Problem statement

My client is a teacher that helps with the robotics club but something that comes up frequently with new students who join the club is that when they set up their robots for the first time the robots do not work because the gears are not set up properly. Typically this is quite hard to imagine without any prior experience so I have been requested to make some form of simulation that allows these students to easily test and try out gear combinations in order to make simple arm movements.

Description of scenario

The problem that I have been given is that new students entering robotics are unable to create a good sense of how gears should be set up, using ratios, in order to create enough strength to make lifts. One of the most important factors that went into my decision-making on the GUI was that it needed to be intractable so that many different combinations could be made. It was also beneficial for my client if I were to make it readily available for use at any time as students would most likely only need to use it once in order to get their plan out quickly. For these two criteria, I decided to use Unity and C# as it has easy access to interactable moveable objects and can be easily put onto a website so that it can be accessed anywhere.

Rationale

I chose to use the Unity engine in order to make this program because it allows for quite nice and dynamic GUI that can easy be interacted with by the user. This also allows for things that other databases, such as netbeans, would not allow for due to it not being able to animate or operate outside the bounds of being purely for data. Since this was to be used for teaching purposes this needed to be able to not only be practical but also look nice which would encourage the interaction of the user with the tool available. I also used C# because it is the language that I am most comfortable with and the Unity engine mainly uses that. The Unity engine also allows for uploads of built versions to be playable on websites like github which can be accessed by anyone allowing for it to be a simulation that can be called upon whenever needed.

Success criteria

- Access can be from any computer and should be simple to access - Should not need to be downloaded but preferably be accessible from the internet in a browser
- Can show the effect of gear ratios on the velocity of spin - Shows the actual data that can be represented by the affects of gears
- Is able to simulate the action or motion of a robots arm when gears are applied to it - The user should be able to physically see how the arm moves when play is pressed