

1. Linear cue slider

- a. Linear rail mounted on one side of the pool table. There will be a dc motor that is mounted on the fixture with the pool stick. This motor will be used to move the stick in X up and down the table. There will also be a servo motor mounted on the pool stick fixture that will be able to turn it at an angle to approach the cue ball from different sides in order to aim it.
- b. The camera will be mounted overhead on an extruded frame and there will be a light that can be attached to the frame alongside the camera.
- c. Pros: simple design, easy to build and wire, simple and cheap components.
- d. Cons: performance depends heavily on cue ball placement, accurately determining the location of the pool stick on the rail,

2. Gantry

- a. Track mounted frame that has the camera and the solenoid attached to it. The solenoid is attached to a downrod that will keep it stuck at the cue ball's level. The downrod will be mounted on a servo motor so that it can rotate 180 degrees to aim the cue ball. The servo motor will in turn be mounted on a rail so that it can move in the x direction and the frame will be mounted on another rail so that it can move in the y direction.
- b. Pros: works better when the cue ball is close to the rail. Easy to aim the solenoid
- c. Cons: difficult to navigate if there are balls in the kitchen, completely fails if the ball is touching the rail.

3. Magnetic solenoid walker

- a. Have a rail mounted electromagnet and put the solenoid on the table. Drag the solenoid across the table to the cue ball using the electromagnet. Flip the polarity and rotate the electromagnet to point the solenoid. Wire management for the solenoid will be done by processing a video feed from the webcam and routing the solenoid to avoid other balls.
- b. Pros: performs the best in tight spaces. Can turn 360 degrees. Robust and clean design.
- c. Cons: ball return physical constraints, very high cost, routing the solenoid while considering collision with the solenoid and its wire.

4. Spring loaded cue with servo trigger

- a. Similar mounting style to the linear cue slider, except instead of using a solenoid to shoot the cue ball, design a guide tube with a spring at the bottom of the tube. It will be loaded by the servo motor in order to determine striking force.

- b. Pros: more closely resembles actual pool. More precise control over force.
Potentially higher maximum striking force.
- c. Cons: less safe and much more complicated spring physics

Criteria	Weight	Linear Rail	Gantry	Magnet
Precision	4	8	8	7
Cost	2	9	6	1
Ease of Implementation	2	7	6	1
Safety	1	10	10	5
Cycle Time	1	10	9	8
Robustness	3	5	7	10
Total Score	13	99	96	75
Perfect Score: 130				