DEVELOPMENT OF AUTO FEEDER MECHANISM FOR CRICKET BALL THROWING MACHINE"

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ABSTRACT
Cricket is one of the most popular games in India. We have developed an automatic feed mechanism for cricket ball throwing machine to help young and passionate players improve their cricket skills. The mechanism consists of a DC geared motor with ribs connected to a shaft. The motor rotates at a specific interval desired by the user. The rotating fins push the ball into the ball-throwing machine. The rotation of the DC motor is detected by an induction sensor and sends a signal to the PLC. This program is designed to control the time interval at which ball is delivered to a throwing machine. This eliminates the external effort required to feed the balls in turn to the cricket-throwing machine
Keywords: DC geared motors, PLC, cricket, machine, External Efforts etc.

I.INTRODUCTION

In today's highly competitive world, every job requires maximum practice to achieve the required skills. In cricket, a bowling machine is a device that repeats the throwing of a ball of a certain length,line, and speed so that the batter can practice (usually on the net) and hone certain skills. In the context of unprecedented pandemics and the uncertainty of the physical crowd, the need for these machines for batters becomes more acute. 4,444 professional cricketers train for an average of about4-6 hours each day over 5 days a week. This includes network training and various forms of trainingsuch as flexibility, strength and conditioning, stamina building, gym and reflexes, fighting, bowlingand playing on the pitch. Even beginners need a fair amount of ball play practice. Usually bowling

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alleys exist to throw the ball to the batter, but if you continue bowling with the same energy, your body gets tired. This is why you need a cricket ball throw that can run continuously at a certain length and speed. Also, the for this ball throwing machine there is need of certain external human efforts to feed ballsinto the machine which is very hectic job for human being to do it for long period of time.

During this pandemic times it becomes necessity maintain the COVID protocol and avoid unwantedgathering of people.

II.METHODOLOGY
1. Conceptual design:
In Auto feeding Mechanism We have used a storage rack to store the balls. The Capacity ofthis Rack is calculated to be 36

Balls. This Mechanism is feasible and easy to use.

Figure 1.CAD Model of mechanism

The storage medium was made of acrylonitrile butadiene styrene (ABS). It is mounted on the ball launcher at an angle of 7°.

This mechanism consists of a 12 V dc gear motor with fins mounted to the shaft. Fins Help put the ball in turn into the Ball throwing machine. An inductive sensor is used to sense a rotation of a DC motor and send a signal to a programmable logic control called a PLC. Power for the PLC is providedby a switched-mode power supply with an output of 8.8A. Three switches are used. When the first switch is turned on, it sends a signal to the PLC and the PLC sends an output according to the programbeing downloaded. A program has been developed in three time periods, i.e., 20 seconds, 30 seconds, 40 seconds. The beep will always sound for 2 seconds at the end of each time cycle. When the time is up, the motor starts to spin and the ball is put into the Ball throwing machine. When the motor finishes one revolution, the induction sensor sends a signal to the PLC and stops the motor and startstiming for the next cycle. If, in the case of a user turning on one or more switches at the same time,an arrangement shall be made so that

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the beeps sound continuously until the single switch or noneremains ON.

2.Closure:

Above chapter briefs us about construction and working of Auto feeding mechanism for ballthrowing machine

III. List of Components –
1.Metal Componant

A.   Storage Rack:

Storage Rack is manufactured from acrylonitrile butadiene styrene (ABS). The part is manufactured by using 3D printing process. The reason behind using this material is that this material offers high strength and toughness and also this material comes with glossy and finished look. The dimensions of storage rack are 900*550*90 mm.
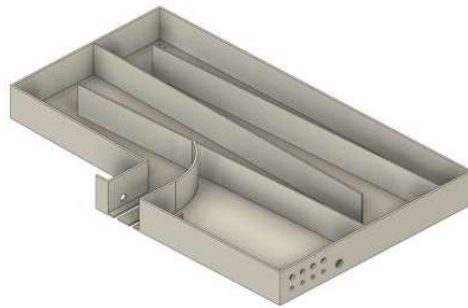
B.   Motor:

Motor is used to rotate the fins which in turn pushes the ball into the ball throwing machine.Motor specifications:

Type:	DC motor
Max Torque:	4 Kg-cm
Speed:	10 rpm
Voltage:	12 V
Current:	450mA
Weight:	150 gm

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C. Synthetic cricket ball:

The balls which we have used for the designing the Auto feeding Mechanism is SyntheticCricket Ball .

Ball specifications

Diameter: 63 mm

Weight: 70 g

D. Supporting stand:

To support entire storage rack stand is required. The storage rack is made of Mild steel

E. Fin:

For applying motor torque on ball, we have attached Fin on shaft of motor. With the help of thisfin ball is push forward.

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2.Electrical components

A. Programmable Logic Control (PLC)

switched-mode power supply supplies power to the PLC. The negative voltage from SMPS is given to S0.X0 is connected to main ON/OFF switch. X1 is connected to one end of Inductive sensor. While X2, X3, X4 are connected to the three switches. Positive voltage from SMPS is given to the C0. While Y1, Y2 are connected to positive ends of Relay
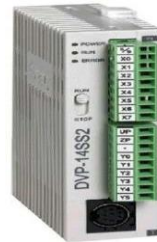
B. Switched-Mode Power Supply

Specifications: Current: 8.8AmpVoltage:24V

C. Inductive Sensor

It is used to sense one revolution of shaft of DC motor. When DC motor completes onerevolution it is sensed by inductive which in turn sends signals to the PLC.

D. DC to DC convertor

As the output coming from SMPS is 24V and our motor and Beep requires 12V supply we have use DC to DC convertor. After converting the voltage, the output of DC convertor is given to motor and beep

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E. Beep

A beep is used to alert the batsman that ball will be delivered in short time

F. Switches

Switches are provided so that user can select any one of the time interval which he/she wants.

G. LED

16   mm LED is being used which indicated which switch is ON/OFF

IV. Calculations

For the proposed Auto feeding Ball throwing Machine we need a dc motor. For pushing the ball into the machine, we need to calculate the required torque.

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a)   Torque Calculation

Mass of the Ball (m)=150gm=0.15 kgCoefficient of Friction(μ)=0.4 Diameter of Ball(d)=70mm

Force due to weight= m*g

=0.15*9.81

= 1.4715 N

Normal Force = Force due to weight

=1.4715 N

Force due to Friction = μ* Normal Force

=0.4*1.4715

=0.5866 N

Total Force = Force due to weight + force due to friction

= 1.4715+0.5866

=2.0601 N

Perpendicular Distance=76.75 mm

 Perpendicular distance * total force

= 76.75*2.0601

=158.11 N-mm

=0.15811 N-m

The torque required to push the ball into the machine is 0.15811 N-m

We have used Storage rack made up of acrylonitrile butadiene styrene (ABS). Its is required tocalculate quantity of balls that can be stored into the storage rack

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b)   Closure:

This chapter briefs about the torque calculation

V.FIGURES AND TABLES

V.1 CAD Model of mechanism
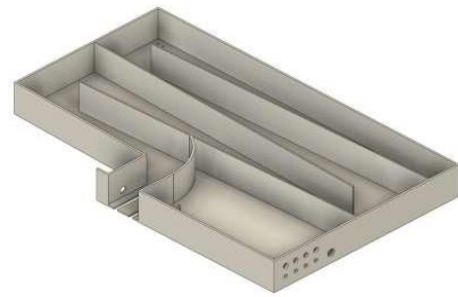
V.2 Storage Rack

V.3 Final Modules

CONCLUSION

➢   Cost of ball throwing machine around 2.7 lack which is too expensive because it developed byforeign manufacturers, but there has no existing machine that has Auto feeder mechanism installed. So that is not affordable to local Academy and institute

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level practice purpose.

➢ It becomes a hectic job for a person to feed balls one by one into the ball throwing machine. For this purpose, there is a need to affordable Auto feeder Mechanism for Cricket Ball throwing machine

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