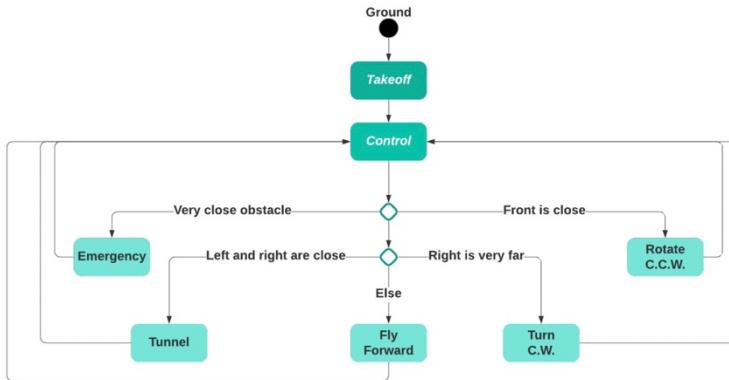


לוגיקת הפעלה



- $emergency_threshold := 0.3$
- $front_threshold := 1$
- $tunnel_threshold := 0.25$
- $right_far_threshold := 2.5.$

Algorithm 1: BAT's control loop logic

```

while true do
  if front < emergency_threshold then
    | do Emergency()
  else if front < front_threshold then
    | do Rotate C.C.W()
  else if left < tunnel_threshold and right < tunnel_threshold then
    | do Tunnel()
  else if right > right_far_threshold then
    | do Turn C.W()
  else
    | do Fly forward()
  end
end
  
```

דוגמאות :

1.

```
Time ,pitch,roll,yaw,X ,Y,z,VX,VY,VZ,Range_Up ,Range_Front,Range_Back,Range_Right,Range_Left,State  
0.016958951950073,0,0,0,0,0,0.039108876138926,0,0,-1,6.34653425216676,1.68364071846008,2.73489475250248,2.216037273407, State.safe
```

```
If(6.34653425216676 < 0.3) do Emergency  
Else if (6.34653425216676 < 1) do Rotate C.C.W  
Else if (2.2126037273273407 < 0.25 && 2.73489475250248 < 0.25) do Rotate Tunnel  
Else if (2.73489475250248 > 2.5) do turn C.W.()  
Else fly forward
```

* לפני הקלט ימינה < סף ימני ממש רחוק (לכן המצב () מתבצע).

2.

```
Time pitch roll yaw X Y Z VX VY VZ Range_Up Range_Front Range_Back Range_Right Range_Left State  
14.97228527 0.634060027 -0.481323175 -71.49085242 0.219397277 0.536110222 1.174259186 0.02962917 -0.004078657 0.000969129 -1 1.98118937 0.223194346 0.672449708 0.358423114 State.safe
```

```
If(1.9 < 0.3) do Emergency  
Else if (1.9 < 1) do Rotate C.C.W  
Else if (0.358423114 < 0.25 && 0.672449708 < 0.25) do Rotate Tunnel  
Else if (0.672449708 > 2.5) do turn C.W.()  
Else fly forward
```

* כל התנאים לא מתקיימים (לכן המצב () מתבצע).

3.

```
61.1981604099274,0.123592329591646,1.22005925775355,-106.001769907628,0.083381116390228,-12.1168212890625,1.1668260097509,0.257963621439342,-0.40077862694766,-0.01257074  
80355,0.833218812942678,0.812300443649294,2.92807555198673,0.830004870891593,0.204879283905078, State.normal
```

```
If(0.812300443649294 < 0.3) do Emergency  
Else if (0.812300443649294 < 1) do Rotate C.C.W  
Else if (0.20487928390508 < 0.25 && 0.830004870891593 < 0.25) do Rotate Tunnel  
Else if (0.830004870891593 > 2.5) do turn C.W.()  
Else fly forward
```

* לפני הקלט קדמי > סף קדמי (לכן המצב () מתבצע).

Data sample

Time	pitch	roll	yaw	X	Y	Z	VX	VY	VZ	Range_Up	Range_Front	Range_Back	Range_Right	Range_Left	State
14.97228527	0.634060027	-0.481323277	-71.490837278	0.219397278	0.536110222	1.174251985	0.029621898	-0.004078653	0.00096129	-1	1.98118973	0.223194346	0.722449708	0.358423114	State.safe
15.09148526	0.348599171	-0.283264208	-71.64622179	0.2193804764	0.532042205	1.173961759	0.040424834	-0.01508636	0.000906262	-1	1.979106545	0.229643226	0.692255795	0.36002995	State.safe
15.097311	0.128810505	-0.063140868	-72.45673913	0.2193873667	0.526708951	1.173850653	0.044573594	-0.012522002	0.000581948	-1	2.05274466	0.233519886	0.713511825	0.358717473	State.safe
15.33128667	0.355463516	1.05073357	-73.30094802	0.220229015	0.520861804	1.173907757	0.040987651	-0.003248793	0.000397937	-1	2.147643089	0.237542182	0.709397733	0.357333928	State.safe
15.44828224	0.529845069	0.456105355	-73.69064188	0.222577795	0.515225749	1.17388773	0.058148206	0.013476235	0.000678997	-1	2.02257633	0.242103338	0.70556883	0.358038366	State.safe
15.56348443	0.595210013	0.113162358	-73.82836691	0.226609662	0.508524179	1.173753262	0.069452127	0.018952758	0.000763678	-1	2.221730709	0.247340083	0.701070666	0.36094138	State.safe
15.68169546	0.620877852	-0.058471617	-73.83488028	0.231116295	0.500922203	1.173671128	0.081673966	0.019271971	0.000754883	-1	2.218629599	0.253576756	0.69635939	0.365120053	State.safe
15.79426338	0.63054948	-0.144195461	-73.76412954	0.235903487	0.491968364	1.173598647	0.093602089	0.017122267	0.000744911	-1	2.201666594	0.260965317	0.691547394	0.370016307	State.safe
15.90939927	0.634032754	-0.186675863	-73.67493551	0.240785282	0.481580216	1.173452854	0.106289649	0.015336164	0.000751367	-1	2.146817293	0.27944070	0.68186924	0.380874634	State.safe
16.0264318	0.635255338	-0.208160368	-73.49672872	0.245926333	0.469066769	1.173377514	0.118934644	0.009262487	0.000769422	-1	2.14708424	0.290571332	0.677035511	0.386573285	State.safe
16.14015269	0.635494025	-0.338226323	-73.43158137	0.250610679	0.456019282	1.173308015	0.1313665	0.003584791	0.000709392	-1	2.081589937	0.302979618	0.672213197	0.392360538	State.safe
16.15804899	0.635494025	-0.338226323	-73.43158137	0.250610679	0.456019282	1.173322285	0.1313665	0.003584791	0.000709392	-1	2.080618549	0.302979618	0.672213197	0.392360538	State.safe
16.37809846	0.635328978	-0.250901051	-72.845105879	0.2599528137	0.424980710	1.173097869	0.156997959	-0.005940307	0.000884598	-1	2.01653364	0.313175805	0.681002312	0.403614184	State.norm
16.4836688	0.635521938	-0.239858282	-72.80408773	0.261110955	0.404668657	1.173049927	0.169600719	-0.015530204	0.000886954	-1	1.985147238	0.348171786	0.685425154	0.409245968	State.norm
16.61427259	0.332152102	-0.215545722	-72.98255602	0.268517315	0.383097298	1.172960043	0.181208454	-0.018532137	0.000646107	-1	1.95486739	0.365773797	0.654074788	0.414818257	State.norm
16.7313204	0.129145198	-0.20904398	-73.7658277	0.272366881	0.3262030894	1.172881127	0.184575875	-0.020105444	0.000442332	-1	2.04080309	0.401590973	0.64008866	0.422411531	State.norm
16.84730816	0.34616077	-0.454467573	-74.61119745	0.275971681	0.340743393	1.172902223	0.188587084	-0.023819567	0.000667392	-1	2.131410599	0.415290221	0.632350922	0.425040452	State.norm
16.96351719	0.528321899	-0.425650196	-75.00562278	0.278660146	0.318718255	1.172962785	0.19764293	-0.015738228	0.000567979	-1	2.183959007	0.438763297	0.626572967	0.422798987	State.norm
17.0852046	0.509857751	-0.346404947	-75.16743468	0.280869812	0.294083863	1.172919988	0.209612418	-0.039088381	0.000103309	-1	2.027659245	0.459457397	0.622185582	0.431049705	State.norm
17.19956708	0.622674076	-0.273223673	-75.17966949	0.28256312	0.268506467	1.172819138	0.221447715	-0.045039503	0.0001196446	-1	2.212278366	0.481605679	0.618674755	0.434120506	State.norm
17.31212588	0.631068436	-0.215942375	-75.1111809	0.283965856	0.242089227	1.172696471	0.233167945	-0.049335997	0.0001186132	-1	2.204814672	0.505164027	0.615693152	0.437208414	State.norm
17.43056881	0.634148927	-0.175018286	-74.79633115	0.282525561	0.214208364	1.172571659	0.245888924	-0.054401475	0.000111482	-1	1.89912081	0.530081987	0.612299896	0.440434946	State.norm
17.54622746	0.635344116	-0.148010326	-74.85014269	0.286558898	0.184091792	1.172341585	0.257953444	-0.058166877	0.000103257	-1	1.248459911	0.583830537	0.607861817	0.446949333	State.norm
17.65828967	0.635740301	-0.196685772	-74.69155989	0.287878497	0.153293461	1.172240019	0.269901408	-0.062200258	0.0001004669	-1	1.24871170	0.612617274	0.605238795	0.450461775	State.norm
17.78153992	0.635835862	-0.160827647	-74.51545779	0.289188832	0.119308472	1.17213586	0.282614502	-0.066812515	0.000979381	-1	1.201075862	0.642663538	0.6025846	0.454067826	State.norm
17.89861965	0.635917907	-0.140289301	-74.33165498	0.290543644	0.08373291	1.172035452	0.295206971	-0.070727175	0.0009198	-1	2.076392412	0.673978388	0.599873006	0.457722732	State.norm
18.01864552	0.635917937	-0.133361898	-74.14992313	0.291939586	0.0745732346	1.171940327	0.307768053	-0.07452516	0.000879984	-1	2.052032232	0.709542134	0.597047687	0.461622059	State.norm
18.139231	0.331303785	-0.166264204	-74.09261732	0.293019226	0.0745732346	1.171906627	0.311678262	-0.074525162	0.000879984	-1	2.072778253	0.709542134	0.597047687	0.461622059	State.norm
18.25809762	0.115951051	-0.138840805	-73.98689102	0.2944920216	0.071680276	1.171864816	0.321481856	-0.085105911	0.000102469	-1	1.9807746	0.810071509	0.597942402	0.473997075	State.norm
18.37631178	0.042606719	-0.22747694	-73.57676587	0.296032333	0.069536738	1.171957374	0.322409262	-0.08677204	0.000203412	-1	1.857825065	0.846991513	0.585066438	0.477894664	State.norm
18.49185967	0.016717208	-0.181335452	-73.74955488	0.29675802	0.109677732	1.172160983	0.3222025382	-0.089838213	0.000198277	-1	1.95460391	0.882428086	0.581566446	0.48107341	State.norm
18.60969615	0.080361051	-0.162353484	-74.51897942	0.297042161	0.149382223	1.172359467	0.324045679	-0.089888275	0.000177133	-1	2.017493113	0.915761471	0.577277832	0.48136127	State.norm
18.72434139	0.050218265	-0.193847629	-75.32779295	0.296961038	0.186285391	1.172541618	0.325216942	-0.087688089	0.000146658	-1	2.129277468	0.947624087	0.571899474	0.47931695	State.norm
18.84214759	0.0303087258	-0.232574411	-75.75221998	0.296438338	0.225751305	1.172698855	0.3252552738	-0.089719731	0.0001127985	-1	2.214800119	0.980646431	0.567858279	0.477610022	State.norm
18.9570776	0.001720745	-0.216156003	-75.90440499	0.29539901	0.265280157	1.172825813	0.325235502	-0.093288432	0.000873638	-1	2.264019502	1.014982445	0.565136373	0.476135284	State.norm
19.07500601	0.000676191	-0.171264616	-75.91981812	0.293911397	-0.303901917	1.173002116	0.3252687	-0.097082666	0.000725849	0.827009082	2.29761543	1.085484266	0.562354147	0.472902745	State.norm
19.19870806	6.156-05	-0.149505603	-75.844848264	0.291762859	-0.347680658	1.173069239	0.32481	-0.10093331	0.000619186	0.826937675	2.29706049	1.121427894	0.561857045	0.471210298	State.norm
19.32503366	-0.000218566	-0.0774536	-75.71321562	0.289277405	-0.390495998	1.173128605	0.324238113	-0.104080572	0.000568465	0.826874375	2.290867805	1.157640934	0.561769605	0.468972413	State.norm
19.4498873	-0.00023597	-0.032836911	-75.55940609	0.286769599	-0.4302363688	1.173186064	0.323634016	-0.106000456	0.000556596	0.826815009	2.281432867	1.194043756	0.563314021	0.466665219	State.norm