

EE200: Design (Concept) Essay

Name: **Sikka Sultan**, the Coin Sorter

Sikka Sultan, in all simplicity, a coin sorter that would efficiently sort **Pakistani** coins of different sizes (**RS-1**, **RS-2**, **RS-5(new)**, **RS-5(old)**, **RS-10**) and separate them into separate compartments. The machine construction/design is divided into **three** main phases:

1- Phase 1 (The Hopper):

The coins are placed on the hopper tray and owing to a vibrating mechanism, they move down from the tray to the next spinner basket.

2- Phase 2 (The Spinner):

The collected coins are then spun via a spinner which is pivotal for the smooth traversal of the coins to the sorting plate.

3- Phase 3 (The Sorter):

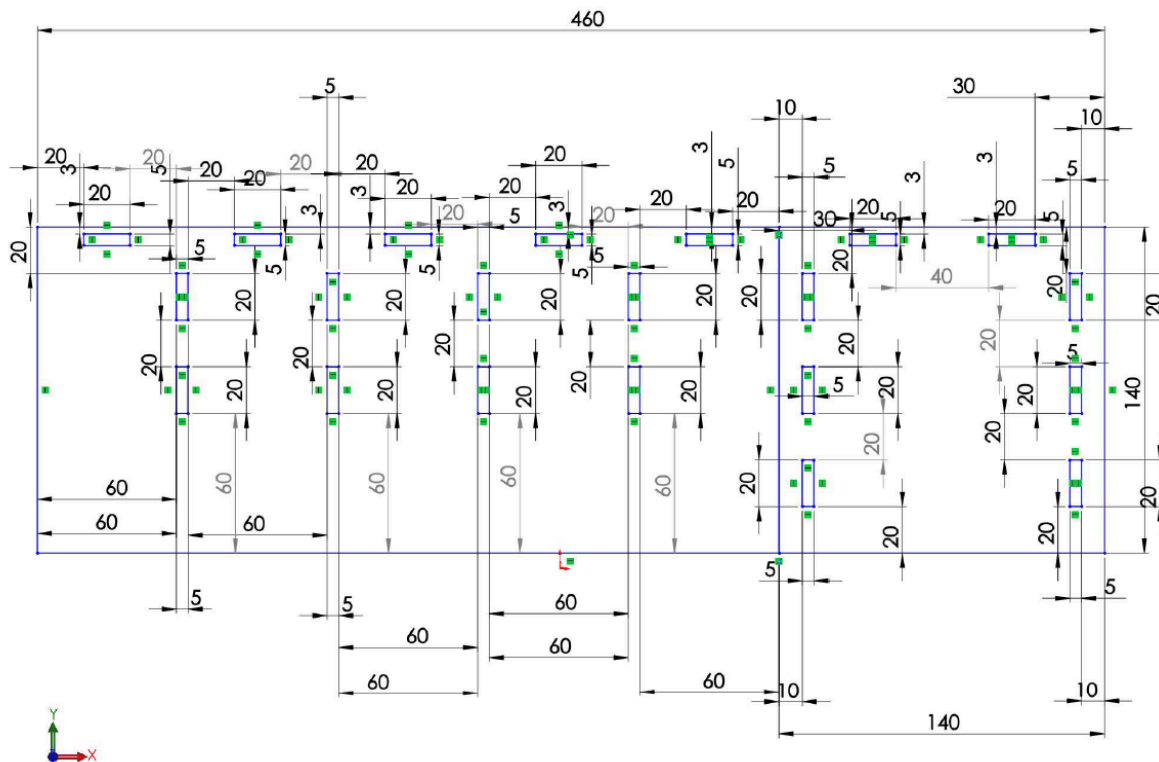
The coins collected from the spinner will be sorted on the sorting plate on the basis of their distinct dimensions.

Provided below is some information about the dimensions of each of the coins to be potentially sorted:

Coin Type	Coin Dimensions
RS-5 (small)	18.5mm diameter
RS-5 (large)	23.5mm diameter
RS-2	22.5mm diameter
RS-1	20mm diameter
RS-10	25.5mm diameter

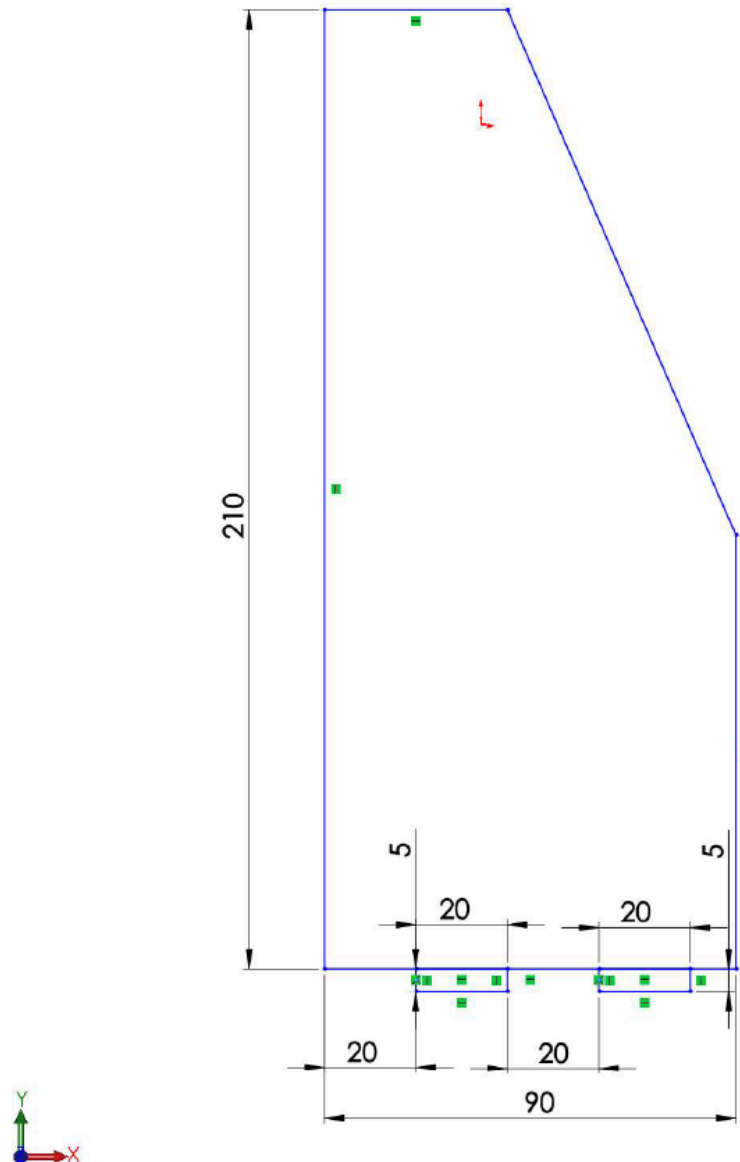
Table 1.0: Coin types and dimensions

At the time of writing this essay, a total of 14 CAD parts were completely designed, ready for laser cutting. Design schematics for each of these parts are shown below (**all dimensions in mm**):



Part #1: The Bottom Plate

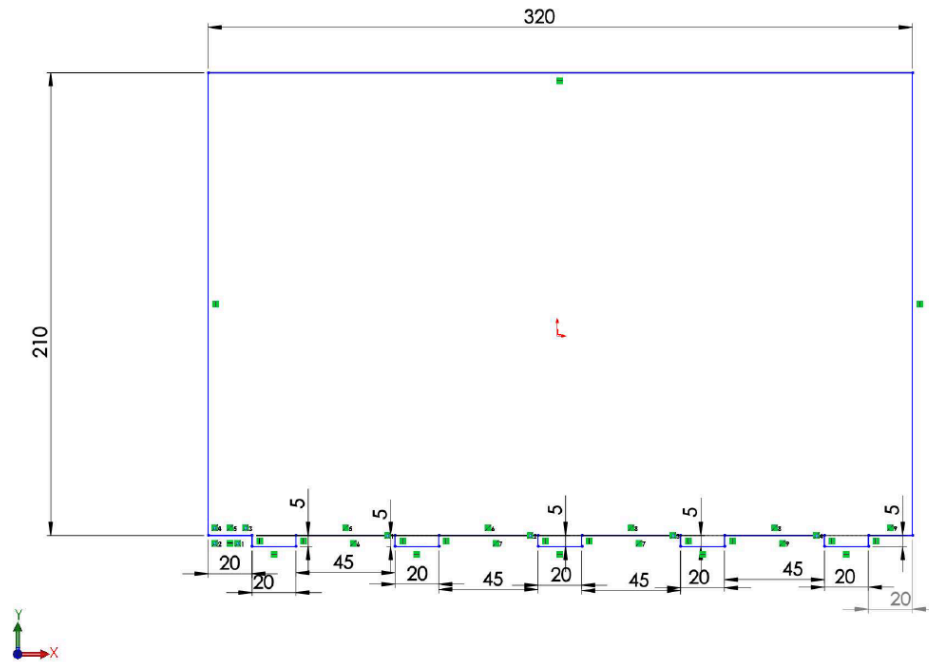
Made by **Sadaan Tahir**



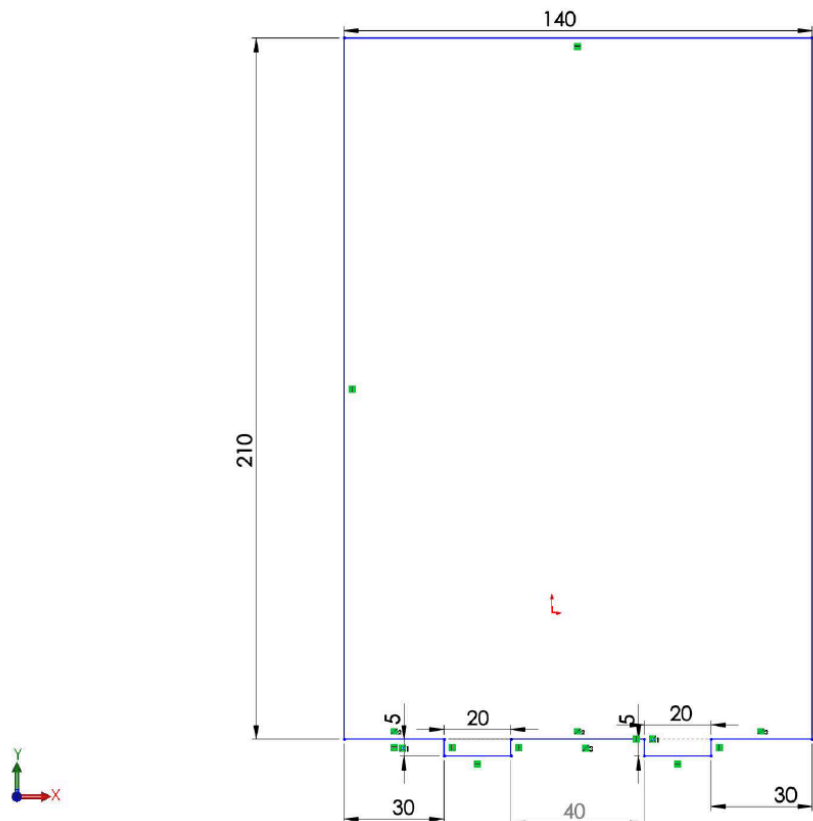
Parts 2,3,4,5,6: Coin enclosures

Note: Part 2 has been duplicated 5 times for each of the 5 coins to be sorted.

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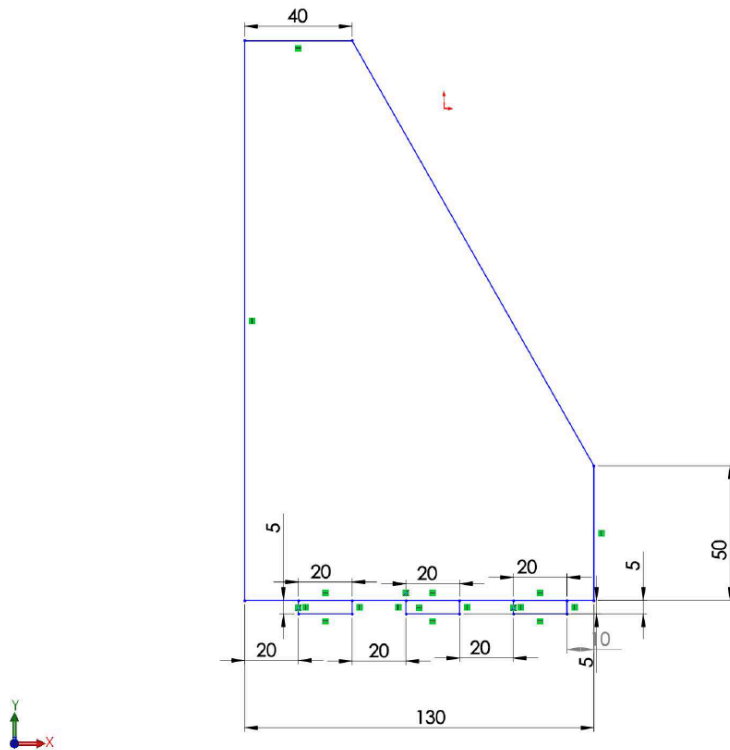
Part 7: Left backplate



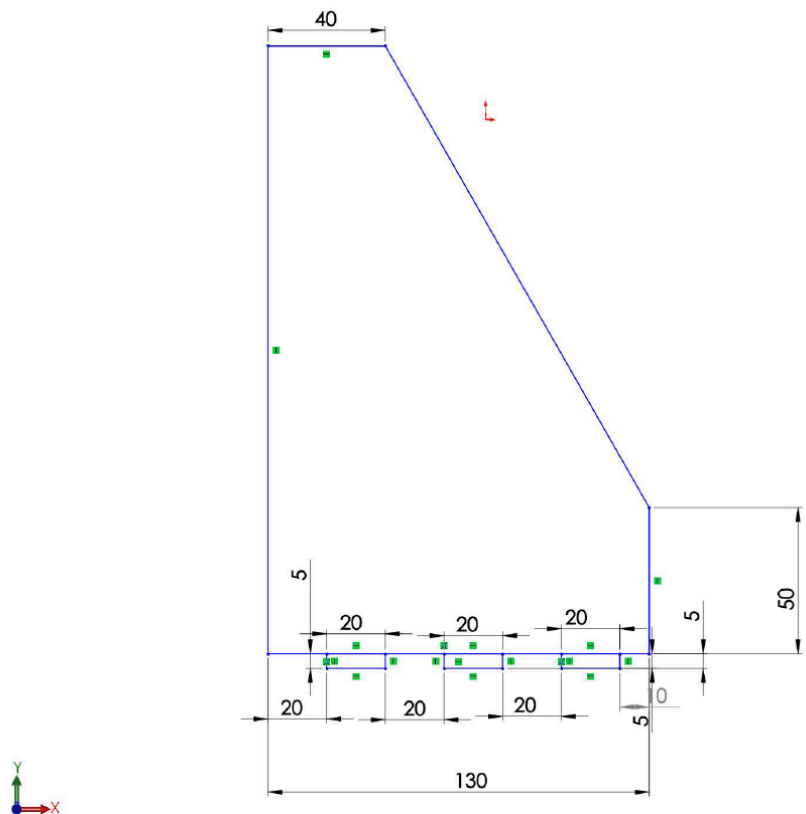
Part 8: Right backplate

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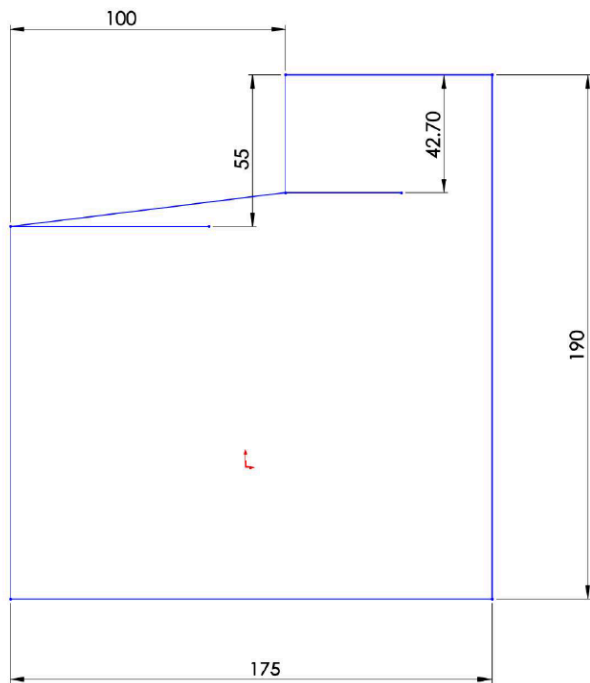
Part 9: Left spinner enclosure



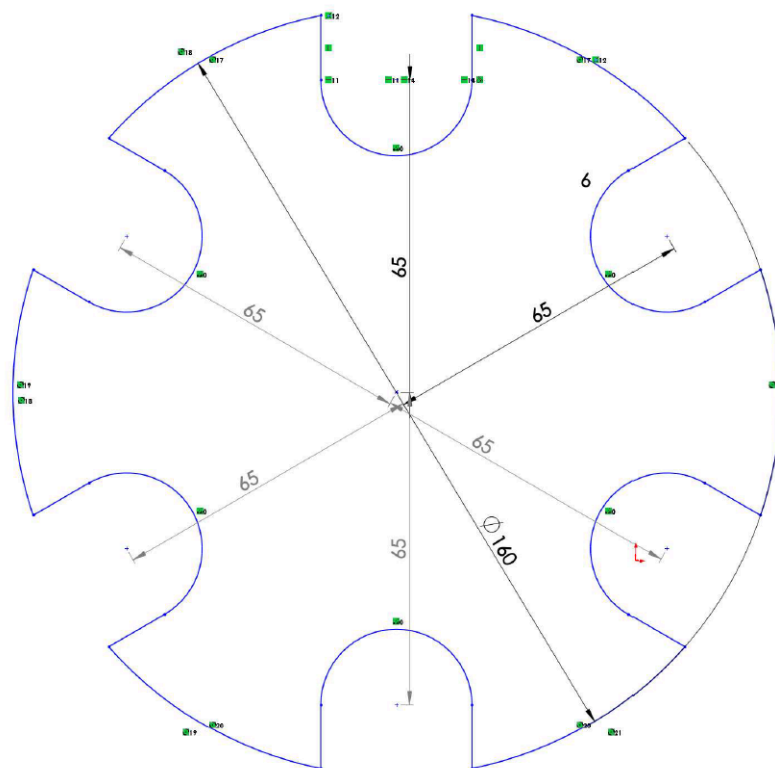
Part 10: Right spinner enclosure



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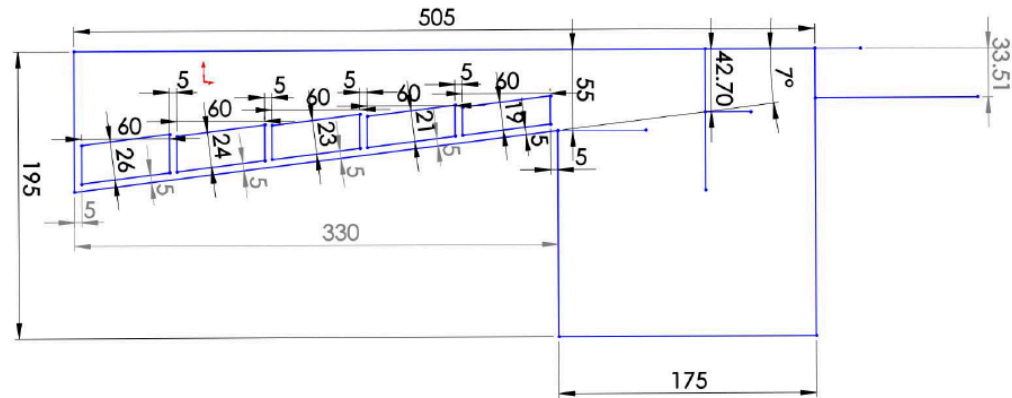


Part 11: Spinner base

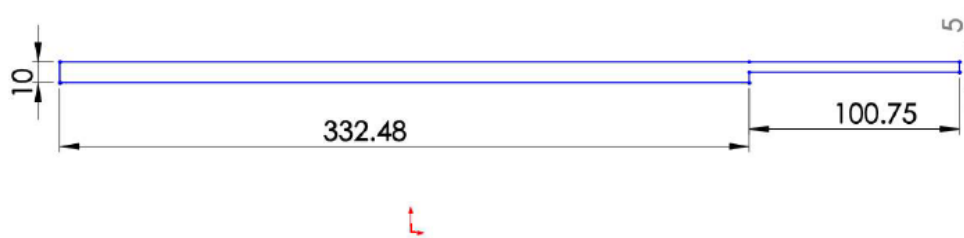


Part 12: The spinner

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Part 13: The sorter plate



Part 14: The line

The CAD models for the hopper tray system and the spinner basket (the curvature that allows the coins to make their way from the hopper to the spinner) are left.

Complete Design-flow provided below:

Our coin sorter, namely Sikka Sultan, will begin its operation with a trapezoidal hopper tray mounted on its side. This tray will temporarily hold the coins and will be equipped with a motor and battery setup that will provide just enough vibration to keep the coins moving. This motor setup for the hopper is essentially the vibrator module of a broken Xbox controller that we salvaged. This will ensure that the machine runs continuously without any interruptions. The coins will then fall from the hopper tray onto a curved transporting tray, which will guide them towards the next stage of the process.

At the base of the spinner, the coins will be collected. The spinner will be crafted from a large circular plate with six equal flaps cut out, leaving a hole in the middle for mounting on a motor (to be done either before or after laser cutting - haven't decided on that yet). As the spinner rotates, the empty flaps will scoop up the coins one by one and transfer them to the sorting tray. To maintain the proper speed and prevent the coins from falling out of place, a circuit will be used to control the speed of the DC motor. This circuit will employ an IC 555 timer, which, when supplied with 12V, will generate a pulse at output pin 3. This pulse will control a MOSFET connected to the motor, allowing the speed to be adjusted via a potentiometer. The

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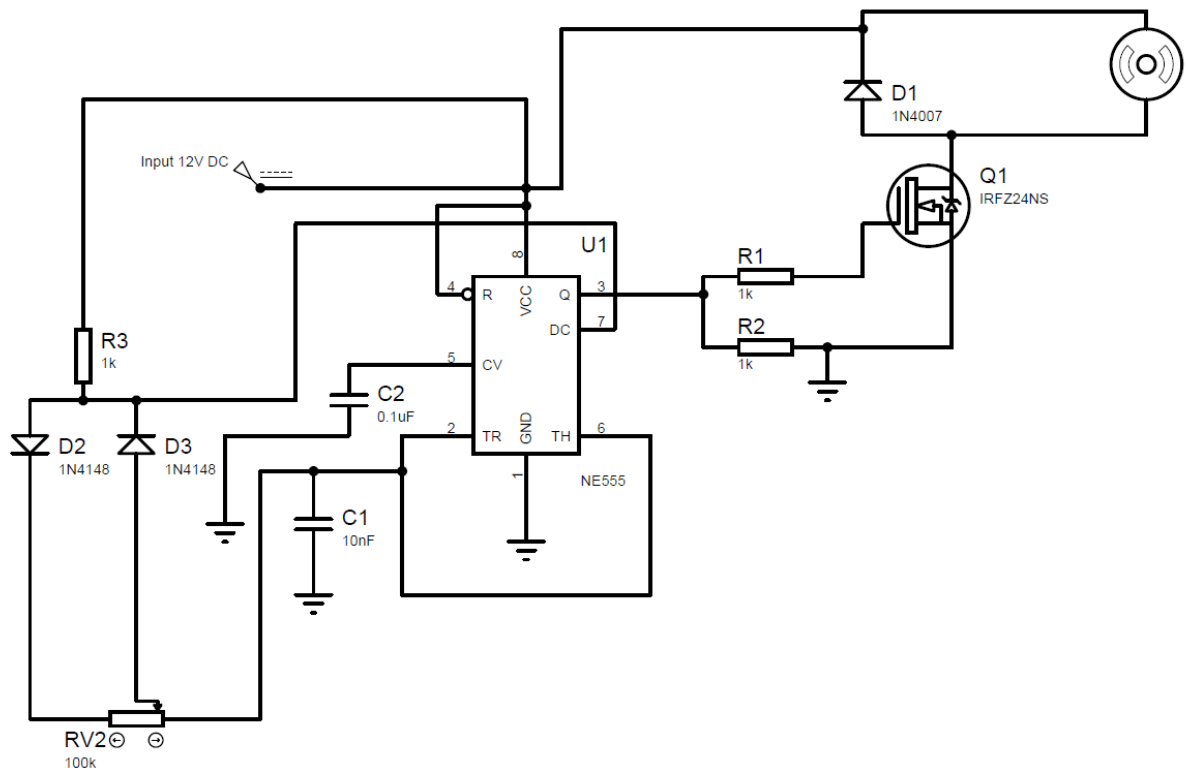
potentiometer's turning mechanism will make it easy and interactive to control the speed, similar to adjusting the speed of a fan.

The sorted coins will then move onto a slanted sorting tray designed to utilize gravity for sorting. This tray will have rectangular cavities of varying sizes that gradually increase with respect to the dimensions of the 5 coin types to be sorted, allowing them to fall through their respective cavities. The sorting tray will be mounted on top of five columns, through which the coins will fall and be collected in containers placed below each column.

All these components will be assembled on a base and supported by solid walls on the sides, bringing the Sikka Sultan to life and ready to efficiently sort coins, preferably till eternity.

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Spinner Circuit: The purpose of this circuit will be to ensure that the spinner's rotational speed can be controlled. This will allow us to either increase or decrease the rate at which the coins are sorted.



Hopper Circuit: The picture to the right shows the vibrator module of an Xbox controller which is to be connected to a 12V battery with a switch connected in a series configuration. The vibrations from this module will be pivotal in the hopper's operation.

