

# The Physical Modeling of a Bowling Ball in Action

The idea behind this project is to create a model of the dynamical bowling game system. By analyzing sets of physics equations and applying them to this system, a program can be created to calculate and output the path and other characteristics of a bowling ball's traversal across a bowling lane. This output is based on a set of initial conditions, including speed, angle, lane conditions, and starting rotation. Once finished, this model will be used to analyze the magnitude of effect of each of the different variables on the resultant trajectory of the bowling ball. Values will be saved in a database so that patterns may be analyzed and compared with other research.



Some of the equations used:

- $\Sigma\tau = F \times R = I\alpha = dL/dt$
- $L = I\omega$
- $v_{cm} = R\omega$
- $I = 2/5 MR^2 \leftarrow \text{Solid Sphere}$
- $\omega = \omega_0 + \alpha t$

Some of the constants used:

- $M = 7.27$  kilograms
- $R = .1095$  meters
- $g = 9.81 \text{ m/s}^2$

Future Location of  
some sort of graph