improves student understanding. In the field of industry, experiments are one of the right frameworks to use [5]. The results of experiments can be a reference for the system to be operated, thus obtaining optimal output. The use of technology makes the results of experiments more qualitative, thus reducing uncertainty before launching a product [6].

Technological advances have become an important factor in the success of experimental activities in this era. The use of technology makes experiments more extensive in gathering enough evidence to reduce uncertainty before launching a product [7]. In this digital age, technology is being used to accelerate experimental processes. The use of digital technology in experiments can range from integration into built-in systems, monitoring processes and results, processing and storing data, to the publication of experimental results.

Wheel movement experiments related to belts included one of the learning activities on circular motion material. Knowledge of this material is very important, as its applications are widely implemented and developed in everyday life, especially in the field of industry. Engine belt conveyor systems use this principle as the transmission of power from one wheel to the other [8]. Industrial products that implement this system such as sewing machines, escalators, bowling machines, vehicle machines and others.

The use of wheel-related modeling tools for technology based experimental activities makes the understanding of physical concepts more interesting and effective [9]. Use of technology on tool modeling to support the effectiveness and success of experiments. The technology used is IoT and video tracker. The use of IoT as a remote-control system serves to facilitate the use of devices anywhere during internet connections [10]. Using video tracker to perform analysis of physical magnificence on tool modeling makes the abstract concepts understandable and the truth of the theoretical basis can be proved [11]. The phenomena of wheel movement related to the belt can be understood through the graphics and tables for physical magnification analysis using video trackers.

The manufacture of wheel movement experimental tools related to belts is useful for improving understanding the characteristics of circular motion phenomena. The tool modeling created must align with the experiment's objective, which is to provide a visualization of the relationship between physical quantities and the values of parameters that are not yet known [12]. In this research, the experiment to be studied is the experiment of the motion of connected wheels. The tool modeling created consists of two wheels connected by a belt, where both have different diameters. The speed and rotation time can be controlled and varied using the Blynk application. This is what is observed to see the characteristics of the wheel phenomenon in relation to the belt. Among them are the rotational speeds of wheel 1 and wheel 2 in rpm. The use of a tracker application to observe the effects of diameter differences and speed variations on the frequency, linear speed, and angular speed of both wheels.

Research on circular motion has been conducted previously. Research on the development of a wheel movement experiment modeling tool for tracker video analysis, this experimental tool can be controlled with a microcontroller and the results of video analysis in the form of graphs and tables processed using tracker[13]. Video analysis of circular motion phenomena is useful to prove the concept of the theory that already exists[14]. Tracker can automatically analyze and determine the magnitude value of physics [15].

The tracker application is one of the computer technologies that can be used as a learning medium to analyze complex matter[16]. It has a variety of tools that support the process of analysis of the desired physical magnitude. Tracker application can analyze videos of natural phenomena such as speed, acceleration, style, gravitational field and energy conservation[17].

The use of IoT technology in this research is a renewal of this research. Wheel modeling tools relating to the belt can be controlled and accessed remotely while the smartphone/PC is connected to the internet [18]. Research on the development of a wheel-related experimental system using WEB, learning physics through a virtual laboratory using video of physical phenomena provides improved understanding through analytical activities [19].

Under real circumstances, such solutions seem to be insufficient and less effective to optimize experimental activities. The manufacture of the wheel experimental tool relates to this research, depending on the flaw and vulnerability of existing research. The experimental tools made can be controlled through smartphones, for speed control and wheel rotation time. With this control system, users can enter data remotely as long as there is Wi-fi connection on the smartphone. The use of the Blynk app on the smartphone as a communication between the microcontroller and the smartphone. The layout of the Blynk application can be customized to suit the needs of the user [20].This experimental activity is used to analyze the results of experiments using the Tracker application. The tracker can display the characteristics of wheel motion related to the belt in the form of a sinusoidal graph on the y-axis over time and a linear graph showing the relationship between linear speed and angular speed. Therefore, research on "Design of Wheel Modeling for Tool Connected to Belt Using Speed and Time Control for Video Tracker Analysis" has great potential to develop.

2. Materials and Method

The research is being carried out in the electronics and instrumentation laboratory of the UNP Department of Physics. The research begins since February 2024. This research belongs to engineering research. The phases in engineering research include concept and clarification of tasks, conceptual design, geometry arrangement of functions, detail design, modeling, testing.

The phase defines ideas and clarity tasks are activities searching the library, theoretical studies as well as analysis of tools and materials needs. The design and manufacture of the wheel modeling tool relates to the belt made in the form of a functional block diagram. The functional block diagram is obtainable in Figure 1.

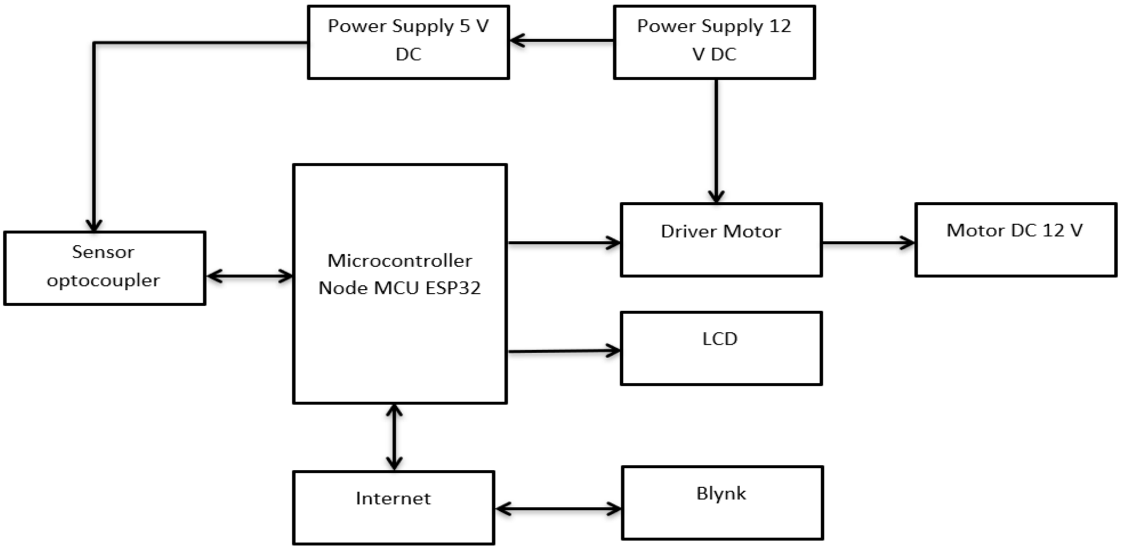


Figure 1. Related Wheel Movement Modeling Tool Making Diagram Blocks

In Figure 1, there are electronic components that have different functions – different for the tool modeling to work properly. The Blynk application is a data input site, which will be programmed by the MCU Node. The MCU node is a modeling tool connector with the Internet so that the Blynk application can be used. The power supply provides the components with electric current. TB6600 driver serves as steppers' motor direction control. Steppers are useful as wheel drives used for modeling tools. The optocoupler sensor detects the speed of the angle of rotation which is then transmitted to the node MCU ESP32. The output is the speed of the wheel, the frequency, and the number of turns that can be seen on the LCD and the Blynk app.

Geometric layout design and functionality of tool modeling design to facilitate research activities. At this stage, the thing is to plan a set of wheel motion experiments related to using a PC. The design is made in accordance with the theory of circular motion as in Figure 2.

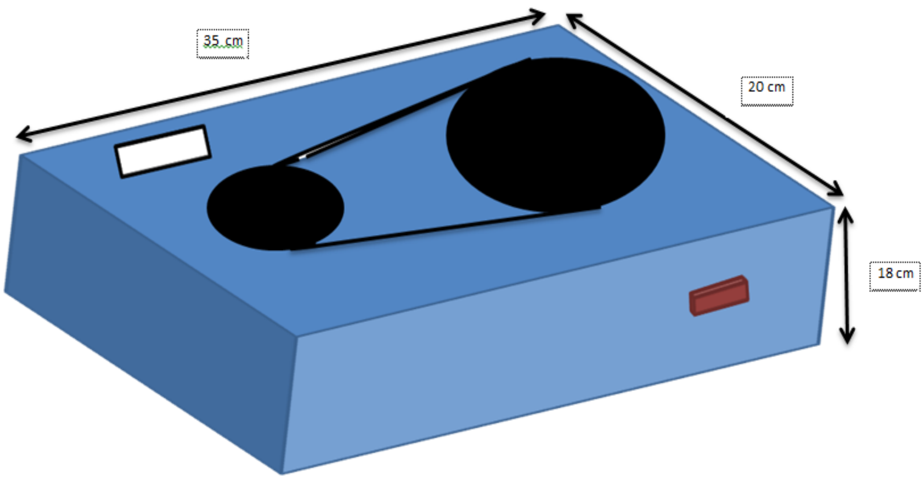


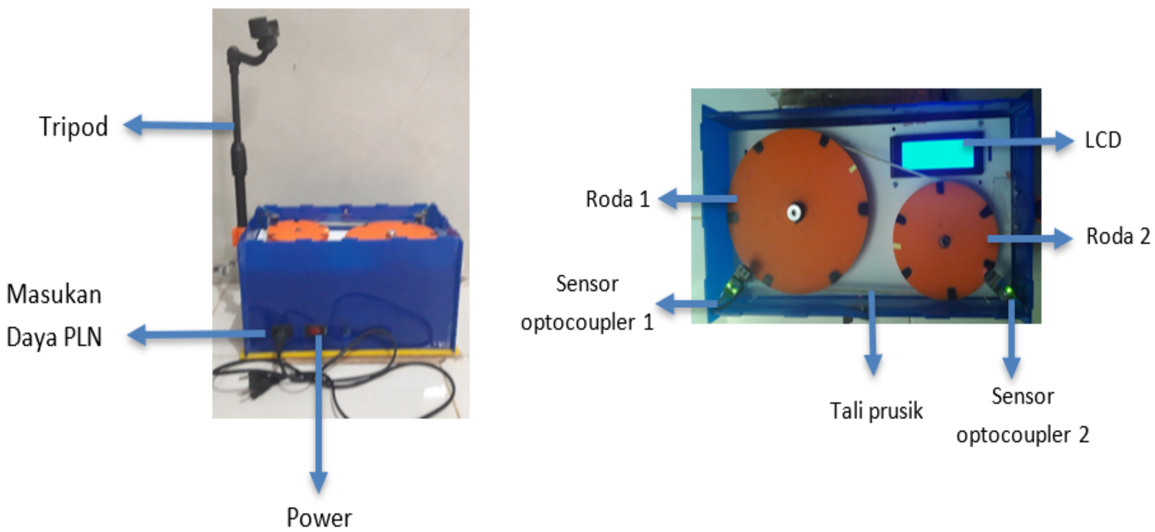
Figure 2. Design Tool Modeling Wheel Movement Related to Belt

The design of the tool modeling in Figure 2 for the experimental set of wheels related to the belt in this study was used for the modeling of the wheel-wheel relationship on circular motion material. The modeling tool is made using a box size is 35 cm in length, 20 cm in width and 18 cm in height. The electronic set is arranged inside the box. The outer part of the experimental set consists of one switch, an LCD, and two wheels connected with ropes. Both wheel has different diameters, wheel 1 has a diameter of 15 cm and wheel 2 is 10 cm.

Tracker applications is used to observe how the characteristics of wheels rotation relates to the belt in the form of graphs and tables. This application can be used to read the position of moving objects from the inserted video[21]. The first step in its use is to import video recordings of experiments into the application. Identifies how many frames will be analyzed. Calibration for angle accuracy and video frame[22]. Place the mass point on the desired object. The application will do the plot and analyze the movement of the object. The results of this analysis are displayed in the form of a graph of the change of position on the y axis relative to time. This graph can also display a graph of linear velocity versus angle velocity.

3. Results and Discussion

Wheel movement modeling tools related to belts have performance specifications consisting of hardware and software designs. Both of these things are the basic operations of the system for rotating the wheel and reading the great speed of the rotation of wheels. The results of the wheels system are related to the experimental activities of circular motion in front and up are shown in Figure 3.



(a) (b)

Figure 3. Tool Modeling Wheel Movement Related Belt (a) Visible Front (b) Visible Top

Wheel movement modeling tools relate to belts using valid and effective speed and time controls. Figure 3 is a modeling tool that can be used for experimental activities. The system has dimensions of 35 cm in length, 20 cm in width and 18 cm in height, one switch, LCD, in addition two wheels measuring 15 cm and 10 cm in diameter. The modeling tool is already able to rotate the wheel-wheel according to the speed and time input and displays the results of the analysis period, frequency, time, number of spins, linear speed, angle speed, finger-to-finger and speed on the Blynk application. The rotation of this wheel, also directly recorded using the video recorder app on the android that can then be analyzed using the video tracker application. Wheel 1 with a diameter of 15 cm is connected to the dc motor which is the wheel drive. Wheel movement 2 is based on wheel 1 which is both connected by a belt. The top of the wheels 1 and 2 are given six black dots with the same distance. This point is useful for detection of wheel speed by optocoupler and tachometer sensors.

The LCD display of the wheel modeling tool relates to the belt and is functional to display the input value set point and time when the experiment is ongoing. Set point in this case is the speed value (rpm) entered. Both values are the same as the set point and time input values in the Blynk application. This component is used to observe the wheel-wheel rotation input value directly on the tool modeling. Control and monitoring using the Blynk application of Figure 4 and the system electronics network shown by Figure 5.

The Blynk application is a smartphone application as a means of communication with the modeling tool. This application is used to control speed and time as well as monitoring the physical magnitude of the wheel movement related to the belt. Control and monitoring using the Blynk application is presented in Figure 4.

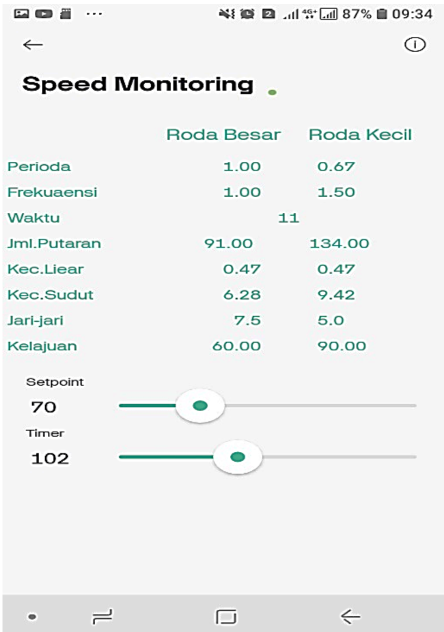


Figure 4. Control and Monitoring Using The Blynk Application

The appearance of the Blynk wheel application related to the belt is described in Figure 4. The input speed value on which application is displayed with the name set point is from 10 to 90. This affects the speed of the wheel-wheel rotation, where the greater the set point value, the faster the rotation. The time input value is zero to 255 seconds. This influences the length of a wheels spin, which means that the longer the time value is set, the longer it rotates. The value of the zero input is activated directly as the off button, which causes the wheels to stop rotating. Both inputs on the system, can be varied according to needs as long as they are within the set range of values.

Monitoring of the physics magnitude values of wheels 1 and 2 displayed: period, frequency, time, number of turns, linear speed, angle speed, finger-to-finger and speed. The value shown is based on the optocoupler sensor detection of the wheel-wheel rotation. This result, on the arduino software, is programmed to obtain the speed value (rpm) of this speed value, which then forms the basis of the output of the physical magnitude that can be observed on the Blynk application.

The electronic network is inside the device. The order is based on a network of system diagram blocks. Each component is arranged in such a way that it disconnects the system from wheel-related experimental activities. The electronic network is shown in Figure 5.

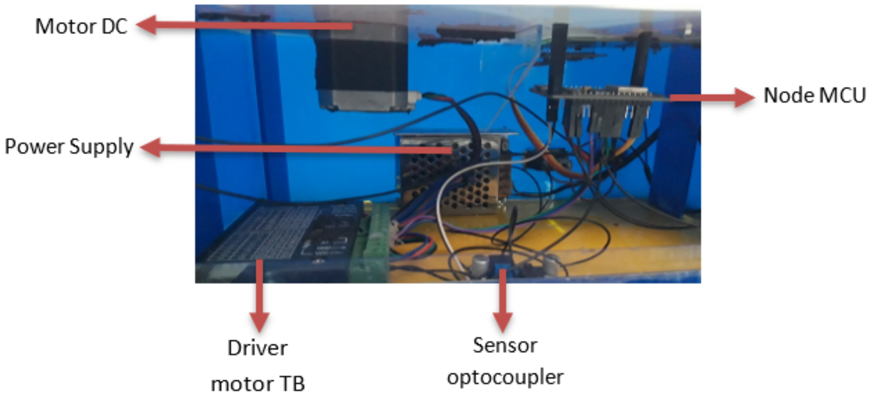


Figure 5. Network electronics tool modeling

A series of electronic tools for modeling wheels related to the belt in Figure 5 are arranged inside the device. Power supply is used as a power supply provider on the system's electronics network. The power supply will ease and filter the AC input voltage and make it DC voltage. Node MCU is a stepper motor rotation accuracy control system and LCD display, as well as wheel-wheel rotation monitoring based on optocoupler sensor detection results.

Stepper motor accuracy control using node MCU as well as TB6600 motor driver. A stepper motor is a DC motor that may rotate according to a divaricated angle. In this case, Node MCU becomes a device to control the input speed and time of the stepper motor rotation. The rotation of the stepper motor becomes the driver of the 1st wheel, which also affects the movement of the 2nd wheel as both are connected by a belt. The optocoupler sensor detects the rotations of wheels 1 and 2. The results of this detection by the sensor are forwarded to the node MCU, which is used to obtain the speed value (rpm) of the wheel movement related to the belt.

3.1 Results Design Specifications Accuracy and Precision Wheel Connected Belt Modeling Tool Using Controls For Video Tracker Analysis

Testing accuracy and precision is a test activity of a set of experiments when completed. The accuracy is obtained from the ratio of speed values (rpm) of wheels-wheels on a device compared to measurement values using a tachometer as a standard measuring instrument.

3.1.1 Accuracy and Precision of The Stepper Motor

The stepper motor's speed may be precisely measure using performing nine data captures from 10 rpm input to 90 rpm. At each data input, speed measurements are performed using a tachometer DT 2268. The tachometer emits a beam of infrared light directed at a black spot on the wheel. When the light beam hits the target, the beam is reflected back to the light sensor placed inside the tachometer. Thus, the reflected signal can provide a reading of the wheel speed in RPM. Measurement accuracy of stepper motors with standard measuring instruments is described in Table 1.

Table 1. Accuracy of Stepper Motor Measurements using Tachometer

No	Motor (rpm)	Tachometer (rpm)	Percentage accuracy (%)
1	10	10.25	97.56
2	20	20.16	99.20
3	30	30.20	99.30
4	40	39.55	98.86
5	50	49.60	99.19
6	60	59.61	99.35
7	70	71.48	97.93
8	80	80.06	99.93
9	90	91.60	98.25
	Average		98.84

The accuracy data on the wheel movement modeling tool relates to the belt using the stepper motor and the TB6600 motor driver from table 1 with input and monitoring using the Blynk application with nine times the variation has a fairly good accuracy. After the data analysis is done, the measurement is achieved with an average accuracy of 98.84%. The data obtained is approximately accurate because the designed modeling tool has results close to the standard measuring device reading of the tachometer.

The speed measurement accuracy of the stepper motor was acquired by carrying out ten repetitive data pickups at a nearby time. The input values are set points of 30 rpm, 50 rom and 80 rpm. Average of these speed values compared to measurements using a tachometer. The speed precision of the stepper motor is described in Table 2.

Table 2. Stepper Motor Speed Precision

Measurement to Speed	Speed		
	30 rpm	50 rpm	80 rpm
1	30	50	80
2	30	50	80
3	30	50	80
4	30	50	80
5	30	50	80
6	30	50	80
7	30	50	80
8	30	50	80
9	30	50	80
10	30	50	80
Average	30	50	80
Tachometer	30.20	49.60	80.06
Precision	99.30 %	99.19 %	99.93 %

The stepper motor precision in table 2 was obtained with ten repetitive measurements for input speeds of 30 rpm, 50 rpm and 80 rpm having a fairly good precision. The data is obtained from the optocoupler sensor readings and contras the outcome with examination of repeated measurement data. This activity aims to indicates that the stepper motor as the wheel rotor has an accurate rotation result.

3.1.2 Accuracy and Precision of Wheel Speed 1 and Wheel 2 on Wheel Modeling Tool Connected with Belt

The speed measurement accuracy of wheel 1 is obtained by performing nine data retrievals from 10 rpm to 90 rpm inputs. The input values on wheels 1 are set points 30 rpm, 50 rpm and 80 rpm. Average speed compared to measurement using a tachometer. After data analysis, measurements performed on wheel 1 obtain a flat-rate accuracy of 97.59%. This indicates that tool modelling has results that are similar to tachometers. Wheel speed precision 1, the measurements carried out obtained wheel density 1 at 30 rpm of 99.3%, 50 rpm at 99.19% and 80 rpm by 99.93% This indicates that wheel 1 has a rotating result that is close to accurate.

The accuracy measurement of wheel speed 2, the measurements on the wheel movement modeling tool relates to the belt for nine input variations, has a fairly good accuracy. After the data analysis, the measurement on wheel 2 obtained an average accuracy of 98.15%. The precision of the speed of wheel 2, can be seen in the table 9. The precision with ten times repeated measurements for the input speed of 20 rpm, 40 rpm and 60 rpm had quite good results. It indicates that the wheel 2 has a rotating result that is close to accurate.

3.1.3 Accuracy of Video Tracker Analysis Results on Wheel Modeling Tools Related to Belt

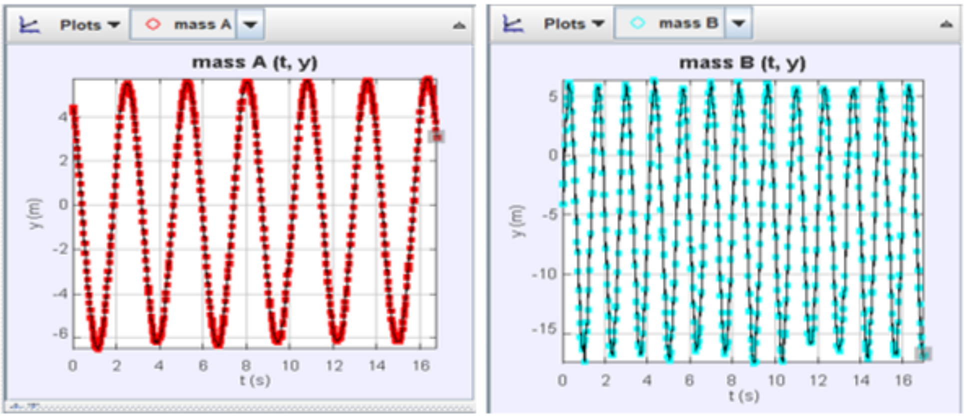
Accuracy measurement data is derived by contrasting tracker analysis with theoretical calculations. The comparable physical magnitude is the value of the angle speed (ω) and the linear speed (v) of the link wheel related to the belt along with experimental activity. The data analyzed is the accuracy for the rotation of wheel 1 with wheel 2. The data was obtained by performing eight variations of the speed input, from 20 rpm to 90 rpm. After the data analysis, wheel 1, obtains a precision of the average angle speed of 95.47% and wheel 2 of 98.01%. The linear velocity of the wheel, 1 achieves the average rate of 96.31%. And wheel 2, 97.67%. This indicates that the tracker application can display the values analyzed have results not much different from the calculation values of the formula.

3.2 Wheel Analysis Results Connecting to Belt Using Video Tracker

Analysis activities using a video tracker are used to observe the trajectory of circular motion on the wheels related to the belt. Tracker is an application that is able to display the characteristics of the wheel related to the belt in the form of graphics. The chart is a chart of position change on the y axis and time change on x axis. Through this application, the chart also shows the relationship between the linear velocity of the y Axis and the angle speed of the x Axis.

There are three variations of video speeds of experimental activities using wheel-related modeling tools, namely 30 rpm, 60 rpm and 80 rpm. The analysis was performed on wheels 1 and 2. Wheels 1, 15 cm in diameter, and wheel 2, 10 cm in Diameter. Each wheel was analyzed for each speed input to show the desired output chart.

Wheels rotation generates sinusoidal graphics on the tracker application. The y axis change graph against the x-axis time, provides information related to physical magnitude for circular motion matter. Changes in the position of wheels 1 and 2 for speeds of 30 rpm are shown in figure 6.



(a) (b)

Figure 6. (a) Graphic Sinusoidal Change of Wheel Position 1 Speeds 30 Rpm (b) Graphic Sinusoidal Change of Wheel Position 1 Speeds 30 Rpm

The result of the wheel analysis relates to the belt for the input speed of 30 rpm, can be seen in Figure 6. The graph of the change of position on the axis-y forming the sinusoidal wave. Figure 6 (a) is the results of the analysis of wheel 1 and figure 6 (b) results of analysis wheel 2. The time it takes to form one wave on wheel 1 is longer than wheel 2. This is due to the fact that the radius of wheels 1 are larger than the wheel 2, so it takes longer to rotate.

A tracker application can plot a graph of the linear velocity relationship to the angle speed. Rotations of wheels 1 and 2 respectively have output values that can be used to observe the characteristics of the rotation of the wheel. The linear speed versus the angle speed for a speed of 30 rpm is shown in figure 7.

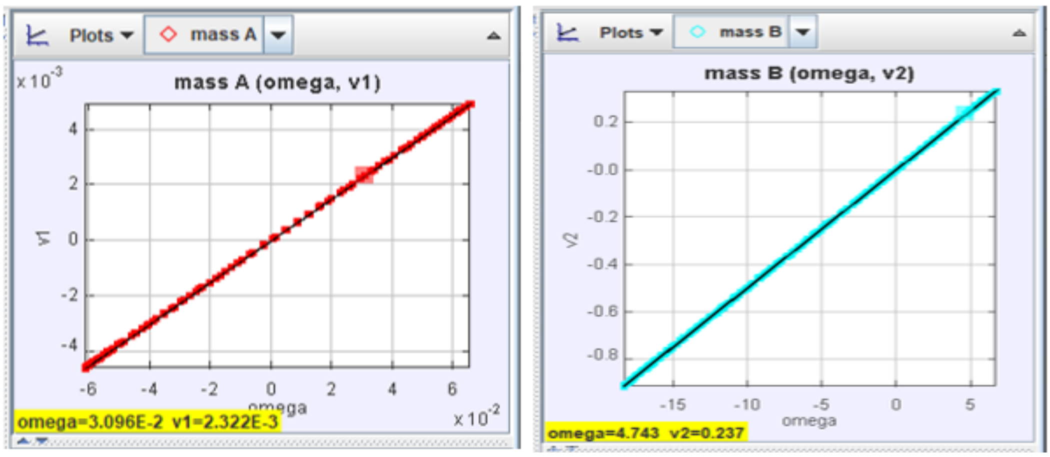
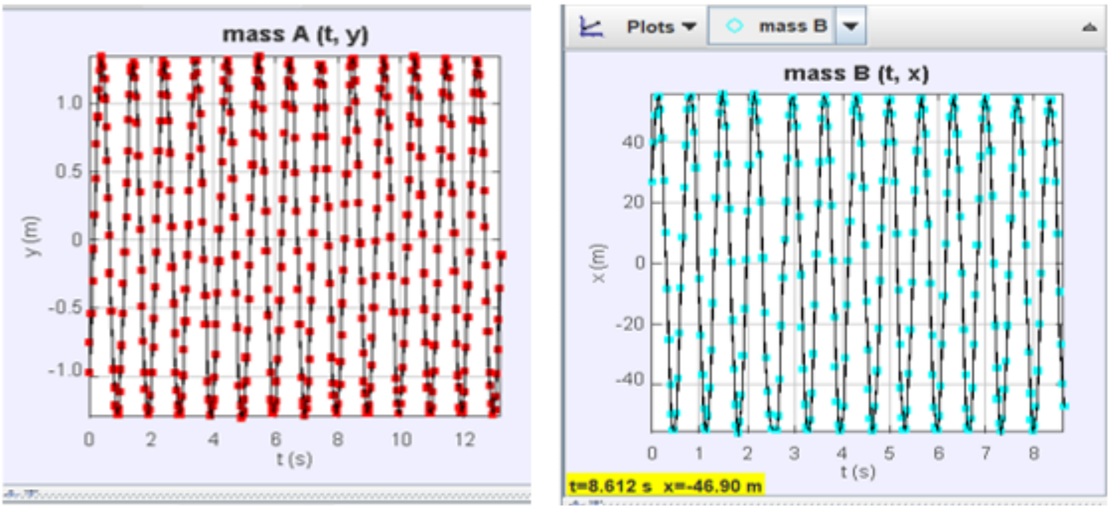


Figure 7. Linear Speed Graph Against Angle Speed of 30 Rpm

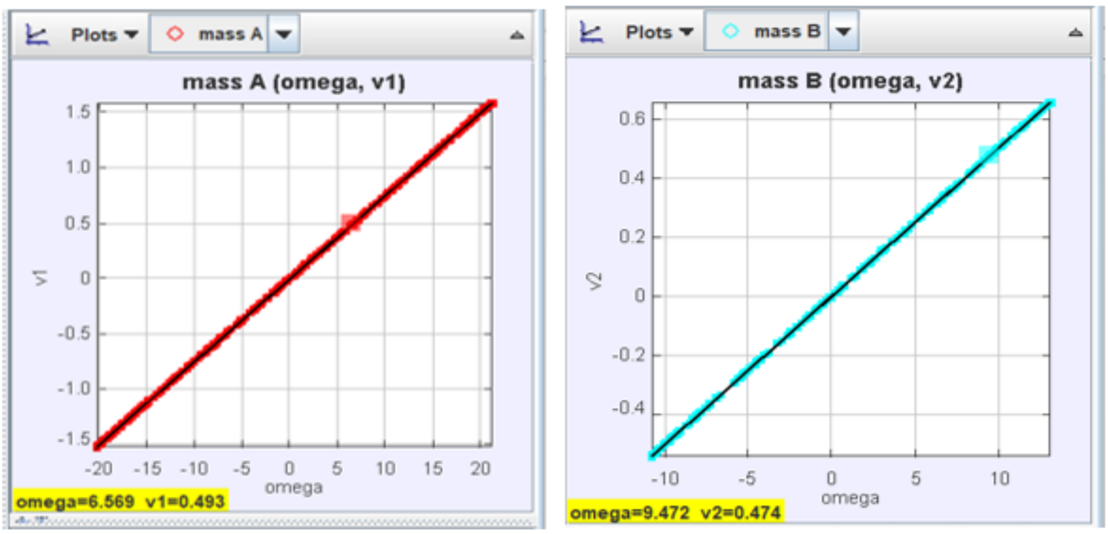
Figure 7 is a graph of the linear velocity to the angle speed for the input of 30 rpm. Figure 7 (a) is the analysis of wheel 1 and Figure 7 (b) the analysis results of the wheel 2. The value of the angle velocity of wheels 1 is 3.096 rad/s and its linear speed is 0.232 m/s. Changes in the position of wheels 1 and 2 for speeds of 60 rpm are shown in figure 8.



(a) (b)

Figure 8. (a) Graphic Sinusoidal Change of Wheel Position 1 Speeds 60 Rpm (b) Graphic Sinusoidal Change of Wheel Position 2 Speeds 60 Rpm

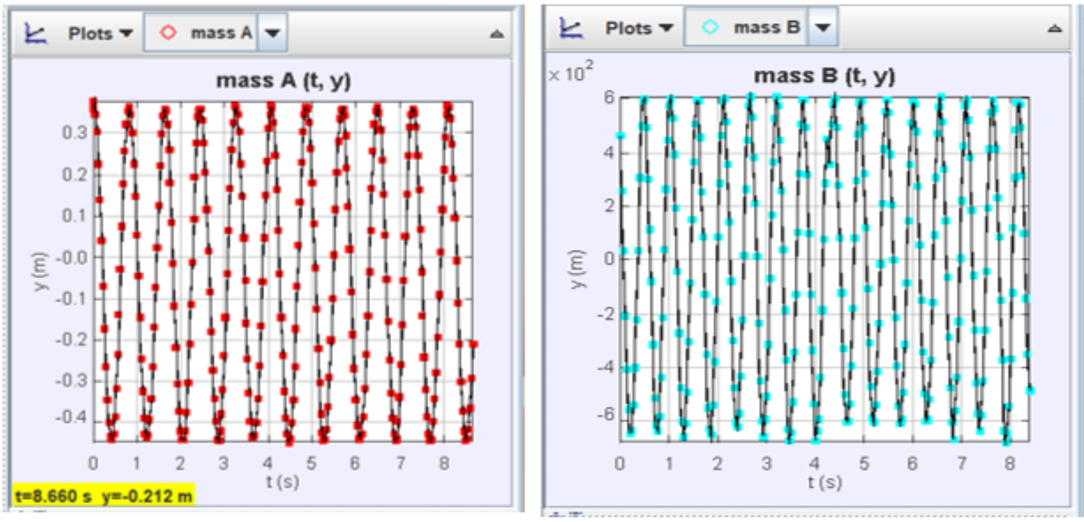
The result of the wheel analysis relates to the belt for the input speed of 60 rpm, can be seen in Figure 8. The chart of the change of position on the axis-y forming the sinusoidal wave. Figure 8 (a) is the results of the analysis of wheel 1 and figure 8 (b) results of analysis wheel 2. The time it takes to form one wave on wheel 1 is longer than wheel 2. This is due to the fact that the radius of wheels 1 are larger than the wheel 2, so it takes longer to rotate. The linear speed versus the angle speed for a speed of 60 rpm is shown in figure 9.



(a) (b)

Figure 9. (a) is the result of the analysis of wheel 1 and figure 9 (b) the results of analyzing wheel 2

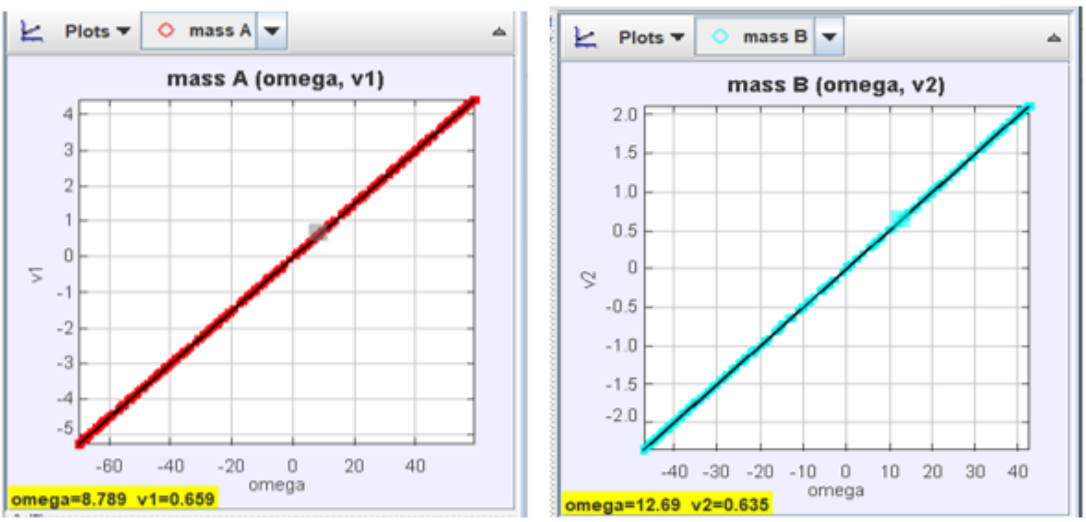
Figure 9 is a graph of the linear velocity against the angle speed for the input of 60 rpm. Figure 9 (a) is the result of the analysis of wheel 1 and figure 9 (b) the results of analyzing wheel 2. The value of the angle velocity of wheels 1 is 6.549 rad/s and its linear speed is 0.49 m/s. Changes in the position of wheels 1 and 2 for speeds of 80 rpm are shown in figure 10.



(a) (b)

Figure 10. (a) Graphic Sinusoidal Change of Wheel Position 1 Speed 80 Rpm (b) Graphic Sinusoidal Change of Wheel Position 1 Speed 80 Rpm

The result of the wheel analysis relates to the belt for the input speed of 80 rpm, can be seen in Figure 10. The chart of the change of position on the axis-y forms the sinusoidal wave. Figure 10 (a) is the result of wheel 1 analysis and Figure 10 (b) results from wheel 2 analysis. The time it takes to form one wave on wheel 1 is longer than wheel 2. This is due to the fact that the radius of wheels 1 are larger than the wheel 2, so it takes longer to rotate. The linear speed versus the angle speed for a speed of 80 rpm is shown in figure 11.



(a) (b)

Figure 11. (a) is the result of the analysis of wheel 1 and figure 11 (b) the analysis results of the wheel 2.

Figure 11 is a graph of the linear velocity to the angle speed for the input of 80 rpm. Figure 11 (a) is the result of the analysis of wheel 1 and figure 11 (b) the analysis results of the wheel 2. The value of the angle velocity of wheels 1 is 8.789 rad/s and its linear speed is 0.659 m/s.

On wheel analysis related to the belt for video tracker analysis, the speed values analyzed are 30 rpm, 60 rpm and 80 rpm. The physical magnitude analyzed is frequency, period, angle velocity and linear velocity. Frequency values will increase as the speed increases. Period values are reduced as the velocity grows. The frequency value is also influenced by the radius of the wheel. The time required to form one wave on a wheel with a larger diameter becomes longer compared to a smaller wheel. This is because the larger the diameter of the wheel, the longer the time required for one complete rotation.

The speed input of the wheel is the same so that the wheel 1's linear speed value is closer to the linear speed of wheels 2 because they are both bent with a belt. The angle speed value for wheel 1 is smaller than for wheel 2, this is influenced by the radius difference. The angular speed will be greater if the radius of a wheel are smaller. The data analysis finding revealed that the magnitude of the physics read on the Blynk and tracker applications is close to the calculation of the theoretical formula.

The Tracker application has a potential impact effect on improved understanding of physical experimental activities [23]. The design of the wheel modeling tool related to the belt using speed and time control for video tracker analysis can be used for circular motion experiment activities. There are two advantages of this research: the tool modeling that can be controlled remotely using android and the Tracker video analysis resulting from the graphics of the wheels related to the belt. From the data analysis resulted that the magnitude values - the physical magnitudes read on the Blynk and tracker applications are close to the calculations of the theoretical formula. The Blynk application is an IoT service to create remote controls and sensors from Arduino and NodeMCU devices quickly and easily [24]. The Tracker application displays the sinusoidal chart of y axis position changes against time as well as the diagram of the relationship between angle speed and linear speed.

In this study there are some shortcomings. The first disadvantage is that the stepper motor is unstable for turns above 100 rpm. This can be overcome by using a more stable stepper engine for high inputs. The second disadvantage is that the optocoupler sensor cannot read speeds below 10 rpm and above 150 rpm, as well as the order of numbers that can be read only in integer numbers. This leads to the speed value being read only for the multiple 10. This deficiency can be overcome by using a sensor that can read in decimal order. The third disadvantage is that speed values above 90 rpm yield poor Tracker analysis results. The reason is that the video recorded using a smartphone with a video resolution of 1920 x 1080 fps. This can be overcome by using a high-resolution video recorder.

4. Conclusion

Considering the outcomes obtained, consequently it may be said that the wheel modeling tool related to the belt using speed and time control can be controlled through the Blynk application and video recording used as circular motion analysis material on the tracker application. The design of the system is a box size 35 in length, 20 cm in width and 18 cm in height consisting of one switch, LCD, and two wheels connected by a belt. Wheel 1 has a diameter of 15 cm and wheel 2 is 10 cm. Based on data analysis, obtained results of physical parameters with high accuracy and precision values with standard measuring instrument namely tachometer and is in line with the calculation of the theoretical formula. Results of comparison of angle speed and linear speed tool modeling using Blynk application with formula analysis on the theory of circular motion approaches formula calculation results. The frequency value increases according to the increase in the speed input and compared to the reverse period. The wheel analysis results relate to the belt for video analysis tracker with the same speed input, the value of wheel 1's linear speed is close to the linear speed of the wheel 2 because both are connected with the belt. The wheel 1's angle speed value is lower than wheel 2's, this is influenced by the difference between the finger and the finger of the wheel. So, it can be concluded that the wheel modeling tool related to the belt using speed and time control can work effectively and validly.

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