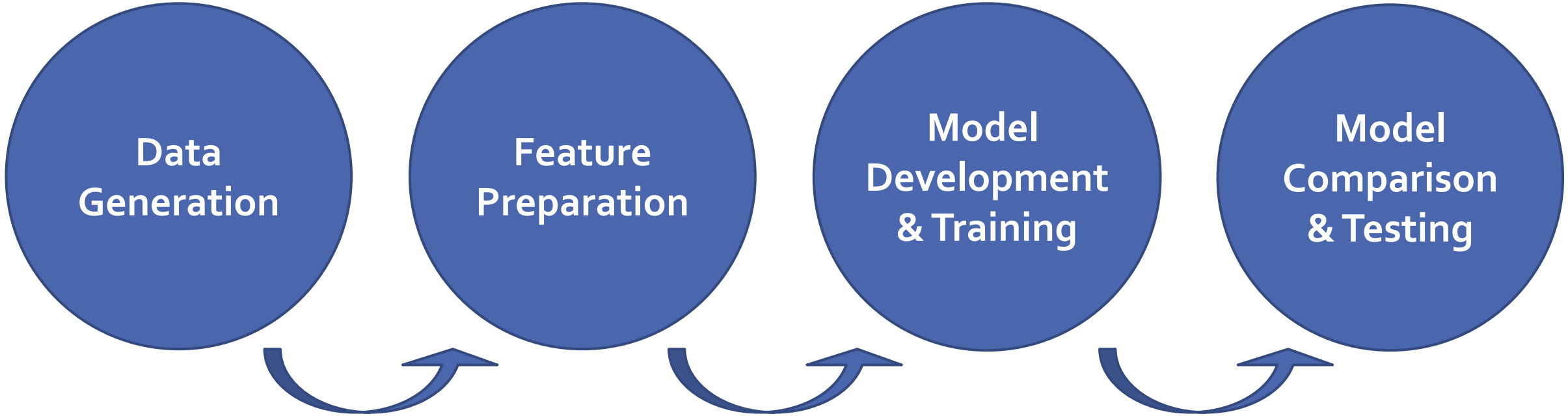
SIMULATION OF BNE

Brazil Nut Effect Simulation Guideline

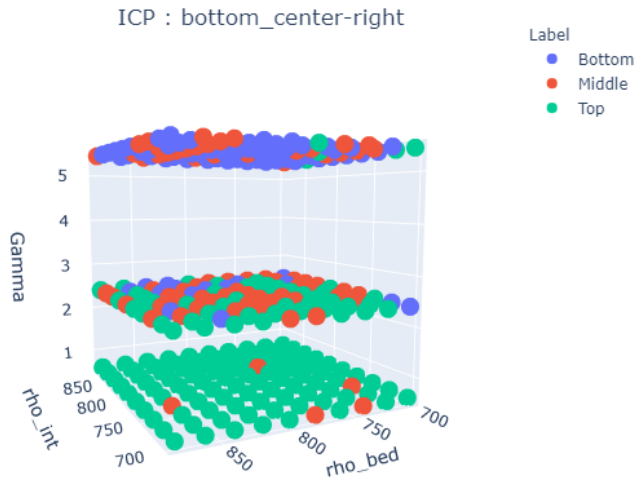
Research Pipeline

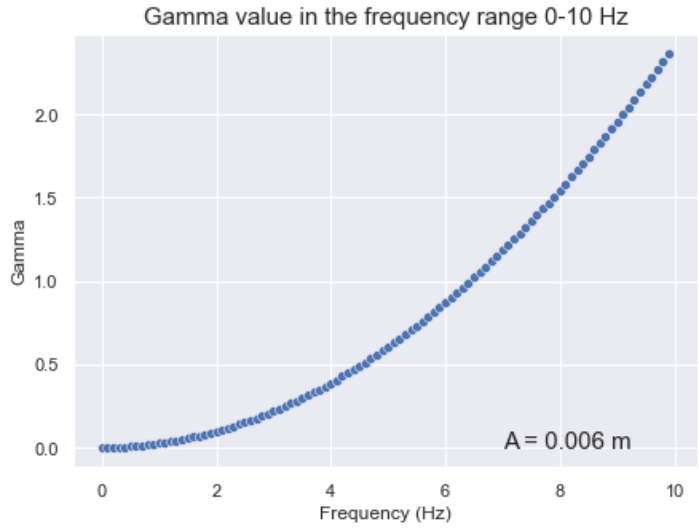


Data Generation

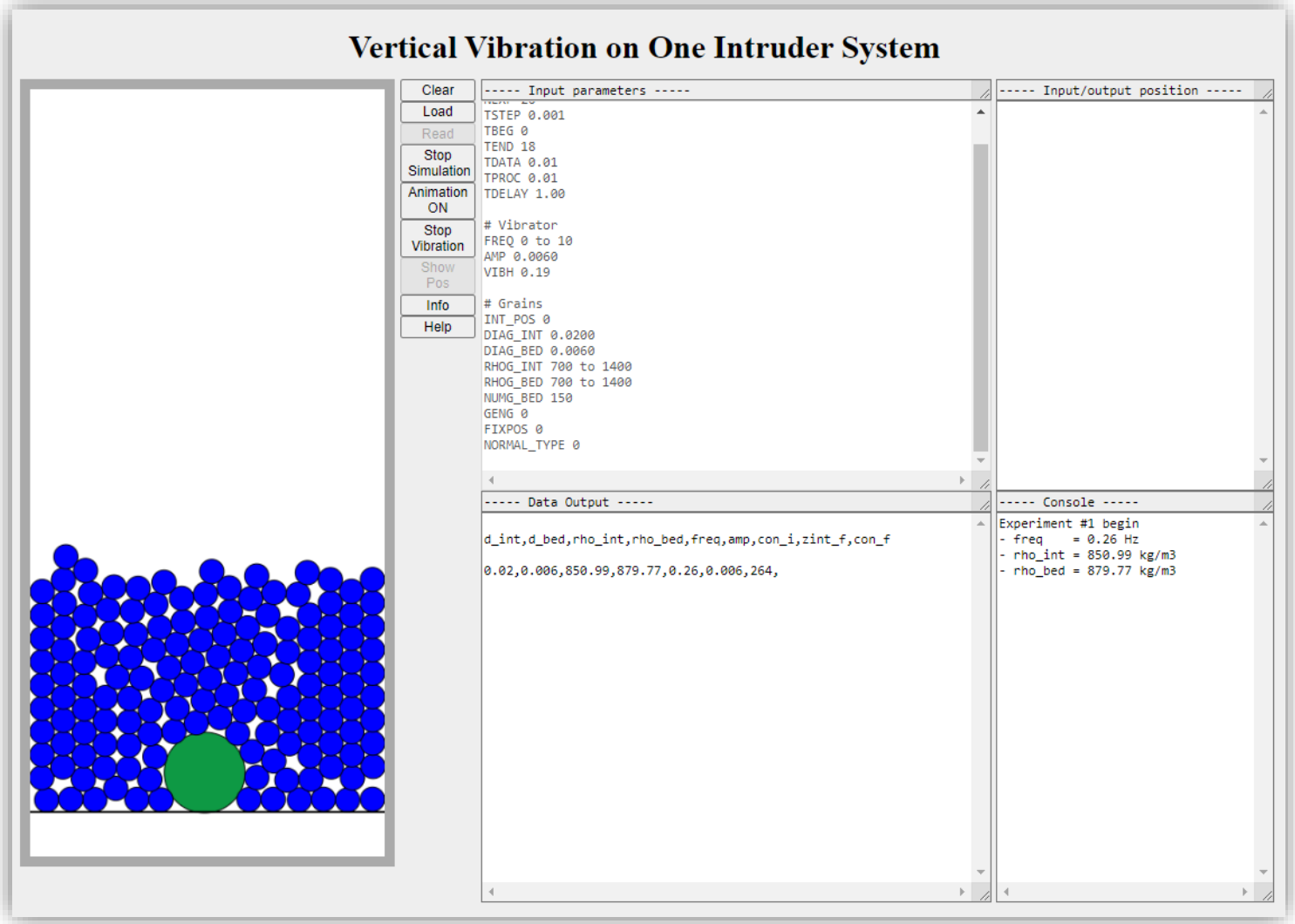
Randomly generated variables:

- **The initial horizontal position of the intruder,** will result in a different system configuration before the vibration begins.
- **Contactopy** will be calculated**.**
- **Density of intruder and bed,** each will be generated randomly with a range 700-1400. The diameter will be fixed in a ratio of 0.02:0.006.
- **The frequency will be chosen randomly with a range of 0-10 Hz**. The amplitude is fixed so that the Gamma value will range between: 0-2.5.

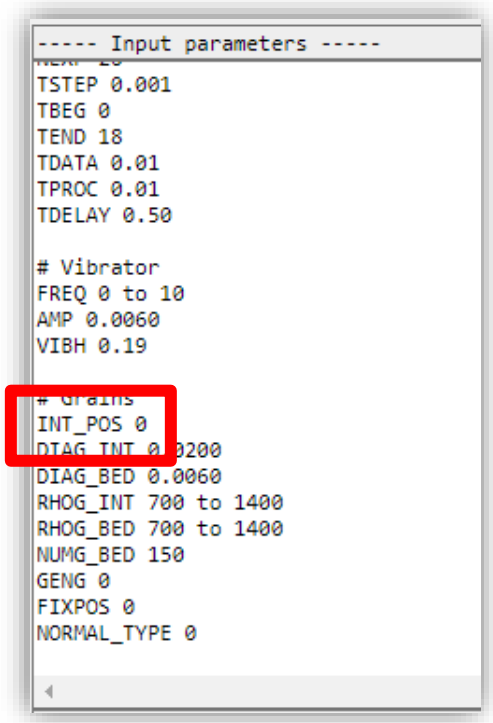


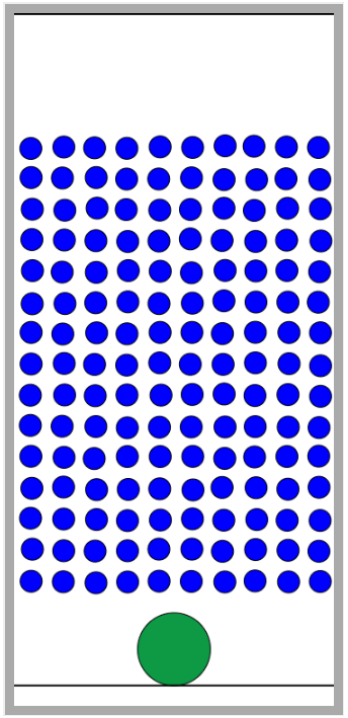


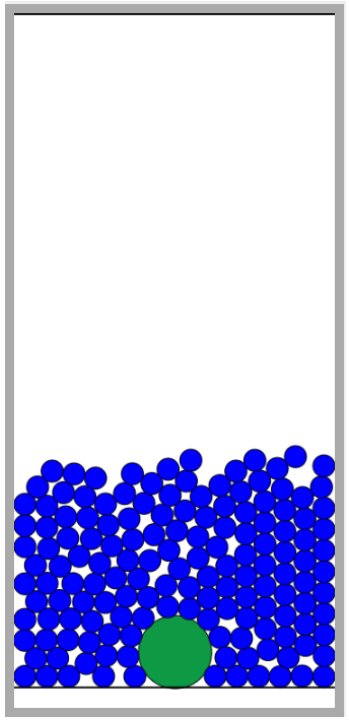
Simulation Layout



Intruder Initial Position





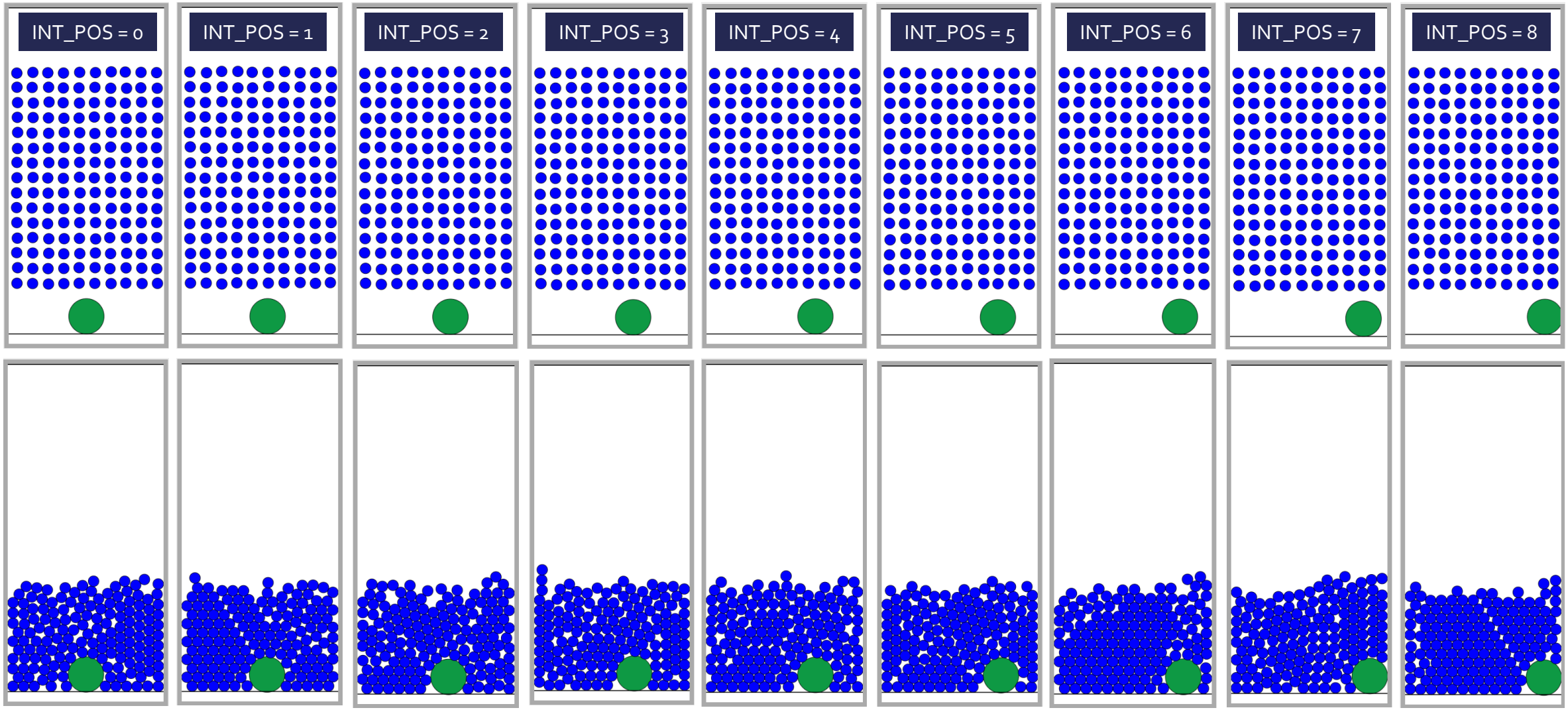


Users need to set the initial position in INT_POS parameters. The value is in range of **0 – 8** (negative value will give the opposite direction)

After users click the **READ** button, The intruder will be in the specified position while the beds will be in the hover position (with a random factor).

By clicking of the **Start Simulation** button, the floating bed will experience free fall and settle to the bottom during the delay time before the vibration starts.

Initial Configuration



Concactopy Calculation

```
function getContactopy() {
    var Contactopy = 0;
    for (var i=1; i<numg-1; i++) {
        for (var j=i+1; j<numg; j++) {
            var deuclid = Math.sqrt(
                                (r[i].y-r[j].y)*(r[i].y-r[j].y)
                                +(r[i].z-r[j].z)*(r[i].z-r[j].z));
            if (deuclid < (0.5*(D[i]+D[j]))) {
                Contactopy = Contactopy + 1;
            }
        }
    }
    return Contactopy;
}
```

Get the Result

```
----- Data Output -----

d_int,d_bed,rho_int,rho_bed,freq,amp,deg_i,zint_f,deg_f

0.02,0.006,885.82,888.15,5.03,0.006,264,,0.1165,297,
0.02,0.006,1079.98,790.37,9.66,0.006,256,,0.1115,287,
0.02,0.006,823.80,1215.41,6.39,0.006,264,,0.1095,294,
0.02,0.006,1051.85,1035.62,6.42,0.006,285,,0.1195,298,
0.02,0.006,961.63,1348.33,0.05,0.006,298,,0.1184,314,
0.02,0.006,1043.36,1200.70,8.67,0.006,277,,0.1144,310,
0.02,0.006,773.48,830.07,2.72,0.006,267,,0.1165,289,
0.02,0.006,1367.86,776.24,4.83,0.006,249,,0.1117,286,
0.02,0.006,714.68,805.25,6.62,0.006,252,,0.1458,300,
0.02,0.006,928.84,1175.84,6.17,0.006,285,,0.1156,291,
0.02,0.006,914.87,817.76,1.75,0.006,259,,0.1093,310,
0.02,0.006,1041.62,915.21,6.68,0.006,267,,0.1112,301,
0.02,0.006,864.51,1379.16,9.89,0.006,297,,0.1229,310,
0.02,0.006,803.22,893.08,1.70,0.006,266,,0.1127,316,
0.02,0.006,1092.14,973.20,3.94,0.006,290,,0.1146,301,
0.02,0.006,1244.12,765.34,2.80,0.006,246,,0.1131,301,
0.02,0.006,978.28,845.45,1.69,0.006,261,,0.1148,305,
0.02,0.006,750.67,706.16,3.69,0.006,248,,0.1150,277,
0.02,0.006,1154.77,931.91,4.00,0.006,281,,0.2002,314,
0.02,0.006,956.13,914.29,5.53,0.006,282,,0.1492,299,
```

- Copy all the result and paste into the plain text (ex: notepad).
- Save as CSV
- Filename: *"**int_pos_5.CSV**"* (for intruder position 5)

THANK YOU