

## Project 2: Fidget Spinning at a Midville Mall Kiosk

**Instructions.** Work in groups of two.

You have been contacted by a manager of Twitching Toys, a game and toy store that has a kiosk in Midville Mall. One of the items for sale at the kiosk are fidget spinners. The manager is trying to determine the number of fidget spinners to order each day.

The manager has given you the following description of the kiosk and its fidget spinner sales operation. The kiosk is open each day from 10 a.m. until 8 p.m. At the beginning of each day, the store receives a delivery of spinners to satisfy customer demand. Twitching Toys purchases spinners in packages of five. Any unsold spinners are stored for sale on the next day.

Once a week-long contract for purchasing has been made, it is fixed and the same number of spinners arrive each day. Spinners take a certain amount of time to unpack from the package and put onto the kiosk display. When fidget spinner customers arrive, they instantly leave if no spinners are on display. If there are spinners, they purchase exactly one, take a certain amount of time to complete the purchase, and leave the kiosk.

The manager wants your help in determining the best number of packages of spinners to order each day by simulating a week of spinner sales. In particular, the manager is interested the best tradeoff between the objective of minimizing the number of unsatisfied customers – customers that arrive to find no spinners – and minimizing the number of spinners kept in the kiosk overnight.

Data on unloading/display times (in seconds), purchase times (in seconds), and fidget spinner customer interarrival times (in minutes) are in the dataset below:

<https://github.com/sa421-usna/project-02/zipball/master>

Conduct a simulation study to help the manager of Twitching Toys, and write a report with your findings. Your report should be in R Markdown. Follow the guidelines from Lesson 7 to structure your report. Your .Rmd file must call JaamSim directly to run your simulation, and must run in RStudio from top to bottom without any user intervention or errors. Make sure to hide any unnecessary code or output from your report.

## Additional guidance

For this project, you will need to use some JaamSim constructs that we have not covered before. One learning goal of this project is for you to get some practice reading the JaamSim manual to extend your comfort with JaamSim. You can find the manual, examples, and other JaamSim related things here:

<http://jaamsim.com/downloads.html>

As a first step, ignore the unloading/display times and purchase times. Assume that new fidget spinners are put on display immediately, and purchases happen instantaneously. Focus on creating a model that correctly represents

- (i) the customers arriving,
- (ii) the spinners arriving,
- (iii) the customers leaving without a spinner if no spinners are on display, and
- (iv) the customers leaving with a spinner if there are spinners on display.

Some hints:

- You should have three types of entities: customers, fidget spinners, and customers united with fidget spinners (i.e. a satisfied customer).
- To unite a customer with a fidget spinner, you will need to use an **Assemble** object. Read the manual to see what this object does and how it works.
- You can model the inventory of fidget spinners with a queue. This queue should lead to the Assemble object mentioned above.
- You will also need a **Branch** object to direct customers to purchase a spinner or leave immediately, depending on the number of spinners on display.

Once you have a model that works correctly, incorporate the unloading/display times and purchase times.