# ENCRYPTION METRICS

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VID\_20200717\_171254** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0124252005 | 0.0016118272 | | 0.0214091116 | 7.9999040069 | 7.9999085252 | 7.9999151378 | 7.9999728886 | 99.6106288580 | 33.4256010197 |
| **2** | -0.0258630692 | -0.0251565524 | | -0.0102039582 | 7.9999053347 | 7.9999115126 | 7.9999182176 | 7.9999722137 | 99.6147440844 | 33.4254195287 |
| **3** | 0.0171431160 | 0.0252884558 | | 0.0549307770 | 7.9999139845 | 7.9999167756 | 7.9998984719 | 7.9999733026 | 99.6090374228 | 33.4120209619 |
| **4** | -0.0326202547 | -0.0080998461 | | -0.0208698220 | 7.9999092265 | 7.9998969372 | 7.9999189939 | 7.9999691312 | 99.6123006687 | 33.4233636806 |
| **5** | 0.0243457608 | 0.0032828560 | | 0.0205148041 | 7.9999292275 | 7.9999053318 | 7.9999134217 | 7.9999737301 | 99.6071084105 | 33.4052075138 |
| **6** | -0.0013745692 | 0.0037982127 | | -0.0218555008 | 7.9999097936 | 7.9999065115 | 7.9999045983 | 7.9999676841 | 99.6061599794 | 33.4039401023 |
| **7** | -0.0036792922 | 0.0451996106 | | 0.0164657280 | 7.9999183179 | 7.9999007348 | 7.9999118154 | 7.9999690229 | 99.6064011060 | 33.4145910872 |
| **8** | -0.0375807393 | 0.0021470748 | | 0.0280555443 | 7.9999189088 | 7.9999036751 | 7.9999166258 | 7.9999717079 | 99.6074781379 | 33.4318070181 |
| **9** | -0.0117615517 | 0.0093206382 | | 0.0104807155 | 7.9999172521 | 7.9999034234 | 7.9998877958 | 7.9999664392 | 99.6074299126 | 33.4118466574 |
| **10** | -0.0164716855 | 0.0165396067 | | 0.0296843658 | 7.9999086872 | 7.9999052424 | 7.9999195601 | 7.9999700020 | 99.6137956533 | 33.4172248195 |
| **11** | -0.0090352672 | 0.0080346571 | | -0.0651227129 | 7.9999205935 | 7.9999211182 | 7.9999031506 | 7.9999697775 | 99.6025270062 | 33.4144467265 |
| **12** | -0.0123673891 | 0.0059688289 | | 0.0135797343 | 7.9999162551 | 7.9999050573 | 7.9999040627 | 7.9999694221 | 99.6083140432 | 33.4025904240 |
| **13** | -0.0052083029 | -0.0301025799 | | -0.0110509477 | 7.9999058490 | 7.9999194517 | 7.9999190161 | 7.9999709600 | 99.6053079990 | 33.4220411094 |
| **14** | -0.0175044463 | 0.0019066432 | | 0.0006154810 | 7.9999054340 | 7.9999075113 | 7.9999107309 | 7.9999650579 | 99.6087802212 | 33.4213962141 |
| **15** | 0.0057867168 | 0.0031419754 | | -0.0593724328 | 7.9999168464 | 7.9999190697 | 7.9999187480 | 7.9999760044 | 99.6101305298 | 33.4035641340 |
| **16** | -0.0014308451 | -0.0149026447 | | -0.0273568299 | 7.9999077821 | 7.9998916495 | 7.9999025817 | 7.9999683667 | 99.6107253086 | 33.4148344832 |
| **17** | 0.0063081076 | -0.0019008721 | | -0.0082625987 | 7.9999155825 | 7.9999137633 | 7.9999169051 | 7.9999725418 | 99.6088445216 | 33.4141631112 |
| **18** | -0.0458242732 | -0.0168467804 | | -0.0608936234 | 7.9999218652 | 7.9999170718 | 7.9999104230 | 7.9999745971 | 99.6086837706 | 33.4157873901 |
| **19** | 0.0023078197 | -0.0230022143 | | -0.0572266304 | 7.9999192122 | 7.9999135968 | 7.9999219046 | 7.9999715103 | 99.6104359568 | 33.4290124718 |
| **20** | 0.0110500259 | 0.0400382320 | | 0.0226938605 | 7.9999085164 | 7.9999076279 | 7.9999115175 | 7.9999700665 | 99.6068029835 | 33.4092648698 |
| **21** | -0.0037381121 | 0.0089253747 | | 0.0340895185 | 7.9999237355 | 7.9999076108 | 7.9999197413 | 7.9999739237 | 99.6095196759 | 33.4136528055 |
| **22** | 0.0018329614 | 0.0036343223 | | 0.0511730343 | 7.9999127312 | 7.9999167377 | 7.9999090236 | 7.9999730907 | 99.6081854424 | 33.4180093475 |
| **23** | 0.0118519526 | 0.0275056848 | | -0.0557038444 | 7.9999230119 | 7.9999066051 | 7.9999104658 | 7.9999714933 | 99.6095839763 | 33.4238750580 |
| **24** | -0.0553678354 | -0.0028109291 | | -0.0041172797 | 7.9999206036 | 7.9999046867 | 7.9999231005 | 7.9999711377 | 99.6076549640 | 33.4196771867 |
| **25** | 0.0006174500 | -0.0022802510 | | 0.0339840118 | 7.9999086199 | 7.9999059817 | 7.9999116226 | 7.9999698419 | 99.6082658179 | 33.4065158381 |
| **26** | 0.0050783340 | -0.0036245724 | | -0.0181752761 | 7.9998988326 | 7.9999171802 | 7.9999229586 | 7.9999652312 | 99.6130883488 | 33.4025669103 |
| **27** | -0.0135701018 | -0.0035773899 | | -0.0027484102 | 7.9999177458 | 7.9999112366 | 7.9999117966 | 7.9999695163 | 99.6119470165 | 33.4208830716 |
| **28** | 0.0207223610 | 0.0124003068 | | 0.0390993553 | 7.9999108315 | 7.9999151029 | 7.9999008312 | 7.9999676079 | 99.6128793724 | 33.4212562031 |
| **29** | 0.0183289960 | 0.0062987513 | | 0.0242575569 | 7.9999104446 | 7.9999040514 | 7.9999249015 | 7.9999714755 | 99.6126221708 | 33.4258164891 |
| **30** | -0.0040941824 | -0.0028085936 | | -0.0431639598 | 7.9999155377 | 7.9999227726 | 7.9999188038 | 7.9999736217 | 99.6120273920 | 33.3993121117 |
| **31** | 0.0060705078 | -0.0044321928 | | -0.0134071876 | 7.9999088487 | 7.9999122096 | 7.9999217268 | 7.9999683856 | 99.6115129887 | 33.4237816963 |
| **32** | -0.0246052737 | 0.0012473006 | | -0.0324268450 | 7.9999059070 | 7.9999200028 | 7.9999120099 | 7.9999691082 | 99.6108217593 | 33.4132707224 |
| **33** | -0.0164691558 | -0.0035993087 | | 0.0751153376 | 7.9999167278 | 7.9998887644 | 7.9999036124 | 7.9999677524 | 99.6143422068 | 33.4182416485 |
| **34** | -0.0124700150 | 0.0189288081 | | -0.0136232043 | 7.9999156489 | 7.9999148700 | 7.9999046361 | 7.9999709274 | 99.6070762603 | 33.4082799388 |
| **35** | -0.0024663395 | 0.0146180680 | | 0.0043992860 | 7.9999196563 | 7.9999080245 | 7.9999207549 | 7.9999775259 | 99.6085069444 | 33.4195918311 |
| **36** | -0.0101682060 | 0.0024722570 | | -0.0036766400 | 7.9999189893 | 7.9999107409 | 7.9998880375 | 7.9999672433 | 99.6066743827 | 33.4070326369 |
| **37** | -0.0021689598 | -0.0419405217 | | -0.0445436577 | 7.9999092876 | 7.9999180028 | 7.9999032833 | 7.9999711275 | 99.6071405607 | 33.4006305853 |
| **38** | -0.0113929558 | -0.0154654355 | | 0.0540463761 | 7.9999134581 | 7.9999144761 | 7.9999140294 | 7.9999697894 | 99.6131044239 | 33.4198160000 |
| **39** | 0.0113045930 | 0.0078357464 | | 0.0198594163 | 7.9999029969 | 7.9999258611 | 7.9999061755 | 7.9999726402 | 99.6078800154 | 33.4132919037 |
| **40** | -0.0329371512 | -0.0144520917 | | 0.0286392459 | 7.9999143277 | 7.9999207835 | 7.9999148893 | 7.9999736820 | 99.6053883745 | 33.4141646872 |
| **41** | -0.0076994226 | 0.0083185857 | | 0.0417928846 | 7.9999110972 | 7.9999101441 | 7.9998981045 | 7.9999701203 | 99.6112718621 | 33.3933731492 |
| **42** | 0.0074945415 | -0.0103641447 | | -0.0208147051 | 7.9999004723 | 7.9999215322 | 7.9998985791 | 7.9999727377 | 99.6136509774 | 33.4109726761 |
| **43** | -0.0014260880 | -0.0137241393 | | 0.0752483941 | 7.9999238064 | 7.9999136886 | 7.9999012129 | 7.9999710780 | 99.6098090278 | 33.4359267202 |
| **44** | 0.0128389400 | 0.0191310158 | | -0.0607579595 | 7.9998989245 | 7.9999201739 | 7.9999089661 | 7.9999684508 | 99.6078800154 | 33.4264383120 |
| **45** | -0.0336169942 | 0.0109456823 | | 0.0301510954 | 7.9999118049 | 7.9999000402 | 7.9999050665 | 7.9999701815 | 99.6104520319 | 33.4055187404 |
| **46** | -0.0118589074 | -0.0209941448 | | -0.0482201184 | 7.9999164193 | 7.9999033483 | 7.9999028495 | 7.9999689195 | 99.6108378344 | 33.4005596027 |
| **47** | 0.0210327682 | -0.0070987778 | | 0.0152635347 | 7.9999159821 | 7.9999060962 | 7.9999155150 | 7.9999741363 | 99.6071084105 | 33.4156412012 |
| **48** | 0.0094031088 | -0.0202239527 | | -0.0404913136 | 7.9998867811 | 7.9999199871 | 7.9999053219 | 7.9999704049 | 99.6042791924 | 33.4275475571 |
| **49** | 0.0070430521 | 0.0317498211 | | 0.0043453820 | 7.9999139007 | 7.9999265502 | 7.9999105122 | 7.9999766025 | 99.6124292695 | 33.4375269179 |
| **50** | 0.0056516794 | 0.0121031584 | | 0.0136905172 | 7.9999063243 | 7.9999016803 | 7.9999189590 | 7.9999724172 | 99.6088927469 | 33.4070256395 |
| **Total** | -0.2709837943 | 0.0649855662 | | 0.0194996104 | 399.9956261316 | 399.9955435294 | 399.9955311657 | 399.9985445971 | 4980.4704700360 | 1670.7683205111 |
| **Average** | -0.0054196228 | 0.0012997106 | | 0.0003899922 | 7.9999125226 | 7.9999108706 | 7.9999106233 | 7.9999708919 | 99.6094094007 | 33.4153664102 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VID\_20200717\_171657\_01** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0217114691 | -0.0365240044 | | -0.0067257241 | 7.9999182558 | 7.9999106501 | 7.9999099114 | 7.9999717453 | 99.6132651749 | 33.4166552565 |
| **2** | 0.0187217801 | 0.0053340508 | | 0.0195094217 | 7.9999135976 | 7.9999157024 | 7.9999249461 | 7.9999746049 | 99.6110146605 | 33.3944915981 |
| **3** | 0.0125368122 | -0.0227664331 | | -0.0006083272 | 7.9999139577 | 7.9998994742 | 7.9999131052 | 7.9999684203 | 99.6112718621 | 33.4233904094 |
| **4** | -0.0093641482 | -0.0126868159 | | -0.0266927164 | 7.9999063953 | 7.9999236746 | 7.9999126000 | 7.9999743309 | 99.6108699846 | 33.3994302479 |
| **5** | 0.0021847548 | 0.0231411631 | | -0.0012533643 | 7.9999041776 | 7.9999202963 | 7.9998977647 | 7.9999690943 | 99.6067869084 | 33.4049361913 |
| **6** | -0.0407866715 | -0.0034363596 | | 0.0282130241 | 7.9999100296 | 7.9999167073 | 7.9999151034 | 7.9999720180 | 99.6089731224 | 33.4080246283 |
| **7** | 0.0188430361 | -0.0202025968 | | 0.0578996540 | 7.9999052804 | 7.9999152265 | 7.9999012917 | 7.9999716117 | 99.6097768776 | 33.4092322153 |
| **8** | -0.0140447136 | 0.0004107505 | | 0.0250193529 | 7.9999093800 | 7.9998970466 | 7.9999130459 | 7.9999679406 | 99.6071566358 | 33.4153875298 |
| **9** | -0.0215987680 | -0.0180315799 | | -0.0267317322 | 7.9999149024 | 7.9999055683 | 7.9999054472 | 7.9999661048 | 99.6052276235 | 33.4135334715 |
| **10** | 0.0113501008 | -0.0203139400 | | -0.0256380017 | 7.9999103732 | 7.9999117030 | 7.9999106293 | 7.9999734940 | 99.6098572531 | 33.4189529245 |
| **11** | 0.0196759151 | -0.0145277180 | | 0.0595206107 | 7.9999100420 | 7.9999084198 | 7.9999292387 | 7.9999734533 | 99.6113361626 | 33.4239314154 |
| **12** | 0.0182844445 | 0.0350354567 | | 0.0287393576 | 7.9999044133 | 7.9999218287 | 7.9999064393 | 7.9999711357 | 99.6093750000 | 33.4192235536 |
| **13** | 0.0095471475 | -0.0319579249 | | -0.0305385116 | 7.9999088418 | 7.9999196300 | 7.9999125386 | 7.9999734427 | 99.6078960905 | 33.4077636443 |
| **14** | 0.0007041534 | -0.0036211797 | | 0.0126343918 | 7.9999148141 | 7.9999022510 | 7.9999106130 | 7.9999696999 | 99.6062885802 | 33.4246353788 |
| **15** | -0.0104970193 | 0.0108676291 | | 0.0397447479 | 7.9999107835 | 7.9999150577 | 7.9999099268 | 7.9999721478 | 99.6104359568 | 33.3918343521 |
| **16** | 0.0142231811 | -0.0042458187 | | -0.0102714180 | 7.9999100211 | 7.9999080591 | 7.9999102961 | 7.9999699059 | 99.6092785494 | 33.4026775448 |
| **17** | -0.0036165312 | -0.0073904798 | | 0.0377871554 | 7.9999017729 | 7.9999183996 | 7.9999084275 | 7.9999681302 | 99.6104841821 | 33.4102577438 |
| **18** | -0.0064117065 | 0.0012843471 | | 0.0501823932 | 7.9999124149 | 7.9999047048 | 7.9999169998 | 7.9999701730 | 99.6125900206 | 33.4270226262 |
| **19** | -0.0074606512 | -0.0249885696 | | 0.0115359938 | 7.9999068210 | 7.9999104027 | 7.9999068883 | 7.9999754144 | 99.6049864969 | 33.4128551652 |
| **20** | -0.0034876908 | -0.0034337960 | | -0.0543809106 | 7.9998990514 | 7.9999118996 | 7.9999073165 | 7.9999687711 | 99.6063046553 | 33.4170782523 |
| **21** | -0.0000588819 | 0.0051774995 | | 0.0046833133 | 7.9999191130 | 7.9999093480 | 7.9999234481 | 7.9999705629 | 99.6076388889 | 33.4274715313 |
| **22** | -0.0106149694 | 0.0128697066 | | -0.0231387865 | 7.9999194086 | 7.9998979682 | 7.9999008940 | 7.9999691033 | 99.6085551698 | 33.4044957335 |
| **23** | 0.0004840963 | -0.0381286297 | | -0.0488617487 | 7.9999137852 | 7.9999210120 | 7.9999075560 | 7.9999718830 | 99.6069637346 | 33.4051913126 |
| **24** | 0.0110881729 | -0.0284999338 | | -0.0353791950 | 7.9999072844 | 7.9999002748 | 7.9999227109 | 7.9999650180 | 99.6139242541 | 33.4209926975 |
| **25** | -0.0128706880 | -0.0290231629 | | 0.0278459707 | 7.9999054577 | 7.9999156705 | 7.9999098841 | 7.9999697528 | 99.6066261574 | 33.4094505215 |
| **26** | 0.0012178442 | -0.0190649766 | | -0.0105892864 | 7.9999205392 | 7.9999158119 | 7.9999087943 | 7.9999722813 | 99.6110307356 | 33.4117415703 |
| **27** | 0.0217625955 | -0.0049510845 | | 0.0055265826 | 7.9999099346 | 7.9999143128 | 7.9999100948 | 7.9999668982 | 99.6132169496 | 33.4012988683 |
| **28** | 0.0161645939 | -0.0193549251 | | -0.0013858428 | 7.9999198980 | 7.9999168508 | 7.9999160360 | 7.9999721644 | 99.6096322016 | 33.4219740983 |
| **29** | 0.0015418066 | 0.0021192968 | | -0.0809825326 | 7.9999123136 | 7.9999262764 | 7.9999095269 | 7.9999726777 | 99.6078960905 | 33.4074132701 |
| **30** | -0.0152293910 | 0.0048342089 | | 0.0450169034 | 7.9998940042 | 7.9999075643 | 7.9999116056 | 7.9999672060 | 99.6047292953 | 33.4241222363 |
| **31** | -0.0069903977 | 0.0050874678 | | 0.0083033708 | 7.9999181687 | 7.9998978871 | 7.9999060932 | 7.9999679507 | 99.6118505658 | 33.4098764802 |
| **32** | -0.0198456935 | 0.0003105064 | | -0.0179668853 | 7.9999039377 | 7.9999077515 | 7.9999161343 | 7.9999713333 | 99.6095839763 | 33.3986689815 |
| **33** | -0.0123703712 | 0.0141173600 | | 0.0360749913 | 7.9999034451 | 7.9999264425 | 7.9998971291 | 7.9999689020 | 99.6098090278 | 33.4126884254 |
| **34** | 0.0281022332 | 0.0020542907 | | -0.0175157163 | 7.9999279029 | 7.9999229877 | 7.9999210778 | 7.9999763458 | 99.6070762603 | 33.4244070493 |
| **35** | 0.0018005518 | 0.0251976801 | | -0.0866194759 | 7.9999105602 | 7.9999106378 | 7.9999196858 | 7.9999723179 | 99.6100501543 | 33.4206241048 |
| **36** | 0.0364235607 | -0.0007996434 | | 0.0606387078 | 7.9999161516 | 7.9999118496 | 7.9999215090 | 7.9999734710 | 99.6092946245 | 33.4280554673 |
| **37** | 0.0096380712 | -0.0103140754 | | 0.0134255603 | 7.9999084253 | 7.9999109924 | 7.9999130847 | 7.9999680931 | 99.6113843879 | 33.4211667499 |
| **38** | -0.0162127756 | 0.0146395001 | | 0.0152813009 | 7.9999083152 | 7.9999160101 | 7.9999091756 | 7.9999692810 | 99.6096965021 | 33.4105080741 |
| **39** | -0.0108587770 | 0.0133825903 | | -0.0434676079 | 7.9999175931 | 7.9999231349 | 7.9998987492 | 7.9999678548 | 99.6078960905 | 33.4313815637 |
| **40** | -0.0051908950 | 0.0027534601 | | 0.0350375967 | 7.9999012540 | 7.9999012882 | 7.9999126795 | 7.9999701616 | 99.6089088220 | 33.4029629882 |
| **41** | 0.0039429901 | -0.0057134224 | | -0.0474742429 | 7.9999077385 | 7.9999084073 | 7.9999214418 | 7.9999697166 | 99.6079764660 | 33.4234722979 |
| **42** | -0.0145455915 | 0.0346181116 | | 0.0272802373 | 7.9999117527 | 7.9999170772 | 7.9999133490 | 7.9999690806 | 99.6078639403 | 33.4239402410 |
| **43** | -0.0113726753 | -0.0073297997 | | -0.0366956260 | 7.9999137474 | 7.9999175558 | 7.9999173753 | 7.9999732131 | 99.6061278292 | 33.4012838649 |
| **44** | -0.0193847112 | 0.0365205369 | | -0.0051597295 | 7.9999123784 | 7.9999111196 | 7.9999103842 | 7.9999700584 | 99.6130401235 | 33.4058615499 |
| **45** | 0.0007911145 | -0.0062924388 | | -0.0027416086 | 7.9999284565 | 7.9999026589 | 7.9999172828 | 7.9999736966 | 99.6110146605 | 33.4100217235 |
| **46** | -0.0233008525 | 0.0098316195 | | 0.0056392262 | 7.9999016362 | 7.9999031406 | 7.9999187604 | 7.9999728710 | 99.6041827418 | 33.4251246293 |
| **47** | -0.0012534922 | -0.0150185097 | | 0.0302364403 | 7.9999114451 | 7.9999091054 | 7.9999188286 | 7.9999737091 | 99.6083461934 | 33.4103669284 |
| **48** | 0.0165477019 | 0.0332752878 | | -0.0201351218 | 7.9999254710 | 7.9999145749 | 7.9999072188 | 7.9999720106 | 99.6083461934 | 33.4208200320 |
| **49** | 0.0312402405 | -0.0093084078 | | -0.0109447031 | 7.9999089402 | 7.9999079402 | 7.9999051359 | 7.9999734813 | 99.6107413837 | 33.4128998603 |
| **50** | 0.0167542936 | 0.0013204475 | | 0.0145585108 | 7.9999168780 | 7.9999109158 | 7.9999177488 | 7.9999688451 | 99.6067547582 | 33.4060165013 |
| **Total** | 0.0044916599 | -0.1237432583 | | 0.0284360004 | 399.9955612620 | 399.9955932693 | 399.9956059239 | 399.9985415801 | 4980.4533339763 | 1670.6756135016 |
| **Average** | 0.0000898332 | -0.0024748601 | | 0.0005687199 | 7.9999112252 | 7.9999118654 | 7.9999121185 | 7.9999708316 | 99.6090666795 | 33.4135122700 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VID\_20200717\_171835** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0135335623 | 0.0040381733 | | -0.0034509471 | 7.9999072234 | 7.9999259011 | 7.9999082450 | 7.9999695431 | 99.6118505658 | 33.4119372453 |
| **2** | -0.0119962979 | -0.0187579528 | | -0.0312818801 | 7.9999178203 | 7.9999188955 | 7.9999148522 | 7.9999736455 | 99.6100019290 | 33.4164885167 |
| **3** | -0.0013064250 | -0.0131334130 | | -0.0246487569 | 7.9999107442 | 7.9999224330 | 7.9999092936 | 7.9999716982 | 99.6096482767 | 33.4116792872 |
| **4** | -0.0128930678 | 0.0148882723 | | 0.0112514626 | 7.9999205806 | 7.9999082490 | 7.9999209229 | 7.9999714328 | 99.6080729167 | 33.4207709241 |
| **5** | -0.0276748657 | 0.0088739142 | | 0.0023319274 | 7.9999196624 | 7.9999160360 | 7.9999218406 | 7.9999703830 | 99.6169142233 | 33.4227634174 |
| **6** | 0.0086939569 | -0.0040447362 | | -0.0400146429 | 7.9999216283 | 7.9999205953 | 7.9999064584 | 7.9999718762 | 99.6161908436 | 33.4121636836 |
| **7** | 0.0130868469 | -0.0260062012 | | 0.0302006814 | 7.9998953797 | 7.9999208279 | 7.9999065633 | 7.9999722201 | 99.6088284465 | 33.4229021676 |
| **8** | -0.0192557836 | -0.0008429439 | | -0.0150147410 | 7.9999057415 | 7.9999169860 | 7.9999214208 | 7.9999731316 | 99.6079121656 | 33.4157440818 |
| **9** | 0.0067712163 | 0.0017702471 | | -0.0293763542 | 7.9999171788 | 7.9999120040 | 7.9999053221 | 7.9999688177 | 99.6048900463 | 33.4301848826 |
| **10** | -0.0047598833 | -0.0076069276 | | -0.0117189340 | 7.9999171613 | 7.9999022186 | 7.9999041833 | 7.9999703542 | 99.6075424383 | 33.4172569697 |
| **11** | -0.0102865003 | 0.0024099521 | | -0.0350862388 | 7.9999033577 | 7.9999117498 | 7.9999174290 | 7.9999729995 | 99.6105484825 | 33.4104887840 |
| **12** | -0.0140115324 | -0.0255897916 | | -0.0090026577 | 7.9999280765 | 7.9998939194 | 7.9999203919 | 7.9999747834 | 99.6064654064 | 33.4374450295 |
| **13** | -0.0296895114 | 0.0118203774 | | -0.0024055945 | 7.9998988904 | 7.9999214687 | 7.9999193199 | 7.9999739145 | 99.6120916924 | 33.4053213003 |
| **14** | 0.0135518860 | 0.0188362398 | | 0.0016610472 | 7.9999029685 | 7.9999148031 | 7.9999084863 | 7.9999693230 | 99.6076549640 | 33.4194286215 |
| **15** | 0.0023982355 | -0.0158064480 | | -0.0427287509 | 7.9999129001 | 7.9999097618 | 7.9999023803 | 7.9999687080 | 99.6094553755 | 33.4208963730 |
| **16** | 0.0089298306 | -0.0193951419 | | 0.0212266035 | 7.9999082563 | 7.9999087139 | 7.9999128900 | 7.9999697645 | 99.6075585134 | 33.4178584937 |
| **17** | 0.0220669656 | 0.0290627112 | | -0.0901712683 | 7.9999114993 | 7.9999193858 | 7.9999220036 | 7.9999727304 | 99.6095357510 | 33.4072778610 |
| **18** | -0.0067484860 | 0.0320889650 | | -0.0038353035 | 7.9999107772 | 7.9998983676 | 7.9998970670 | 7.9999662996 | 99.6101144547 | 33.4080913873 |
| **19** | -0.0105127776 | 0.0217584817 | | 0.0325360518 | 7.9999053491 | 7.9999091721 | 7.9999196973 | 7.9999684447 | 99.6087962963 | 33.4075670237 |
| **20** | -0.0130326735 | -0.0125697480 | | 0.0210482172 | 7.9999284423 | 7.9998984104 | 7.9999024141 | 7.9999656727 | 99.6112397119 | 33.3962106885 |
| **21** | -0.0098926137 | 0.0164915163 | | -0.0176277490 | 7.9999135971 | 7.9999055481 | 7.9999085177 | 7.9999725854 | 99.6083140432 | 33.4022509557 |
| **22** | 0.0257549204 | 0.0057495092 | | -0.0406659739 | 7.9999029555 | 7.9999171962 | 7.9999082739 | 7.9999679461 | 99.6126382459 | 33.3944061794 |
| **23** | -0.0016054190 | -0.0101291237 | | -0.0632076783 | 7.9999060862 | 7.9999008134 | 7.9999104684 | 7.9999666102 | 99.6063528807 | 33.4170491911 |
| **24** | -0.0169366996 | -0.0009320620 | | 0.0353706116 | 7.9999036165 | 7.9999022853 | 7.9999202117 | 7.9999719245 | 99.6093750000 | 33.4275299690 |
| **25** | 0.0052301656 | 0.0162306096 | | -0.0041328537 | 7.9999031708 | 7.9999129293 | 7.9999151952 | 7.9999709340 | 99.6060474537 | 33.4083285423 |
| **26** | -0.0183333544 | 0.0306335356 | | 0.0537275209 | 7.9999194569 | 7.9999157958 | 7.9999053442 | 7.9999722959 | 99.6075585134 | 33.4042583263 |
| **27** | -0.0164648595 | 0.0066901027 | | 0.0180734592 | 7.9999172416 | 7.9999087611 | 7.9999123280 | 7.9999705611 | 99.6118987912 | 33.4207533361 |
| **28** | 0.0148427797 | -0.0229305217 | | -0.0368493738 | 7.9999040206 | 7.9999160185 | 7.9999142498 | 7.9999709587 | 99.6093910751 | 33.4291784551 |
| **29** | 0.0047869465 | -0.0195031323 | | 0.0329376806 | 7.9998950500 | 7.9999068271 | 7.9999070986 | 7.9999618396 | 99.6048900463 | 33.4156050795 |
| **30** | 0.0041425755 | -0.0283387922 | | 0.0033024206 | 7.9999147741 | 7.9999110178 | 7.9999170320 | 7.9999694361 | 99.6121720679 | 33.4304850773 |
| **31** | -0.0145777514 | 0.0228802124 | | 0.0288039669 | 7.9999137899 | 7.9999070894 | 7.9999147497 | 7.9999703528 | 99.6094714506 | 33.4163224703 |
| **32** | 0.0205287639 | -0.0314030702 | | 0.0107427764 | 7.9999155446 | 7.9999121711 | 7.9999259978 | 7.9999708657 | 99.6056616512 | 33.4114541727 |
| **33** | 0.0165193140 | -0.0065416942 | | 0.0551486289 | 7.9999034046 | 7.9999154485 | 7.9999191294 | 7.9999694256 | 99.6110789609 | 33.4066859190 |
| **34** | -0.0007231683 | -0.0100261293 | | -0.0310481988 | 7.9999073715 | 7.9999111698 | 7.9999059199 | 7.9999676711 | 99.6125739455 | 33.4082674569 |
| **35** | -0.0195860002 | 0.0422152036 | | -0.0056781743 | 7.9999231590 | 7.9999191757 | 7.9999375781 | 7.9999756337 | 99.6087319959 | 33.4152569117 |
| **36** | -0.0041413750 | -0.0006431379 | | 0.0426850509 | 7.9998994157 | 7.9999282856 | 7.9999054231 | 7.9999717180 | 99.6081693673 | 33.4210644996 |
| **37** | -0.0185638209 | 0.0309463873 | | -0.0227978954 | 7.9999183069 | 7.9999094465 | 7.9999182825 | 7.9999704103 | 99.6131847994 | 33.4159257620 |
| **38** | 0.0165105776 | 0.0113111962 | | 0.0397921981 | 7.9999020861 | 7.9999166981 | 7.9999256022 | 7.9999734481 | 99.6072048611 | 33.4196590943 |
| **39** | 0.0067658547 | -0.0050732499 | | -0.0032291879 | 7.9999045487 | 7.9999183848 | 7.9999154291 | 7.9999727060 | 99.6135223765 | 33.4228553291 |
| **40** | -0.0022726583 | -0.0009148334 | | -0.0341149789 | 7.9999079505 | 7.9999048774 | 7.9999083783 | 7.9999707686 | 99.6119470165 | 33.4091759209 |
| **41** | 0.0151240405 | 0.0203967649 | | 0.0148119405 | 7.9999102078 | 7.9999146154 | 7.9999170464 | 7.9999713586 | 99.6118505658 | 33.4236761680 |
| **42** | 0.0202079838 | -0.0211464387 | | -0.0099722715 | 7.9999197032 | 7.9998890646 | 7.9999160354 | 7.9999686903 | 99.6112879372 | 33.4191345417 |
| **43** | -0.0000350405 | -0.0161530605 | | -0.0390820481 | 7.9999171482 | 7.9999109348 | 7.9998992792 | 7.9999703039 | 99.6092303241 | 33.4153292811 |
| **44** | 0.0071154201 | -0.0213968275 | | 0.0161165676 | 7.9999167997 | 7.9999086768 | 7.9999151038 | 7.9999738976 | 99.6103555813 | 33.4265545570 |
| **45** | -0.0080226558 | -0.0016825247 | | 0.0264169251 | 7.9999123381 | 7.9999040714 | 7.9999053894 | 7.9999695633 | 99.6046971451 | 33.4130609265 |
| **46** | 0.0012570103 | -0.0036844596 | | -0.0361265003 | 7.9999189423 | 7.9999084193 | 7.9999087228 | 7.9999713933 | 99.6101948302 | 33.3987513743 |
| **47** | 0.0030130543 | 0.0115883943 | | -0.0393245327 | 7.9999087597 | 7.9999066787 | 7.9999022223 | 7.9999675047 | 99.6112879372 | 33.4083443653 |
| **48** | -0.0182428433 | -0.0330605921 | | -0.0115212291 | 7.9999132095 | 7.9999138245 | 7.9999142645 | 7.9999736934 | 99.6073334619 | 33.4110020526 |
| **49** | 0.0079122635 | -0.0054546083 | | -0.0537356155 | 7.9999261299 | 7.9999003693 | 7.9999067807 | 7.9999699279 | 99.6106931584 | 33.4099906449 |
| **50** | -0.0286996086 | -0.0101297713 | | -0.0353030387 | 7.9999019206 | 7.9999118914 | 7.9999233749 | 7.9999721204 | 99.6047614455 | 33.4145176461 |
| **Total** | -0.1085886271 | -0.0322165673 | | -0.3249676312 | 399.9955643438 | 399.9955583848 | 399.9956446107 | 399.9985322876 | 4980.4771894290 | 1670.7493509441 |
| **Average** | -0.0021717691 | -0.0006443313 | | -0.0064992611 | 7.9999112869 | 7.9999111677 | 7.9999128922 | 7.9999706458 | 99.6095437886 | 33.4149870189 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VID\_20200717\_171931** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0009195937 | 0.0274673129 | | -0.0217033118 | 7.9999046899 | 7.9999044682 | 7.9999086922 | 7.9999669788 | 99.6124292695 | 33.3976298364 |
| **2** | 0.0062603678 | -0.0118206786 | | -0.0295776467 | 7.9999231181 | 7.9999084889 | 7.9999156431 | 7.9999709594 | 99.6078317901 | 33.4099147452 |
| **3** | 0.0002944940 | -0.0588463595 | | -0.0203392948 | 7.9999071058 | 7.9999142210 | 7.9999090105 | 7.9999702739 | 99.6109985854 | 33.4215209695 |
| **4** | 0.0042569672 | -0.0021283107 | | 0.0004505803 | 7.9999092137 | 7.9999017715 | 7.9999194134 | 7.9999697841 | 99.6076388889 | 33.4209517217 |
| **5** | 0.0012985716 | 0.0200614460 | | 0.0127590677 | 7.9999210696 | 7.9999117744 | 7.9999109717 | 7.9999703635 | 99.6093267747 | 33.4257830151 |
| **6** | -0.0188214692 | -0.0001000049 | | 0.0313815189 | 7.9999029322 | 7.9999156710 | 7.9999224116 | 7.9999710445 | 99.6100983796 | 33.4226491896 |
| **7** | 0.0029582590 | -0.0076976134 | | 0.0029861355 | 7.9999066125 | 7.9998808941 | 7.9999130611 | 7.9999677052 | 99.6074620628 | 33.4103871011 |
| **8** | 0.0250337249 | -0.0200033208 | | -0.0080712535 | 7.9998958181 | 7.9999062825 | 7.9999144544 | 7.9999708782 | 99.6116094393 | 33.4219637598 |
| **9** | -0.0117598870 | -0.0084781065 | | -0.0255782936 | 7.9999154542 | 7.9999059938 | 7.9999055364 | 7.9999710366 | 99.6043756430 | 33.4080374884 |
| **10** | 0.0041164274 | -0.0073195811 | | 0.0174006357 | 7.9999055746 | 7.9999132279 | 7.9999100564 | 7.9999734916 | 99.6067386831 | 33.4134904785 |
| **11** | 0.0191709282 | -0.0188216088 | | -0.0075611806 | 7.9998990645 | 7.9999089741 | 7.9999014635 | 7.9999648905 | 99.6123167438 | 33.4014734881 |
| **12** | -0.0135753442 | 0.0140104883 | | 0.0055325121 | 7.9999053136 | 7.9999070764 | 7.9999152167 | 7.9999688466 | 99.6115933642 | 33.3998512895 |
| **13** | -0.0256674377 | -0.0008345537 | | 0.0240002486 | 7.9999072920 | 7.9999153571 | 7.9999126874 | 7.9999676913 | 99.6097447274 | 33.4121443935 |
| **14** | 0.0070041168 | 0.0043115298 | | -0.0475370274 | 7.9999109545 | 7.9999169334 | 7.9998998961 | 7.9999683253 | 99.6093910751 | 33.4148881299 |
| **15** | 0.0061414275 | 0.0038264543 | | 0.0777966229 | 7.9999115899 | 7.9999102590 | 7.9999064770 | 7.9999672693 | 99.6067547582 | 33.4142769608 |
| **16** | 0.0065385056 | 0.0255696134 | | -0.0327749289 | 7.9999120564 | 7.9999072853 | 7.9999211610 | 7.9999745270 | 99.6141814558 | 33.4365997942 |
| **17** | 0.0092105876 | -0.0223728071 | | -0.0094411598 | 7.9999155871 | 7.9999095507 | 7.9999078376 | 7.9999753542 | 99.6064171811 | 33.4141583202 |
| **18** | 0.0058314169 | -0.0169106237 | | 0.0105335713 | 7.9999255475 | 7.9999216279 | 7.9999120725 | 7.9999725419 | 99.6094393004 | 33.4247262189 |
| **19** | -0.0073929063 | 0.0029368879 | | -0.0239475946 | 7.9999249618 | 7.9998992134 | 7.9999200807 | 7.9999721998 | 99.6097286523 | 33.4169284702 |
| **20** | -0.0056956770 | -0.0086331922 | | -0.0592966738 | 7.9999046946 | 7.9998975058 | 7.9999014482 | 7.9999654136 | 99.6082818930 | 33.4500782952 |
| **21** | -0.0396841230 | 0.0115378961 | | -0.0104755426 | 7.9999109532 | 7.9998989814 | 7.9999132021 | 7.9999681104 | 99.6132169496 | 33.4255573963 |
| **22** | 0.0241832436 | 0.0104384013 | | -0.0314395891 | 7.9999110902 | 7.9999069025 | 7.9999009788 | 7.9999668567 | 99.6105806327 | 33.4186628792 |
| **23** | -0.0011098223 | -0.0144914954 | | -0.0307157326 | 7.9999144592 | 7.9998971679 | 7.9999109552 | 7.9999671301 | 99.6088445216 | 33.4143451697 |
| **24** | -0.0116681695 | -0.0375581370 | | -0.0088596385 | 7.9999130757 | 7.9999138753 | 7.9999190834 | 7.9999705873 | 99.6071084105 | 33.4188813746 |
| **25** | 0.0219716365 | 0.0033436120 | | 0.0524000553 | 7.9998995877 | 7.9998998031 | 7.9999156517 | 7.9999666871 | 99.6121720679 | 33.4171405355 |
| **26** | -0.0219867719 | -0.0056196091 | | 0.0059038868 | 7.9999076942 | 7.9999227279 | 7.9999048766 | 7.9999674539 | 99.6099054784 | 33.4146232374 |
| **27** | -0.0023952535 | 0.0035009045 | | 0.0013300268 | 7.9999103470 | 7.9999146648 | 7.9999043453 | 7.9999714266 | 99.6085069444 | 33.3961323933 |
| **28** | -0.0158709644 | -0.0260128562 | | 0.0420465070 | 7.9999046384 | 7.9999200310 | 7.9999050446 | 7.9999701611 | 99.6140207047 | 33.4252888475 |
| **29** | -0.0067828824 | 0.0007024556 | | -0.0170869625 | 7.9999140047 | 7.9999127783 | 7.9999036489 | 7.9999695845 | 99.6097768776 | 33.4198372443 |
| **30** | 0.0069319094 | -0.0073767063 | | -0.0141545872 | 7.9999019950 | 7.9999122751 | 7.9999126838 | 7.9999679855 | 99.6087319959 | 33.4215927086 |
| **31** | -0.0018918595 | -0.0353652311 | | 0.0115743627 | 7.9999077368 | 7.9999100959 | 7.9999173497 | 7.9999689366 | 99.6141171553 | 33.4219376614 |
| **32** | -0.0320095201 | -0.0210988110 | | -0.0016956859 | 7.9998997256 | 7.9999141352 | 7.9999020910 | 7.9999706653 | 99.6080889918 | 33.4102602023 |
| **33** | 0.0063466748 | 0.0235754721 | | 0.0032647410 | 7.9999194521 | 7.9999186835 | 7.9999041399 | 7.9999708367 | 99.6158532665 | 33.4195421559 |
| **34** | 0.0175290796 | -0.0161302716 | | -0.0137756350 | 7.9999020341 | 7.9999176196 | 7.9999044299 | 7.9999709946 | 99.6130079733 | 33.4090698882 |
| **35** | 0.0177929153 | -0.0025389041 | | 0.0795118750 | 7.9999179581 | 7.9999121941 | 7.9999111893 | 7.9999728547 | 99.6075263632 | 33.4038833036 |
| **36** | -0.0338890178 | -0.0161834874 | | -0.0641723288 | 7.9999071593 | 7.9999199089 | 7.9999075020 | 7.9999700027 | 99.6068994342 | 33.4157383452 |
| **37** | -0.0352416260 | 0.0037266208 | | 0.0213168813 | 7.9999047189 | 7.9999164180 | 7.9999061282 | 7.9999690190 | 99.6095036008 | 33.4098894663 |
| **38** | 0.0033219577 | 0.0179838295 | | 0.0489022622 | 7.9999036491 | 7.9999131294 | 7.9999092021 | 7.9999672001 | 99.6118505658 | 33.4061662834 |
| **39** | 0.0265859665 | 0.0113586815 | | 0.0537665655 | 7.9998986250 | 7.9999164194 | 7.9999167300 | 7.9999719731 | 99.6099054784 | 33.4202440390 |
| **40** | -0.0109676041 | 0.0204807743 | | -0.0020492256 | 7.9999209533 | 7.9999179204 | 7.9998989786 | 7.9999699461 | 99.6092624743 | 33.4090202130 |
| **41** | 0.0015078934 | 0.0329097134 | | -0.0225407662 | 7.9999160353 | 7.9999025413 | 7.9999030925 | 7.9999715711 | 99.6065136317 | 33.4170755416 |
| **42** | 0.0076944613 | 0.0078138194 | | -0.0032309737 | 7.9999155369 | 7.9999029754 | 7.9999223289 | 7.9999719934 | 99.6080889918 | 33.4094856976 |
| **43** | -0.0030877181 | 0.0002983161 | | 0.0020392832 | 7.9999066648 | 7.9999125669 | 7.9999241695 | 7.9999710204 | 99.6091660237 | 33.4241847716 |
| **44** | 0.0041388505 | -0.0283876932 | | 0.0186859794 | 7.9999163632 | 7.9999223842 | 7.9999142401 | 7.9999707088 | 99.6071084105 | 33.4115064956 |
| **45** | -0.0246912909 | 0.0174741718 | | -0.0268104064 | 7.9999015248 | 7.9999132818 | 7.9999018930 | 7.9999649173 | 99.6102269805 | 33.4260063645 |
| **46** | -0.0004932294 | -0.0085885249 | | -0.0339700534 | 7.9999311414 | 7.9999291447 | 7.9999055315 | 7.9999754951 | 99.6083301183 | 33.4152389454 |
| **47** | -0.0109288186 | -0.0146408576 | | -0.0055943935 | 7.9999032362 | 7.9999077058 | 7.9999271243 | 7.9999721793 | 99.6090856481 | 33.4104082824 |
| **48** | -0.0085157878 | 0.0242191763 | | 0.0312416989 | 7.9999110821 | 7.9999223080 | 7.9999220858 | 7.9999760192 | 99.6083783436 | 33.4210596456 |
| **49** | 0.0327879776 | -0.0046665763 | | 0.0056501088 | 7.9999260717 | 7.9999034054 | 7.9998962709 | 7.9999688139 | 99.6107413837 | 33.4004260217 |
| **50** | -0.0041088325 | 0.0212542856 | | 0.0466796231 | 7.9999056174 | 7.9999228480 | 7.9999109593 | 7.9999697306 | 99.6082497428 | 33.4237620280 |
| **Total** | -0.0784080592 | -0.1138240595 | | 0.0347548636 | 399.9955117817 | 399.9955514695 | 399.9955234984 | 399.9985004363 | 4980.4811278292 | 1670.7944208046 |
| **Average** | -0.0015681599 | -0.0022764773 | | 0.0006950972 | 7.9999102356 | 7.9999110294 | 7.9999104700 | 7.9999700087 | 99.6096225566 | 33.4158884161 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **VID\_20200717\_172041** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0085121951 | -0.0133322874 | | 0.0101645107 | 7.9999225684 | 7.9999033228 | 7.9999177110 | 7.9999712424 | 99.6079603909 | 33.4156852028 |
| **2** | -0.0073968742 | 0.0142291541 | | 0.0132438687 | 7.9999079652 | 7.9999123154 | 7.9999155628 | 7.9999704449 | 99.6140689300 | 33.4330006733 |
| **3** | -0.0145939825 | 0.0293345709 | | 0.0114402545 | 7.9999002413 | 7.9999184662 | 7.9999110729 | 7.9999697090 | 99.6114165381 | 33.4185600616 |
| **4** | -0.0181144579 | 0.0151859440 | | 0.0057629245 | 7.9999182028 | 7.9999114422 | 7.9999020479 | 7.9999736859 | 99.6032182356 | 33.4046811330 |
| **5** | -0.0148766182 | -0.0203125935 | | -0.0165560866 | 7.9999084568 | 7.9999081891 | 7.9999052892 | 7.9999708153 | 99.6133455504 | 33.4201835209 |
| **6** | -0.0011034137 | -0.0053226172 | | -0.0250849684 | 7.9999164717 | 7.9999174435 | 7.9998998090 | 7.9999702706 | 99.6132008745 | 33.4019899086 |
| **7** | -0.0228381393 | -0.0120899199 | | -0.0206968220 | 7.9998970629 | 7.9999056406 | 7.9999100874 | 7.9999697505 | 99.6107253086 | 33.4178770904 |
| **8** | 0.0256817548 | -0.0018026070 | | 0.0060870181 | 7.9999051037 | 7.9999091905 | 7.9999013223 | 7.9999720668 | 99.6132169496 | 33.4329173979 |
| **9** | 0.0128248287 | -0.0214117583 | | 0.0696748294 | 7.9999125597 | 7.9999074493 | 7.9999118424 | 7.9999704047 | 99.6097286523 | 33.4257364919 |
| **10** | 0.0356519640 | -0.0240317887 | | -0.0305862717 | 7.9998997994 | 7.9999178090 | 7.9999269898 | 7.9999720491 | 99.6055330504 | 33.3960702993 |
| **11** | 0.0121659416 | 0.0175890362 | | 0.0390209421 | 7.9999200875 | 7.9999129892 | 7.9999124971 | 7.9999699014 | 99.6139885545 | 33.4184138097 |
| **12** | 0.0179520963 | -0.0281483289 | | -0.0400018771 | 7.9998883063 | 7.9999139286 | 7.9999182236 | 7.9999698951 | 99.6134580761 | 33.4049684676 |
| **13** | -0.0332405689 | -0.0269101065 | | 0.0029210023 | 7.9999146140 | 7.9999214476 | 7.9999116099 | 7.9999720897 | 99.6133134002 | 33.4148346093 |
| **14** | -0.0082787149 | 0.0296832891 | | -0.0132504205 | 7.9999039338 | 7.9999115961 | 7.9999080914 | 7.9999675017 | 99.6093750000 | 33.4120345155 |
| **15** | -0.0164610456 | 0.0235658402 | | -0.0013979520 | 7.9999144330 | 7.9999095391 | 7.9999205999 | 7.9999705164 | 99.6103073560 | 33.4151760949 |
| **16** | -0.0128974939 | -0.0019609441 | | 0.0205119116 | 7.9999214136 | 7.9999147848 | 7.9999059674 | 7.9999689092 | 99.6118023405 | 33.4049637396 |
| **17** | 0.0008058999 | -0.0006427664 | | 0.0038248470 | 7.9999089302 | 7.9999035416 | 7.9999079009 | 7.9999709608 | 99.6109342850 | 33.4111988623 |
| **18** | 0.0361321676 | 0.0121809428 | | -0.0209856339 | 7.9998988572 | 7.9999236931 | 7.9999006979 | 7.9999684005 | 99.6068994342 | 33.4084492002 |
| **19** | -0.0129067764 | 0.0029313756 | | -0.0093335164 | 7.9999118035 | 7.9999157403 | 7.9999113040 | 7.9999736699 | 99.6104038066 | 33.4143452957 |
| **20** | 0.0406323089 | 0.0226531870 | | 0.0209390829 | 7.9999041934 | 7.9999066688 | 7.9999006644 | 7.9999632269 | 99.6122685185 | 33.4062021529 |
| **21** | -0.0268006816 | 0.0204426456 | | 0.0203833868 | 7.9999117822 | 7.9999334436 | 7.9999151092 | 7.9999720583 | 99.6089088220 | 33.4174510686 |
| **22** | -0.0143040699 | 0.0112718546 | | -0.0396729716 | 7.9999005151 | 7.9999137958 | 7.9999210162 | 7.9999714411 | 99.6103073560 | 33.4139272170 |
| **23** | -0.0505448550 | 0.0084391591 | | 0.0250235793 | 7.9999276880 | 7.9999000775 | 7.9999096013 | 7.9999740475 | 99.6166730967 | 33.3934875661 |
| **24** | -0.0043339324 | 0.0062368771 | | -0.0018568996 | 7.9999055255 | 7.9999081047 | 7.9999123686 | 7.9999692212 | 99.6087480710 | 33.4295800805 |
| **25** | 0.0385364050 | -0.0014557337 | | -0.0023281529 | 7.9999200936 | 7.9999272052 | 7.9999102689 | 7.9999767949 | 99.6096000514 | 33.4208492824 |
| **26** | 0.0315278302 | 0.0060021768 | | 0.0076235976 | 7.9999086848 | 7.9999177453 | 7.9999042284 | 7.9999731558 | 99.6040059156 | 33.4060961833 |
| **27** | 0.0276724459 | -0.0239105298 | | 0.0009906245 | 7.9999146078 | 7.9999127819 | 7.9999159630 | 7.9999720288 | 99.6082658179 | 33.4129160615 |
| **28** | 0.0169325125 | 0.0042510689 | | 0.0135362591 | 7.9999168477 | 7.9999100662 | 7.9999089498 | 7.9999700606 | 99.6147440844 | 33.4116050896 |
| **29** | -0.0139529810 | 0.0042240695 | | 0.0035126876 | 7.9999124641 | 7.9999065530 | 7.9999166476 | 7.9999700335 | 99.6067386831 | 33.4018686834 |
| **30** | 0.0103669337 | 0.0171871078 | | -0.0218422536 | 7.9998978187 | 7.9999088424 | 7.9999199123 | 7.9999688170 | 99.6044238683 | 33.4100379877 |
| **31** | 0.0023924619 | -0.0198736768 | | 0.0047684745 | 7.9999219540 | 7.9998942850 | 7.9999123117 | 7.9999661669 | 99.6086194702 | 33.4038445973 |
| **32** | 0.0208495087 | 0.0248099951 | | 0.0202887331 | 7.9999079059 | 7.9999093345 | 7.9998904453 | 7.9999635268 | 99.6088605967 | 33.4198057875 |
| **33** | -0.0228425592 | -0.0243280201 | | 0.0087893814 | 7.9999122222 | 7.9999140848 | 7.9999079791 | 7.9999706811 | 99.6087962963 | 33.4106719771 |
| **34** | 0.0098644891 | 0.0130611789 | | 0.0346618727 | 7.9999142901 | 7.9999147000 | 7.9999046016 | 7.9999709905 | 99.6066743827 | 33.4259605347 |
| **35** | -0.0151329549 | -0.0075915860 | | -0.0315216931 | 7.9999076140 | 7.9999192621 | 7.9999005690 | 7.9999680634 | 99.6085712449 | 33.4071299700 |
| **36** | 0.0076950761 | -0.0129624336 | | 0.0207981199 | 7.9999123518 | 7.9999118215 | 7.9998976330 | 7.9999682793 | 99.6063850309 | 33.4221290497 |
| **37** | -0.0046713188 | 0.0044501623 | | -0.0100830556 | 7.9999106242 | 7.9999132627 | 7.9999086752 | 7.9999711378 | 99.6125096451 | 33.4046846632 |
| **38** | 0.0012331950 | 0.0017899509 | | -0.0188984165 | 7.9999067195 | 7.9999131618 | 7.9999078092 | 7.9999684149 | 99.6096161265 | 33.4079238910 |
| **39** | 0.0195726455 | 0.0339748703 | | 0.0065812967 | 7.9999105597 | 7.9999314017 | 7.9999206744 | 7.9999748231 | 99.6095839763 | 33.4101459745 |
| **40** | -0.0200136366 | -0.0030404522 | | -0.0312015716 | 7.9999134883 | 7.9999059845 | 7.9999213681 | 7.9999704826 | 99.6124935700 | 33.4185167534 |
| **41** | 0.0365930298 | 0.0018473688 | | -0.0498230613 | 7.9999083837 | 7.9999146892 | 7.9999050540 | 7.9999720668 | 99.6075906636 | 33.4103444863 |
| **42** | 0.0148637910 | 0.0257715533 | | 0.0042894974 | 7.9999019021 | 7.9999238366 | 7.9999111323 | 7.9999709334 | 99.6087319959 | 33.4194002537 |
| **43** | -0.0085473539 | 0.0165658464 | | 0.0216814997 | 7.9999082531 | 7.9999093107 | 7.9999016058 | 7.9999683840 | 99.6105324074 | 33.4171196694 |
| **44** | -0.0235623519 | -0.0146278638 | | -0.0107111312 | 7.9999100011 | 7.9999119795 | 7.9999048237 | 7.9999687638 | 99.6072852366 | 33.4324973019 |
| **45** | 0.0073285543 | -0.0043157289 | | -0.0319744961 | 7.9999255375 | 7.9999023656 | 7.9999005351 | 7.9999701710 | 99.6127989969 | 33.4156028101 |
| **46** | -0.0172434755 | -0.0264500809 | | -0.0280838279 | 7.9999167644 | 7.9999133509 | 7.9999041642 | 7.9999700653 | 99.6094714506 | 33.4207600813 |
| **47** | 0.0330026525 | 0.0015266156 | | 0.0717808566 | 7.9999061459 | 7.9999109013 | 7.9999156183 | 7.9999752588 | 99.6099054784 | 33.4107443466 |
| **48** | -0.0074328371 | -0.0100345099 | | 0.0549572122 | 7.9999182343 | 7.9999159496 | 7.9999136794 | 7.9999739859 | 99.6093106996 | 33.4108292610 |
| **49** | 0.0124038284 | 0.0013551331 | | -0.0132269163 | 7.9999160472 | 7.9999257209 | 7.9999162448 | 7.9999709267 | 99.6086194702 | 33.3940082103 |
| **50** | 0.0466513823 | -0.0153203705 | | 0.0175619445 | 7.9999054751 | 7.9999072368 | 7.9999136378 | 7.9999696158 | 99.6057259516 | 33.4019616669 |
| **Total** | 0.1357548052 | 0.0506842700 | | 0.0717022194 | 399.9955255061 | 399.9956464531 | 399.9954919189 | 399.9985259072 | 4980.4896637088 | 1670.6591890332 |
| **Average** | 0.0027150894 | 0.0010136851 | | 0.0014340434 | 7.9999105101 | 7.9999129291 | 7.9999098384 | 7.9999705181 | 99.6097932742 | 33.4131837807 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Star Citizen: 325a Dream Weapons Combat Test AC - ULTRA 1080p60** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0315995420 | -0.0104681719 | | -0.0423195319 | 7.9999136209 | 7.9999127696 | 7.9999210192 | 7.9999731116 | 99.6076421279 | 33.3943622497 |
| **2** | -0.0275271091 | -0.0291767399 | | 0.0549655508 | 7.9999025379 | 7.9999174109 | 7.9999115811 | 7.9999663327 | 99.6138448383 | 33.4227959594 |
| **3** | 0.0028591657 | -0.0171947284 | | 0.0221784096 | 7.9999126457 | 7.9999117373 | 7.9999169863 | 7.9999753581 | 99.6116423093 | 33.4275308888 |
| **4** | 0.0116164497 | 0.0065425252 | | -0.0020253150 | 7.9999125775 | 7.9999062766 | 7.9999207455 | 7.9999679526 | 99.6103305089 | 33.4206303933 |
| **5** | -0.0270894357 | 0.0204425093 | | 0.0210288304 | 7.9999107633 | 7.9999142416 | 7.9999047630 | 7.9999711814 | 99.6089863184 | 33.4155862335 |
| **6** | 0.0326962686 | 0.0377269646 | | 0.0164962894 | 7.9999095736 | 7.9999088266 | 7.9999102129 | 7.9999685288 | 99.6120147958 | 33.4123581439 |
| **7** | 0.0083703658 | -0.0108569862 | | -0.0094682281 | 7.9999208755 | 7.9998965037 | 7.9999142192 | 7.9999712130 | 99.6090025135 | 33.4182711214 |
| **8** | 0.0143320252 | 0.0345402505 | | 0.0661864565 | 7.9999141755 | 7.9999095703 | 7.9999111470 | 7.9999719824 | 99.6095369507 | 33.4237365435 |
| **9** | 0.0130412821 | 0.0110873265 | | -0.0234656017 | 7.9999152711 | 7.9999106470 | 7.9999238078 | 7.9999715650 | 99.6074801772 | 33.4209306689 |
| **10** | -0.0174502461 | -0.0147155240 | | -0.0327673054 | 7.9999073976 | 7.9999023102 | 7.9999133818 | 7.9999651146 | 99.6093264148 | 33.4165919153 |
| **11** | -0.0084285709 | 0.0049211359 | | -0.0131511998 | 7.9999164287 | 7.9999259995 | 7.9999148242 | 7.9999746254 | 99.6103790941 | 33.4124868788 |
| **12** | 0.0008342889 | -0.0016222653 | | -0.0454486124 | 7.9999211487 | 7.9999202430 | 7.9999115833 | 7.9999723187 | 99.6084032960 | 33.4005828065 |
| **13** | -0.0210640148 | 0.0078277296 | | 0.0002931722 | 7.9998917828 | 7.9999179342 | 7.9998988807 | 7.9999679186 | 99.6108973362 | 33.4202792461 |
| **14** | 0.0156166768 | 0.0139039738 | | 0.0087919531 | 7.9999091730 | 7.9999008218 | 7.9999160287 | 7.9999665972 | 99.6097474865 | 33.4024133570 |
| **15** | -0.0013334591 | -0.0216615584 | | -0.0133401560 | 7.9999079690 | 7.9999173019 | 7.9999001828 | 7.9999701272 | 99.6072858364 | 33.3976368286 |
| **16** | 0.0131490029 | -0.0146688634 | | -0.0001006954 | 7.9999115819 | 7.9999277593 | 7.9999247125 | 7.9999720299 | 99.6102495336 | 33.4265810957 |
| **17** | -0.0248955453 | 0.0144844067 | | 0.0653691759 | 7.9999139489 | 7.9999139015 | 7.9999197014 | 7.9999744391 | 99.6057311101 | 33.4298848893 |
| **18** | -0.0096624364 | -0.0194223449 | | 0.0044145795 | 7.9998999054 | 7.9999215919 | 7.9999138594 | 7.9999683263 | 99.6123225021 | 33.4059861792 |
| **19** | -0.0035308589 | -0.0211172294 | | 0.0361453478 | 7.9998967981 | 7.9999187661 | 7.9999129419 | 7.9999688091 | 99.6098608520 | 33.4269819078 |
| **20** | -0.0023592750 | -0.0027721718 | | -0.0359709251 | 7.9999126056 | 7.9998975672 | 7.9999151621 | 7.9999672806 | 99.6060226213 | 33.4022043454 |
| **21** | -0.0336089712 | -0.0122662678 | | 0.0043178311 | 7.9999094426 | 7.9999044791 | 7.9999021976 | 7.9999701325 | 99.6085490516 | 33.4105868482 |
| **22** | -0.0260400539 | 0.0014346249 | | -0.0108559383 | 7.9999085102 | 7.9999190830 | 7.9998966218 | 7.9999701105 | 99.6044516998 | 33.4123351533 |
| **23** | -0.0095135575 | 0.0055217752 | | 0.0221993611 | 7.9999189632 | 7.9999175580 | 7.9999034985 | 7.9999706449 | 99.6094721704 | 33.4085429038 |
| **24** | 0.0194388750 | 0.0010460417 | | -0.0265636234 | 7.9999050092 | 7.9999095270 | 7.9999269533 | 7.9999702311 | 99.6071400808 | 33.4178922204 |
| **25** | 0.0337253241 | 0.0288965919 | | 0.0172955584 | 7.9999249950 | 7.9999022378 | 7.9999199571 | 7.9999691545 | 99.6073992019 | 33.4110083010 |
| **26** | -0.0056558831 | -0.0318478017 | | 0.0078342931 | 7.9999108138 | 7.9999229545 | 7.9999066879 | 7.9999707574 | 99.6103467040 | 33.4195794287 |
| **27** | 0.0252758781 | 0.0034981779 | | 0.0015956208 | 7.9999082763 | 7.9999159444 | 7.9999253684 | 7.9999744445 | 99.6080631996 | 33.4072541576 |
| **28** | -0.0225335259 | 0.0127099040 | | -0.0258159141 | 7.9998952189 | 7.9998998832 | 7.9999035522 | 7.9999634745 | 99.6078688588 | 33.4328349953 |
| **29** | 0.0019418646 | -0.0190902900 | | -0.0452512968 | 7.9999134755 | 7.9999151317 | 7.9999012313 | 7.9999734277 | 99.6054881841 | 33.4136219307 |
| **30** | 0.0121752166 | 0.0150223493 | | 0.0043972395 | 7.9999092926 | 7.9999115101 | 7.9999124771 | 7.9999677222 | 99.6082251503 | 33.4217841171 |
| **31** | -0.0067843780 | -0.0279647368 | | -0.0010847103 | 7.9999048370 | 7.9999188218 | 7.9999049522 | 7.9999688844 | 99.6097312915 | 33.4222154775 |
| **32** | 0.0105153572 | 0.0046560843 | | 0.0077241423 | 7.9998887761 | 7.9999138909 | 7.9999161069 | 7.9999689458 | 99.6111402622 | 33.4227692217 |
| **33** | 0.0216692775 | 0.0113495884 | | 0.0131148352 | 7.9999130174 | 7.9999003121 | 7.9999106150 | 7.9999701442 | 99.6120957711 | 33.4079816019 |
| **34** | -0.0041795579 | -0.0243303737 | | -0.0492933833 | 7.9998923359 | 7.9998977995 | 7.9999201966 | 7.9999680728 | 99.6076745180 | 33.4055277000 |
| **35** | 0.0059189534 | -0.0094578139 | | 0.0190698381 | 7.9999192961 | 7.9999080250 | 7.9999207593 | 7.9999732115 | 99.6068161795 | 33.4288033764 |
| **36** | 0.0010963171 | -0.0297685096 | | 0.0054285726 | 7.9999124957 | 7.9999025117 | 7.9999126068 | 7.9999736058 | 99.6085976368 | 33.3949149778 |
| **37** | 0.0281604236 | -0.0028063719 | | -0.0139369822 | 7.9999202836 | 7.9999059863 | 7.9999007682 | 7.9999706841 | 99.6138448383 | 33.4070914448 |
| **38** | 0.0069726165 | 0.0080639836 | | 0.0208918611 | 7.9999006992 | 7.9999128667 | 7.9999099919 | 7.9999715951 | 99.6098446569 | 33.4135629933 |
| **39** | -0.0091656073 | 0.0180815485 | | 0.0214152390 | 7.9999050654 | 7.9999169501 | 7.9999143817 | 7.9999705810 | 99.6080793947 | 33.4210315228 |
| **40** | 0.0194543550 | -0.0094225260 | | 0.0388850984 | 7.9999242320 | 7.9999047097 | 7.9998978360 | 7.9999731326 | 99.6083871010 | 33.4279983228 |
| **41** | 0.0058374351 | -0.0068423406 | | 0.0792344369 | 7.9999092528 | 7.9999075399 | 7.9999104218 | 7.9999711598 | 99.6116423093 | 33.4106718882 |
| **42** | 0.0170419134 | -0.0022012703 | | -0.0588937989 | 7.9999066126 | 7.9999063902 | 7.9999193120 | 7.9999695088 | 99.6108001658 | 33.4202962033 |
| **43** | -0.0060183676 | 0.0054944080 | | -0.0067270416 | 7.9999037586 | 7.9999166326 | 7.9999006722 | 7.9999697183 | 99.6077878835 | 33.4417734017 |
| **44** | -0.0092598791 | -0.0200236970 | | -0.0028131615 | 7.9999241514 | 7.9999014382 | 7.9998996623 | 7.9999718387 | 99.6080470046 | 33.4126361275 |
| **45** | 0.0269479593 | 0.0126647978 | | 0.0045219416 | 7.9999144553 | 7.9999110231 | 7.9999170639 | 7.9999730698 | 99.6132456209 | 33.4147367228 |
| **46** | -0.0007664869 | -0.0300190086 | | 0.0496049341 | 7.9999019194 | 7.9999112125 | 7.9999107174 | 7.9999680468 | 99.6117394797 | 33.4264023784 |
| **47** | 0.0046417059 | 0.0113441994 | | -0.0506748694 | 7.9999017387 | 7.9999158372 | 7.9999102854 | 7.9999687926 | 99.6118852353 | 33.4120828913 |
| **48** | 0.0112013725 | 0.0162463417 | | -0.0360791026 | 7.9999052745 | 7.9999161975 | 7.9999090814 | 7.9999727672 | 99.6044355048 | 33.4085269628 |
| **49** | -0.0046361713 | 0.0118916760 | | -0.0017680637 | 7.9999108859 | 7.9999154383 | 7.9999239389 | 7.9999715155 | 99.6087433924 | 33.3998341498 |
| **50** | 0.0193571297 | -0.0187013828 | | -0.0182628578 | 7.9999159511 | 7.9998966126 | 7.9999150645 | 7.9999687584 | 99.6076907131 | 33.4158634549 |
| **Total** | 0.0707845675 | -0.0890200600 | | 0.0473222537 | 399.9954798170 | 399.9955506850 | 399.9955987207 | 399.9985189453 | 4980.4599398839 | 1670.7679925282 |
| **Average** | 0.0014156904 | -0.0017803993 | | 0.0009464448 | 7.9999095963 | 7.9999110137 | 7.9999119744 | 7.9999703789 | 99.6091987977 | 33.4153598506 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Wreckfest 2016 - Racing 2 1080p60 HD HQ** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0019949965 | 0.0069796521 | | -0.0069448664 | 7.9999255777 | 7.9998997847 | 7.9999105753 | 7.9999702186 | 99.6086355453 | 33.4022041803 |
| **2** | 0.0080242951 | -0.0050309413 | | -0.0014225717 | 7.9999115410 | 7.9998978608 | 7.9999155814 | 7.9999670449 | 99.6112718621 | 33.4046005684 |
| **3** | 0.0123785483 | 0.0073807827 | | 0.0145573468 | 7.9999050778 | 7.9999031732 | 7.9999150927 | 7.9999659372 | 99.6122363683 | 33.4324154134 |
| **4** | 0.0077861239 | 0.0018011187 | | -0.0062981599 | 7.9999116517 | 7.9999061545 | 7.9999052199 | 7.9999667826 | 99.6135866770 | 33.4341533527 |
| **5** | 0.0002997725 | -0.0331347096 | | -0.0607937772 | 7.9999108683 | 7.9999003386 | 7.9999008897 | 7.9999659997 | 99.6038773148 | 33.4112357404 |
| **6** | -0.0025931843 | -0.0068876253 | | 0.0332865085 | 7.9999127696 | 7.9999186819 | 7.9999151188 | 7.9999705113 | 99.6086194702 | 33.4094204516 |
| **7** | -0.0125297627 | 0.0449800062 | | -0.0478140077 | 7.9999142369 | 7.9999222954 | 7.9998986747 | 7.9999744172 | 99.6083783436 | 33.4112660625 |
| **8** | 0.0044227644 | 0.0097616719 | | 0.0005444873 | 7.9999076533 | 7.9999038025 | 7.9999073825 | 7.9999711472 | 99.6100662294 | 33.4308553720 |
| **9** | -0.0175992156 | -0.0031971949 | | -0.0144902843 | 7.9999086549 | 7.9999192256 | 7.9999162012 | 7.9999708420 | 99.6101144547 | 33.4272299635 |
| **10** | -0.0141677305 | 0.0124294119 | | 0.0281347122 | 7.9999139859 | 7.9999061223 | 7.9999101987 | 7.9999690360 | 99.6084104938 | 33.4118643085 |
| **11** | -0.0236011475 | 0.0165982653 | | 0.0288023261 | 7.9999053161 | 7.9999049280 | 7.9999245210 | 7.9999699762 | 99.6089891975 | 33.4020416011 |
| **12** | -0.0057835715 | 0.0065636082 | | 0.0410203577 | 7.9999150902 | 7.9999162927 | 7.9999206597 | 7.9999715508 | 99.6091017233 | 33.4143485108 |
| **13** | -0.0138220907 | 0.0385413752 | | -0.0672475854 | 7.9999150711 | 7.9999217186 | 7.9999156742 | 7.9999744229 | 99.6096161265 | 33.4025921261 |
| **14** | -0.0020199483 | -0.0036130575 | | -0.0245849890 | 7.9999221970 | 7.9999116619 | 7.9999231672 | 7.9999744489 | 99.6094393004 | 33.4069958848 |
| **15** | 0.0620268779 | 0.0098518873 | | 0.0203102493 | 7.9999208165 | 7.9999165019 | 7.9999131727 | 7.9999738686 | 99.6088605967 | 33.4217109079 |
| **16** | 0.0217035665 | 0.0120401878 | | 0.0274814047 | 7.9999135468 | 7.9999103784 | 7.9999201982 | 7.9999707423 | 99.6124131944 | 33.4063178306 |
| **17** | -0.0100526079 | 0.0049973288 | | -0.0222751003 | 7.9999083102 | 7.9999232811 | 7.9999080430 | 7.9999709383 | 99.6094071502 | 33.4088527798 |
| **18** | 0.0010134133 | 0.0129637297 | | -0.0455842260 | 7.9999176557 | 7.9999095387 | 7.9999161192 | 7.9999726444 | 99.6101787551 | 33.4028122605 |
| **19** | -0.0278466270 | 0.0503250498 | | 0.0310987936 | 7.9999153436 | 7.9999146185 | 7.9999082730 | 7.9999721948 | 99.6120756173 | 33.4227865529 |
| **20** | 0.0220072995 | -0.0024708337 | | 0.0338722735 | 7.9999184710 | 7.9999226013 | 7.9999084259 | 7.9999757597 | 99.6078639403 | 33.4086620849 |
| **21** | 0.0194475373 | 0.0236819954 | | 0.0438696832 | 7.9998991069 | 7.9999138353 | 7.9999031795 | 7.9999667052 | 99.6060796039 | 33.4187605907 |
| **22** | 0.0219132541 | 0.0174336621 | | -0.0300188603 | 7.9999212987 | 7.9999009666 | 7.9999027630 | 7.9999686295 | 99.6088927469 | 33.4050935382 |
| **23** | 0.0095004538 | -0.0075307417 | | -0.0405687444 | 7.9999147600 | 7.9998972576 | 7.9999045855 | 7.9999695172 | 99.6091338735 | 33.3987303821 |
| **24** | 0.0161665218 | -0.0249595759 | | -0.0308435390 | 7.9999209498 | 7.9999110336 | 7.9999000497 | 7.9999689007 | 99.6104841821 | 33.4286762184 |
| **25** | 0.0008615543 | 0.0239837805 | | 0.0100274336 | 7.9999016764 | 7.9999056890 | 7.9999169597 | 7.9999729242 | 99.6090695730 | 33.4191211773 |
| **26** | 0.0166542124 | -0.0049524572 | | 0.0143580462 | 7.9999011291 | 7.9999131987 | 7.9999039396 | 7.9999684281 | 99.6046489198 | 33.4073946104 |
| **27** | -0.0141573403 | 0.0076170198 | | 0.0201576826 | 7.9999199193 | 7.9999094305 | 7.9999080290 | 7.9999725237 | 99.6070601852 | 33.4303291172 |
| **28** | -0.0219199470 | -0.0305235698 | | -0.0504435323 | 7.9999048671 | 7.9999074654 | 7.9999112982 | 7.9999719810 | 99.6076228138 | 33.4128678992 |
| **29** | 0.0248662006 | -0.0158898583 | | 0.0212828630 | 7.9999152166 | 7.9999067098 | 7.9999124324 | 7.9999709054 | 99.6074138374 | 33.4305488734 |
| **30** | 0.0079897893 | -0.0094648925 | | -0.0149386994 | 7.9999147991 | 7.9998987014 | 7.9999072931 | 7.9999712314 | 99.6156442901 | 33.4276875050 |
| **31** | -0.0179541867 | 0.0066421847 | | 0.0145099738 | 7.9999012181 | 7.9999182283 | 7.9999044446 | 7.9999693142 | 99.6060474537 | 33.4113463119 |
| **32** | 0.0258305701 | 0.0007718201 | | -0.0880071919 | 7.9999181582 | 7.9999119659 | 7.9999152759 | 7.9999736191 | 99.6086516204 | 33.4216979848 |
| **33** | -0.0058543835 | 0.0005338025 | | -0.0146466431 | 7.9999174937 | 7.9998995936 | 7.9999188094 | 7.9999688633 | 99.6124774949 | 33.4197371374 |
| **34** | 0.0049347118 | -0.0334992643 | | 0.0283368483 | 7.9999144586 | 7.9999138662 | 7.9999131960 | 7.9999717735 | 99.6056134259 | 33.4032972242 |
| **35** | 0.0184637286 | 0.0127884167 | | 0.0141652113 | 7.9999112471 | 7.9999244230 | 7.9999013866 | 7.9999698745 | 99.6111432613 | 33.4203882736 |
| **36** | -0.0021010754 | -0.0297967409 | | -0.0141988574 | 7.9999020604 | 7.9999134358 | 7.9999174666 | 7.9999700191 | 99.6091338735 | 33.4150070226 |
| **37** | 0.0022915510 | 0.0107758732 | | -0.0544474650 | 7.9999159973 | 7.9999186111 | 7.9998975373 | 7.9999711683 | 99.6123006687 | 33.4135604525 |
| **38** | -0.0107728731 | -0.0038210948 | | -0.0144858897 | 7.9999064889 | 7.9999017538 | 7.9999214909 | 7.9999697984 | 99.6051150977 | 33.4082199881 |
| **39** | 0.0323456835 | -0.0171519910 | | 0.0490444568 | 7.9999057773 | 7.9999016413 | 7.9999055498 | 7.9999681371 | 99.6079443158 | 33.4089378202 |
| **40** | 0.0000595828 | -0.0157600636 | | -0.0310012951 | 7.9999082820 | 7.9999184887 | 7.9999019708 | 7.9999696526 | 99.6096161265 | 33.4178696517 |
| **41** | 0.0107365845 | 0.0104742130 | | 0.0560989662 | 7.9999189848 | 7.9999177302 | 7.9999113838 | 7.9999699165 | 99.6113683128 | 33.3981697707 |
| **42** | 0.0126299372 | 0.0312636050 | | -0.0004083319 | 7.9999113148 | 7.9999188928 | 7.9999196819 | 7.9999735451 | 99.6089570473 | 33.4061443456 |
| **43** | -0.0139037576 | 0.0078215683 | | 0.0091847603 | 7.9999099789 | 7.9999181763 | 7.9999149867 | 7.9999745929 | 99.6109664352 | 33.4167895309 |
| **44** | 0.0085264690 | 0.0142113091 | | 0.0089126460 | 7.9999122609 | 7.9999174634 | 7.9999209848 | 7.9999722101 | 99.6029771091 | 33.4138658794 |
| **45** | -0.0055944049 | 0.0037185122 | | -0.0688193305 | 7.9999150624 | 7.9999057725 | 7.9999094572 | 7.9999686930 | 99.6117541152 | 33.4237659364 |
| **46** | 0.0307808295 | -0.0120235138 | | 0.0760445848 | 7.9999019338 | 7.9999141761 | 7.9999174355 | 7.9999715581 | 99.6105484825 | 33.4219972338 |
| **47** | -0.0225931449 | -0.0246390372 | | 0.0130402459 | 7.9999085154 | 7.9999078295 | 7.9998992683 | 7.9999724242 | 99.6108860597 | 33.4309832794 |
| **48** | 0.0118295758 | 0.0072336503 | | -0.0278546280 | 7.9999160187 | 7.9999044686 | 7.9999096527 | 7.9999691353 | 99.6051954733 | 33.4170747852 |
| **49** | -0.0182712287 | -0.0054377021 | | 0.0126298315 | 7.9999125025 | 7.9998958080 | 7.9999055709 | 7.9999634295 | 99.6045846193 | 33.4210805747 |
| **50** | 0.0177423770 | -0.0293806676 | | 0.0209524961 | 7.9999217545 | 7.9999132758 | 7.9999109641 | 7.9999702761 | 99.6110789609 | 33.4144829112 |
| **Total** | 0.1720905545 | 0.0949999553 | | -0.1064143866 | 399.9956170669 | 399.9955288497 | 399.9955402326 | 399.9985282311 | 4980.4555523405 | 1670.7559919789 |
| **Average** | 0.0034417975 | 0.0018999968 | | -0.0021282845 | 7.9999123413 | 7.9999105770 | 7.9999108047 | 7.9999705646 | 99.6091110468 | 33.4151198396 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Wreckfest 2016 - New Update Racing New Track 1080p60** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0627661123 | 0.0255914853 | | -0.0388466514 | 7.9999016082 | 7.9999097190 | 7.9999080646 | 7.9999683293 | 99.6050347222 | 33.4049903423 |
| **2** | 0.0052976264 | -0.0159997385 | | 0.0267439310 | 7.9999084508 | 7.9999068237 | 7.9999072933 | 7.9999695857 | 99.6075102881 | 33.4162848357 |
| **3** | -0.0019206150 | -0.0155356979 | | -0.0594393823 | 7.9999228029 | 7.9999178122 | 7.9999045424 | 7.9999717291 | 99.6041988169 | 33.4116441111 |
| **4** | -0.0373452957 | 0.0065771665 | | -0.0159779998 | 7.9998962680 | 7.9999031564 | 7.9999124468 | 7.9999667281 | 99.6055812757 | 33.4248794682 |
| **5** | 0.0350550480 | -0.0111489218 | | -0.0144908413 | 7.9999125391 | 7.9999028272 | 7.9999206036 | 7.9999711082 | 99.6088605967 | 33.4212640831 |
| **6** | 0.0136893967 | 0.0191873064 | | 0.0252708293 | 7.9999075969 | 7.9999142442 | 7.9999197555 | 7.9999716832 | 99.6079603909 | 33.4065613527 |
| **7** | -0.0090888038 | 0.0090538520 | | 0.0143518507 | 7.9999120942 | 7.9999131185 | 7.9998992178 | 7.9999688124 | 99.6069637346 | 33.4290286099 |
| **8** | -0.0171745282 | -0.0045458538 | | 0.0262902768 | 7.9999123213 | 7.9999208696 | 7.9999156875 | 7.9999728410 | 99.6104520319 | 33.4014463180 |
| **9** | -0.0224221952 | -0.0018239226 | | 0.0248325439 | 7.9999109034 | 7.9999024825 | 7.9999144712 | 7.9999672758 | 99.6065618570 | 33.4093578532 |
| **10** | -0.0150522436 | -0.0090394010 | | 0.0070758674 | 7.9999215431 | 7.9999128877 | 7.9999076866 | 7.9999692535 | 99.6099054784 | 33.4123635192 |
| **11** | -0.0190706379 | 0.0079298926 | | -0.0868833713 | 7.9999127271 | 7.9999132644 | 7.9999091894 | 7.9999667537 | 99.6130561986 | 33.4127440264 |
| **12** | -0.0045193448 | 0.0023296475 | | -0.0192808530 | 7.9999195687 | 7.9999062570 | 7.9999219485 | 7.9999698514 | 99.6140367798 | 33.4045986772 |
| **13** | -0.0181067807 | -0.0040796124 | | 0.0444799686 | 7.9999070064 | 7.9999199948 | 7.9999062302 | 7.9999667708 | 99.6042148920 | 33.4104680440 |
| **14** | 0.0182575207 | 0.0143074956 | | 0.0557053159 | 7.9999180179 | 7.9999133757 | 7.9999044563 | 7.9999663150 | 99.6108539095 | 33.4371620446 |
| **15** | 0.0415044952 | 0.0124064112 | | -0.0140704721 | 7.9999053754 | 7.9999231940 | 7.9999112831 | 7.9999753394 | 99.6058384774 | 33.4071917489 |
| **16** | -0.0195961893 | 0.0248077888 | | 0.0131930830 | 7.9999238368 | 7.9999191195 | 7.9998990497 | 7.9999728084 | 99.6134580761 | 33.4161261650 |
| **17** | 0.0080337472 | -0.0071329327 | | -0.0293679042 | 7.9998991331 | 7.9999236085 | 7.9999061341 | 7.9999676790 | 99.6092303241 | 33.4157766733 |
| **18** | 0.0128292712 | -0.0015533556 | | 0.0007354031 | 7.9999115072 | 7.9999168454 | 7.9999119686 | 7.9999723594 | 99.6148887603 | 33.4085633019 |
| **19** | 0.0231313104 | -0.0024259314 | | -0.0303110629 | 7.9999125549 | 7.9999218600 | 7.9999148849 | 7.9999740677 | 99.6139885545 | 33.4217682109 |
| **20** | -0.0264999300 | -0.0227033566 | | -0.0327595689 | 7.9999105694 | 7.9999125844 | 7.9999247182 | 7.9999743554 | 99.6092946245 | 33.4048215853 |
| **21** | -0.0130216901 | 0.0218927212 | | -0.0145261246 | 7.9999137433 | 7.9999244353 | 7.9999218126 | 7.9999754822 | 99.6100823045 | 33.4107155375 |
| **22** | -0.0025696910 | -0.0177692518 | | -0.0509210422 | 7.9999230415 | 7.9999113466 | 7.9999052780 | 7.9999735041 | 99.6093267747 | 33.4133114460 |
| **23** | 0.0389074925 | 0.0079739726 | | 0.0315597874 | 7.9999216015 | 7.9999218377 | 7.9999113237 | 7.9999728568 | 99.6066422325 | 33.4155879957 |
| **24** | 0.0085844465 | -0.0027733028 | | -0.0579515704 | 7.9999046471 | 7.9999199656 | 7.9999080816 | 7.9999684320 | 99.6058384774 | 33.4079399661 |
| **25** | 0.0031085210 | -0.0055292800 | | -0.0355218635 | 7.9999064857 | 7.9999135968 | 7.9998993575 | 7.9999702927 | 99.6135063014 | 33.4087690632 |
| **26** | -0.0111835096 | 0.0221408758 | | -0.0167717112 | 7.9999176823 | 7.9999091464 | 7.9999115283 | 7.9999695108 | 99.6085230195 | 33.4101326101 |
| **27** | -0.0086866329 | 0.0075287818 | | -0.0248576243 | 7.9999100793 | 7.9999139232 | 7.9999097537 | 7.9999675067 | 99.6109664352 | 33.4137193123 |
| **28** | 0.0498552787 | -0.0197291956 | | 0.0393054661 | 7.9998926309 | 7.9999031873 | 7.9999151807 | 7.9999692587 | 99.6076388889 | 33.4167784990 |
| **29** | -0.0050710679 | 0.0142565774 | | 0.0481962690 | 7.9999151101 | 7.9999222944 | 7.9999280980 | 7.9999749634 | 99.6076871142 | 33.4157506380 |
| **30** | -0.0044544547 | -0.0113692091 | | -0.0116496801 | 7.9999126302 | 7.9999051447 | 7.9999044830 | 7.9999682271 | 99.6118184156 | 33.4156381753 |
| **31** | -0.0294407303 | -0.0172790236 | | 0.0429558516 | 7.9999016767 | 7.9999192037 | 7.9999108242 | 7.9999698877 | 99.6107413837 | 33.4073636579 |
| **32** | 0.0158544237 | 0.0068160222 | | 0.0034145006 | 7.9998977358 | 7.9999074728 | 7.9999125077 | 7.9999712690 | 99.6109342850 | 33.4087042585 |
| **33** | 0.0075627395 | 0.0207031509 | | 0.0132948133 | 7.9999139327 | 7.9999050728 | 7.9999123191 | 7.9999708291 | 99.6083944187 | 33.4110388047 |
| **34** | 0.0075969313 | 0.0247199280 | | -0.0143529828 | 7.9999159284 | 7.9999071557 | 7.9999126556 | 7.9999698760 | 99.6144868827 | 33.4297912632 |
| **35** | 0.0135328470 | -0.0082745188 | | -0.0449619191 | 7.9999174105 | 7.9999054869 | 7.9999166962 | 7.9999715808 | 99.6067226080 | 33.4074430248 |
| **36** | -0.0075111067 | 0.0003188114 | | 0.0400379656 | 7.9998994217 | 7.9999158155 | 7.9999206405 | 7.9999716167 | 99.6093589249 | 33.4132964425 |
| **37** | -0.0209782523 | -0.0027184396 | | -0.0154826234 | 7.9999187333 | 7.9999176645 | 7.9998988757 | 7.9999718817 | 99.6123006687 | 33.4077906883 |
| **38** | -0.0119455259 | -0.0040629019 | | -0.0251241318 | 7.9999083085 | 7.9999291698 | 7.9999106423 | 7.9999725535 | 99.6060796039 | 33.3987033381 |
| **39** | -0.0221602985 | -0.0284469165 | | 0.0025042611 | 7.9999128888 | 7.9999161773 | 7.9999076607 | 7.9999683935 | 99.6103555813 | 33.3955658562 |
| **40** | -0.0152319627 | 0.0402238360 | | 0.0132344603 | 7.9999116531 | 7.9999165879 | 7.9999029204 | 7.9999673010 | 99.6086837706 | 33.4099777848 |
| **41** | 0.0166728407 | -0.0055137489 | | -0.0471042839 | 7.9999197442 | 7.9999092535 | 7.9999106125 | 7.9999711268 | 99.6084908693 | 33.4199691232 |
| **42** | -0.0007427962 | 0.0247902307 | | 0.0047829265 | 7.9999146870 | 7.9999149157 | 7.9999160673 | 7.9999700106 | 99.6075585134 | 33.4094730896 |
| **43** | -0.0009457512 | 0.0046700744 | | 0.0284266898 | 7.9999104652 | 7.9999133304 | 7.9999102904 | 7.9999731312 | 99.6106449331 | 33.4173267545 |
| **44** | 0.0106328959 | -0.0254838167 | | -0.0096615258 | 7.9999093359 | 7.9999115960 | 7.9999094420 | 7.9999695813 | 99.6079443158 | 33.4068102331 |
| **45** | -0.0179080730 | 0.0265292203 | | 0.0047855588 | 7.9999153417 | 7.9999276093 | 7.9999098634 | 7.9999700091 | 99.6112236368 | 33.3988421513 |
| **46** | -0.0016437687 | 0.0155328725 | | -0.0151326309 | 7.9999267945 | 7.9998989767 | 7.9999142394 | 7.9999674647 | 99.6099697788 | 33.4041869654 |
| **47** | -0.0042975498 | -0.0412186567 | | 0.0100331604 | 7.9999149836 | 7.9999099981 | 7.9999255708 | 7.9999726289 | 99.6108699846 | 33.4088679723 |
| **48** | 0.0251544973 | 0.0073279147 | | -0.0662259522 | 7.9999107469 | 7.9999173520 | 7.9999286982 | 7.9999726319 | 99.6107253086 | 33.4045607273 |
| **49** | -0.0160833785 | -0.0188153556 | | -0.0312788561 | 7.9999144571 | 7.9999024199 | 7.9999119575 | 7.9999691071 | 99.6067708333 | 33.4076359891 |
| **50** | 0.0110976121 | 0.0024243845 | | -0.0894715395 | 7.9999104399 | 7.9999164813 | 7.9999027494 | 7.9999710559 | 99.6075585134 | 33.4039000091 |
| **Total** | 0.0444522499 | 0.0650680783 | | -0.3912133890 | 399.9955887622 | 399.9956806624 | 399.9955797625 | 399.9985256175 | 4980.4637345679 | 1670.5766323480 |
| **Average** | 0.0008890448 | 0.0013013608 | | -0.0078241081 | 7.9999117752 | 7.9999136132 | 7.9999115953 | 7.9999705123 | 99.6092746914 | 33.4115326470 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **DiRT Rally 2016 - Driving Rally With A BMW 1080p60** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0081565057 | 0.0041278369 | | 0.0426645631 | 7.9999125054 | 7.9999122723 | 7.9999160591 | 7.9999704305 | 99.6059670782 | 33.4150114354 |
| **2** | 0.0142402547 | -0.0114866484 | | -0.0456026488 | 7.9999158628 | 7.9999193176 | 7.9999124115 | 7.9999685511 | 99.6068351337 | 33.4061809086 |
| **3** | 0.0015075174 | 0.0004661511 | | 0.0073393099 | 7.9999189130 | 7.9999069829 | 7.9999115205 | 7.9999715468 | 99.6064171811 | 33.4262273183 |
| **4** | -0.0083870859 | 0.0111322544 | | 0.0058026177 | 7.9999221481 | 7.9999146282 | 7.9999135743 | 7.9999705847 | 99.6083140432 | 33.4166860829 |
| **5** | 0.0086583306 | 0.0091989502 | | 0.0367398636 | 7.9999035828 | 7.9998999793 | 7.9998989346 | 7.9999705623 | 99.6094875257 | 33.4073369291 |
| **6** | -0.0580872727 | 0.0231394605 | | 0.0071780349 | 7.9999140687 | 7.9999113096 | 7.9999190464 | 7.9999700940 | 99.6110789609 | 33.4173604807 |
| **7** | -0.0114209987 | -0.0085362147 | | 0.0318802709 | 7.9999158761 | 7.9999226694 | 7.9999192956 | 7.9999750579 | 99.6121077675 | 33.4129601892 |
| **8** | 0.0031020829 | 0.0125974707 | | -0.0343139929 | 7.9999177241 | 7.9999053735 | 7.9999185497 | 7.9999724670 | 99.6152263374 | 33.4176212756 |
| **9** | -0.0013189476 | 0.0049454398 | | -0.0200153648 | 7.9999020828 | 7.9999131667 | 7.9998924109 | 7.9999664533 | 99.6094875257 | 33.4166069051 |
| **10** | 0.0126524829 | 0.0004174035 | | 0.0023458091 | 7.9999081325 | 7.9999255564 | 7.9999137264 | 7.9999706358 | 99.6005497685 | 33.4171448222 |
| **11** | -0.0074906174 | -0.0030557319 | | -0.0521186726 | 7.9999068483 | 7.9998977188 | 7.9999094732 | 7.9999711297 | 99.6081693673 | 33.4237697818 |
| **12** | -0.0164162884 | 0.0063136799 | | -0.0346460866 | 7.9999040506 | 7.9999033790 | 7.9999247937 | 7.9999699967 | 99.6134741512 | 33.4200218243 |
| **13** | -0.0131298972 | 0.0135184744 | | -0.0186247885 | 7.9999056990 | 7.9999197858 | 7.9999183462 | 7.9999708840 | 99.6078639403 | 33.4183924393 |
| **14** | 0.0035558929 | -0.0112015935 | | -0.0176788791 | 7.9999179554 | 7.9999114591 | 7.9999142201 | 7.9999688871 | 99.6099858539 | 33.4256832234 |
| **15** | -0.0032657512 | 0.0045737746 | | 0.0415153427 | 7.9999213138 | 7.9999146159 | 7.9998991245 | 7.9999695434 | 99.6088605967 | 33.4085824029 |
| **16** | -0.0198663412 | -0.0026325836 | | -0.0250078452 | 7.9999059860 | 7.9999190247 | 7.9999139673 | 7.9999706294 | 99.6090374228 | 33.4164225142 |
| **17** | -0.0008572965 | 0.0102928232 | | 0.0222673080 | 7.9999016947 | 7.9999172300 | 7.9999153684 | 7.9999695353 | 99.6040541409 | 33.4008937127 |
| **18** | -0.0275180985 | -0.0066883943 | | -0.0347475133 | 7.9999089221 | 7.9999018921 | 7.9999033292 | 7.9999654194 | 99.6133455504 | 33.4072852366 |
| **19** | -0.0044528465 | -0.0080271738 | | 0.0841961718 | 7.9999037689 | 7.9999121562 | 7.9999048708 | 7.9999693479 | 99.6079443158 | 33.4137368373 |
| **20** | 0.0086478769 | -0.0292109016 | | 0.0436777985 | 7.9999183397 | 7.9998956762 | 7.9999077359 | 7.9999669343 | 99.6082818930 | 33.4109601312 |
| **21** | 0.0033922087 | 0.0326550942 | | -0.0154758251 | 7.9998990862 | 7.9999140155 | 7.9999197464 | 7.9999665432 | 99.6127668467 | 33.4123384295 |
| **22** | -0.0092373036 | -0.0064312322 | | 0.0487741693 | 7.9999019586 | 7.9998969223 | 7.9999000712 | 7.9999661484 | 99.6102591307 | 33.4087053932 |
| **23** | 0.0156289051 | -0.0083447627 | | -0.0117933594 | 7.9999078415 | 7.9999052076 | 7.9999150895 | 7.9999691743 | 99.6091820988 | 33.4090504720 |
| **24** | -0.0050976425 | -0.0041746804 | | 0.0138312006 | 7.9999113658 | 7.9999158888 | 7.9999116732 | 7.9999710720 | 99.6067226080 | 33.4035450960 |
| **25** | -0.0023811307 | -0.0157390068 | | 0.0365338016 | 7.9999156435 | 7.9999167372 | 7.9998987396 | 7.9999697690 | 99.6070119599 | 33.4171340424 |
| **26** | 0.0020902729 | 0.0054017617 | | -0.0125230195 | 7.9999032031 | 7.9999067324 | 7.9999071936 | 7.9999705738 | 99.6051150977 | 33.3889512981 |
| **27** | -0.0093018352 | -0.0237042542 | | -0.0145683173 | 7.9999214434 | 7.9998986741 | 7.9998910693 | 7.9999653546 | 99.6100340792 | 33.4228892444 |
| **28** | -0.0038222328 | -0.0334681352 | | -0.0230132850 | 7.9999095694 | 7.9999161872 | 7.9998997353 | 7.9999696728 | 99.6096804270 | 33.4073187737 |
| **29** | -0.0468838591 | 0.0141147985 | | 0.0246340943 | 7.9999158873 | 7.9998956632 | 7.9999241499 | 7.9999740048 | 99.6129597479 | 33.4122936713 |
| **30** | 0.0015422613 | 0.0023022896 | | -0.0101929175 | 7.9999063337 | 7.9999082323 | 7.9999102785 | 7.9999683741 | 99.6092463992 | 33.4220964582 |
| **31** | 0.0130711775 | 0.0250351505 | | -0.0141294870 | 7.9999114455 | 7.9999123427 | 7.9999055968 | 7.9999689445 | 99.6082497428 | 33.4254893766 |
| **32** | 0.0075843570 | -0.0072034480 | | 0.0516095212 | 7.9999092356 | 7.9999164583 | 7.9999037384 | 7.9999693080 | 99.6064814815 | 33.4088763566 |
| **33** | 0.0260015936 | 0.0122735818 | | 0.0501290890 | 7.9999153997 | 7.9999074265 | 7.9999208539 | 7.9999720516 | 99.6083783436 | 33.4034193950 |
| **34** | 0.0007578938 | -0.0196219152 | | -0.0204308673 | 7.9999030075 | 7.9998992935 | 7.9998982373 | 7.9999640846 | 99.6075745885 | 33.4197506279 |
| **35** | 0.0157964688 | 0.0100227128 | | -0.0461453751 | 7.9999020489 | 7.9999160263 | 7.9999049898 | 7.9999671209 | 99.6074942130 | 33.4270108378 |
| **36** | -0.0075947603 | 0.0197449638 | | -0.0174599713 | 7.9999110655 | 7.9999209719 | 7.9999031666 | 7.9999701194 | 99.6066583076 | 33.4275713861 |
| **37** | 0.0012239959 | -0.0389550925 | | -0.0239352436 | 7.9999239728 | 7.9999236137 | 7.9999084885 | 7.9999699255 | 99.6096482767 | 33.4056482238 |
| **38** | -0.0174908285 | -0.0340824021 | | -0.0024128742 | 7.9999204487 | 7.9999171101 | 7.9999124061 | 7.9999718719 | 99.6109342850 | 33.3972615589 |
| **39** | 0.0092564084 | -0.0031999422 | | -0.0155794247 | 7.9999105163 | 7.9999065231 | 7.9999252039 | 7.9999713538 | 99.6136831276 | 33.4217095210 |
| **40** | -0.0238757049 | 0.0152456029 | | 0.0093685665 | 7.9999172249 | 7.9999197133 | 7.9999160842 | 7.9999696369 | 99.6048096708 | 33.3969335638 |
| **41** | 0.0340922208 | 0.0156721169 | | -0.0346080328 | 7.9999018473 | 7.9999095554 | 7.9999147840 | 7.9999704323 | 99.6094393004 | 33.4252561300 |
| **42** | -0.0186432791 | -0.0086946028 | | -0.0243120237 | 7.9999212473 | 7.9999110974 | 7.9999013438 | 7.9999626553 | 99.6096804270 | 33.4175182689 |
| **43** | -0.0103410271 | -0.0147427295 | | 0.0451172553 | 7.9999098595 | 7.9999056895 | 7.9999149380 | 7.9999697597 | 99.6070762603 | 33.4120275181 |
| **44** | -0.0056105192 | -0.0034984020 | | 0.0397653639 | 7.9999187375 | 7.9999300964 | 7.9999113924 | 7.9999714297 | 99.6139403292 | 33.4155210477 |
| **45** | 0.0485479043 | 0.0228678293 | | -0.0561644259 | 7.9999161268 | 7.9998893479 | 7.9999008932 | 7.9999647125 | 99.6094071502 | 33.4207668896 |
| **46** | 0.0106826759 | 0.0224898135 | | -0.0248474398 | 7.9999183845 | 7.9999051139 | 7.9999095061 | 7.9999692802 | 99.6118987912 | 33.4119102013 |
| **47** | -0.0263188494 | -0.0019471495 | | -0.0429745856 | 7.9999065794 | 7.9999131253 | 7.9999200347 | 7.9999699169 | 99.6095357510 | 33.4280594388 |
| **48** | 0.0143681597 | 0.0068186706 | | -0.0204895301 | 7.9999144349 | 7.9999104915 | 7.9999076208 | 7.9999685422 | 99.6110628858 | 33.4014779008 |
| **49** | -0.0272342265 | 0.0252708262 | | -0.0329728932 | 7.9999201571 | 7.9999153433 | 7.9999078398 | 7.9999701013 | 99.6085390947 | 33.4248289735 |
| **50** | 0.0504281945 | 0.0047810685 | | -0.0321999812 | 7.9999300617 | 7.9999168329 | 7.9999059820 | 7.9999745646 | 99.6081211420 | 33.4015253066 |
| **Total** | -0.0710589985 | 0.0307730031 | | -0.1336145190 | 399.9955996090 | 399.9955446272 | 399.9954976052 | 399.9984751895 | 4980.4520801183 | 1670.6957698525 |
| **Average** | -0.0014211790 | 0.0006154600 | | -0.0026722840 | 7.9999119922 | 7.9999108925 | 7.9999099521 | 7.9999695038 | 99.6090416024 | 33.4139153971 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **FlatOut: Ultimate Carnage 1080p60 Action** | | | | | | | |
| **Resolution** | | | **1080p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0253254170 | -0.0155929364 | | -0.0014403520 | 7.9999073782 | 7.9999140315 | 7.9999134145 | 7.9999704506 | 99.6084587191 | 33.4062529629 |
| **2** | -0.0092661721 | -0.0150881652 | | 0.0196969204 | 7.9999092422 | 7.9999049317 | 7.9999156443 | 7.9999676933 | 99.6140207047 | 33.4162600611 |
| **3** | -0.0061608390 | -0.0190437822 | | 0.0302491889 | 7.9999038850 | 7.9999011860 | 7.9999246808 | 7.9999743354 | 99.6109503601 | 33.4281184439 |
| **4** | 0.0243957629 | 0.0048208066 | | 0.0066129688 | 7.9999138885 | 7.9999163802 | 7.9999200848 | 7.9999719607 | 99.6075263632 | 33.4329594454 |
| **5** | -0.0221922032 | -0.0433786494 | | 0.0393473464 | 7.9999099557 | 7.9999125901 | 7.9999137709 | 7.9999726629 | 99.6050829475 | 33.4203493782 |
| **6** | -0.0143327569 | 0.0129492555 | | -0.0160708646 | 7.9999100681 | 7.9999126449 | 7.9998929365 | 7.9999698588 | 99.6051793981 | 33.4107028035 |
| **7** | 0.0288346031 | 0.0277832702 | | -0.0524345888 | 7.9999131976 | 7.9999069752 | 7.9999091537 | 7.9999707731 | 99.6078478652 | 33.4247492914 |
| **8** | -0.0083498838 | 0.0303180729 | | 0.0256134915 | 7.9999059464 | 7.9999114077 | 7.9999035252 | 7.9999681238 | 99.6036844136 | 33.4129828204 |
| **9** | -0.0146052109 | -0.0112149375 | | -0.0251156793 | 7.9999128711 | 7.9999172197 | 7.9998910971 | 7.9999656879 | 99.6079764660 | 33.4247197889 |
| **10** | -0.0080120208 | 0.0001036705 | | -0.0115015579 | 7.9999149628 | 7.9999125057 | 7.9999160837 | 7.9999720849 | 99.6066100823 | 33.4175514908 |
| **11** | 0.0003911830 | -0.0136188864 | | 0.0079317447 | 7.9999128248 | 7.9999129472 | 7.9998997890 | 7.9999699941 | 99.6071244856 | 33.4185086213 |
| **12** | 0.0073138657 | -0.0188134332 | | -0.0193590282 | 7.9999173648 | 7.9999136414 | 7.9999195951 | 7.9999694766 | 99.6064493313 | 33.4095017727 |
| **13** | 0.0395867334 | 0.0120402780 | | 0.0375923635 | 7.9999138041 | 7.9999067464 | 7.9999166585 | 7.9999718012 | 99.6072370113 | 33.4071198207 |
| **14** | 0.0106958171 | 0.0149332854 | | 0.0249245169 | 7.9998961418 | 7.9999064306 | 7.9999197883 | 7.9999689241 | 99.6087319959 | 33.3968646615 |
| **15** | 0.0070671171 | 0.0124782329 | | 0.0207998612 | 7.9999175889 | 7.9999129041 | 7.9999220776 | 7.9999725835 | 99.6115129887 | 33.4261876664 |
| **16** | 0.0320126260 | 0.0405611768 | | 0.0304486438 | 7.9999166731 | 7.9999127694 | 7.9999173471 | 7.9999716357 | 99.6115612140 | 33.4367422638 |
| **17** | 0.0115068841 | -0.0057834047 | | 0.0006346528 | 7.9999236471 | 7.9999122407 | 7.9999107289 | 7.9999691907 | 99.6073977623 | 33.4071520970 |
| **18** | -0.0304256945 | -0.0019345568 | | 0.0119963975 | 7.9999234810 | 7.9999113138 | 7.9998982507 | 7.9999710977 | 99.6090213477 | 33.4085948217 |
| **19** | 0.0389788783 | -0.0064196788 | | 0.0125052511 | 7.9999109131 | 7.9999180534 | 7.9999218010 | 7.9999732430 | 99.6092142490 | 33.4238438534 |
| **20** | -0.0333329964 | 0.0123494703 | | 0.0371304855 | 7.9999099594 | 7.9999194180 | 7.9999118212 | 7.9999758908 | 99.6118505658 | 33.4041347056 |
| **21** | -0.0130673141 | -0.0228235325 | | 0.0160399345 | 7.9999116212 | 7.9999079944 | 7.9999039312 | 7.9999692079 | 99.6063689558 | 33.4286743272 |
| **22** | 0.0158543520 | -0.0161957031 | | -0.0115104453 | 7.9999197865 | 7.9999076673 | 7.9999266482 | 7.9999746754 | 99.6090695730 | 33.4186292791 |
| **23** | -0.0088742376 | 0.0192428028 | | -0.0263930709 | 7.9999052443 | 7.9999149344 | 7.9999016989 | 7.9999717585 | 99.6116255144 | 33.4215748684 |
| **24** | -0.0071491063 | 0.0075628906 | | 0.0020487835 | 7.9999150093 | 7.9999259148 | 7.9999146128 | 7.9999739280 | 99.6085551698 | 33.4077307376 |
| **25** | -0.0178620410 | -0.0059532573 | | 0.0351379916 | 7.9999032745 | 7.9999170305 | 7.9999218687 | 7.9999718774 | 99.6126864712 | 33.4125473428 |
| **26** | -0.0165285130 | -0.0161120760 | | 0.0605153344 | 7.9999113548 | 7.9999076932 | 7.9999173463 | 7.9999717429 | 99.6108539095 | 33.4227268544 |
| **27** | 0.0108527375 | 0.0002023608 | | 0.0185269083 | 7.9999067794 | 7.9999189966 | 7.9999152276 | 7.9999708559 | 99.6097768776 | 33.4047059076 |
| **28** | 0.0071778372 | -0.0015010882 | | -0.0160903192 | 7.9999134952 | 7.9999045926 | 7.9999134318 | 7.9999716753 | 99.6100983796 | 33.4083942296 |
| **29** | 0.0206642914 | 0.0323240663 | | -0.0333169235 | 7.9999090234 | 7.9999187553 | 7.9998951566 | 7.9999672415 | 99.6110628858 | 33.4151776709 |
| **30** | -0.0213747473 | -0.0107427305 | | 0.0495266152 | 7.9999079698 | 7.9999177350 | 7.9999041135 | 7.9999723851 | 99.6104681070 | 33.4187812046 |
| **31** | 0.0232493261 | -0.0172191660 | | -0.0307669141 | 7.9999235382 | 7.9999113330 | 7.9999124489 | 7.9999744000 | 99.6105645576 | 33.4122800548 |
| **32** | 0.0002860339 | 0.0191172317 | | -0.0150973018 | 7.9999090956 | 7.9999164682 | 7.9999180137 | 7.9999721088 | 99.6090695730 | 33.4241190213 |
| **33** | -0.0166327932 | 0.0046253010 | | 0.0343653860 | 7.9999105146 | 7.9999175497 | 7.9999071476 | 7.9999669304 | 99.6071887860 | 33.4070428493 |
| **34** | 0.0223347540 | 0.0216846378 | | -0.0595180196 | 7.9999139520 | 7.9999130566 | 7.9999000376 | 7.9999700806 | 99.6063207305 | 33.4095165870 |
| **35** | -0.0127470589 | -0.0238509794 | | 0.0418353107 | 7.9999061434 | 7.9999131087 | 7.9999054336 | 7.9999664327 | 99.6097286523 | 33.4230319661 |
| **36** | -0.0288905949 | 0.0166343733 | | -0.0209817048 | 7.9999170468 | 7.9999011586 | 7.9999151912 | 7.9999730516 | 99.6118184156 | 33.4281912546 |
| **37** | 0.0018784185 | 0.0433906409 | | -0.0065917273 | 7.9999168460 | 7.9999238069 | 7.9999132684 | 7.9999734211 | 99.6135063014 | 33.4231239409 |
| **38** | 0.0047217879 | -0.0067218331 | | 0.0163117576 | 7.9999102944 | 7.9999107973 | 7.9999132655 | 7.9999699206 | 99.6059188529 | 33.4150090399 |
| **39** | -0.0003231853 | -0.0248027537 | | -0.0039081266 | 7.9999108694 | 7.9999149924 | 7.9999107380 | 7.9999699349 | 99.6094071502 | 33.3957794975 |
| **40** | -0.0051220642 | -0.0351043705 | | -0.0094564151 | 7.9999181739 | 7.9999020514 | 7.9999096643 | 7.9999726645 | 99.6096161265 | 33.4206602265 |
| **41** | -0.0128965108 | 0.0336129227 | | 0.0246736078 | 7.9999205442 | 7.9999171811 | 7.9999056446 | 7.9999715683 | 99.6067065329 | 33.4101283865 |
| **42** | 0.0036272035 | 0.0190465742 | | -0.0097081033 | 7.9999182226 | 7.9999119723 | 7.9999161449 | 7.9999718781 | 99.6095357510 | 33.4166688731 |
| **43** | 0.0165194884 | -0.0096227589 | | -0.0022490896 | 7.9999208936 | 7.9999163026 | 7.9999151644 | 7.9999755653 | 99.6091499486 | 33.4140056383 |
| **44** | 0.0151704656 | -0.0029154637 | | 0.0265788670 | 7.9999216264 | 7.9999103287 | 7.9999110907 | 7.9999718684 | 99.6117701903 | 33.4151286891 |
| **45** | 0.0130595345 | 0.0077374681 | | -0.0269656380 | 7.9999146921 | 7.9999195235 | 7.9999075861 | 7.9999711460 | 99.6117380401 | 33.4056789871 |
| **46** | -0.0137814412 | -0.0138279506 | | -0.0316926172 | 7.9999118086 | 7.9999107088 | 7.9999105832 | 7.9999689254 | 99.6064975566 | 33.4163055757 |
| **47** | -0.0265313481 | 0.0055384901 | | 0.0090712207 | 7.9998986137 | 7.9999065727 | 7.9999145818 | 7.9999690447 | 99.6087802212 | 33.4030542695 |
| **48** | -0.0360342957 | 0.0267837715 | | -0.0049418924 | 7.9999134538 | 7.9999200182 | 7.9999211017 | 7.9999736159 | 99.6091017233 | 33.4139980105 |
| **49** | 0.0136273675 | 0.0049452692 | | -0.0183244179 | 7.9999047415 | 7.9999063292 | 7.9999191879 | 7.9999677584 | 99.6096643519 | 33.4109057280 |
| **50** | -0.0056281057 | 0.0260216676 | | 0.0144949271 | 7.9999080920 | 7.9999166253 | 7.9999200194 | 7.9999694925 | 99.6050829475 | 33.4244283567 |
| **Total** | 0.0050113510 | 0.0985258935 | | 0.2011756801 | 399.9956165151 | 399.9956375375 | 399.9955985979 | 399.9985526247 | 4980.4491705247 | 1670.7812961451 |
| **Average** | 0.0001002270 | 0.0019705153 | | 0.0040234919 | 7.9999123303 | 7.9999127508 | 7.9999119720 | 7.9999710525 | 99.6089834105 | 33.4156259229 |

# DECRYPTION METRICS

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_171254** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0023639369 | | 26.2636411509 |
| **2** | 0.0021659331 | | 26.6435496210 |
| **3** | 0.0021451245 | | 26.6854749770 |
| **4** | 0.0021098614 | | 26.7574607092 |
| **5** | 0.0021035484 | | 26.7704748662 |
| **6** | 0.0020917046 | | 26.7949964970 |
| **7** | 0.0021224230 | | 26.7316805220 |
| **8** | 0.0021040303 | | 26.7694801311 |
| **9** | 0.0021258398 | | 26.7246947615 |
| **10** | 0.0021206990 | | 26.7352096444 |
| **11** | 0.0021693279 | | 26.6367478973 |
| **12** | 0.0021271329 | | 26.7220536717 |
| **13** | 0.0022735432 | | 26.4329679421 |
| **14** | 0.0021232286 | | 26.7300325124 |
| **15** | 0.0021102168 | | 26.7567291939 |
| **16** | 0.0020970088 | | 26.7839973890 |
| **17** | 0.0021404535 | | 26.6949419245 |
| **18** | 0.0020543449 | | 26.8732663743 |
| **19** | 0.0020852880 | | 26.8083396129 |
| **20** | 0.0020094613 | | 26.9692035289 |
| **21** | 0.0021090551 | | 26.7591207960 |
| **22** | 0.0020672783 | | 26.8460104540 |
| **23** | 0.0020954924 | | 26.7871391860 |
| **24** | 0.0020707875 | | 26.8386445594 |
| **25** | 0.0021864897 | | 26.6025256959 |
| **26** | 0.0020808726 | | 26.8175450209 |
| **27** | 0.0020723169 | | 26.8354383172 |
| **28** | 0.0020400046 | | 26.9036885251 |
| **29** | 0.0021782922 | | 26.6188386199 |
| **30** | 0.0021548992 | | 26.6657304269 |
| **31** | 0.0021766096 | | 26.6221945787 |
| **32** | 0.0021954529 | | 26.5847587745 |
| **33** | 0.0021978810 | | 26.5799582900 |
| **34** | 0.0020710192 | | 26.8381586937 |
| **35** | 0.0021172677 | | 26.7422423314 |
| **36** | 0.0020855929 | | 26.8077045141 |
| **37** | 0.0022149450 | | 26.5463705869 |
| **38** | 0.0020496749 | | 26.8831501171 |
| **39** | 0.0021478892 | | 26.6798812447 |
| **40** | 0.0021177372 | | 26.7412793544 |
| **41** | 0.0021259806 | | 26.7244070690 |
| **42** | 0.0021019310 | | 26.7738154618 |
| **43** | 0.0021455350 | | 26.6846438891 |
| **44** | 0.0021184169 | | 26.7398856126 |
| **45** | 0.0021517825 | | 26.6720163265 |
| **46** | 0.0020599503 | | 26.8614324939 |
| **47** | 0.0021059725 | | 26.7654731343 |
| **48** | 0.0021120201 | | 26.7530195949 |
| **49** | 0.0022103134 | | 26.5554614333 |
| **50** | 0.0021236208 | | 26.7292302817 |
| **Total** | 0.1063281883 | | 1336.2447083112 |
| **Average** | 0.0021265638 | | 26.7248941662 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_171657\_01** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.3189026923 | | 4.9634181423 |
| **2** | 0.3298334508 | | 4.8170530156 |
| **3** | 0.3301387897 | | 4.8130344517 |
| **4** | 0.3305128629 | | 4.8081163403 |
| **5** | 0.3307126627 | | 4.8054917597 |
| **6** | 0.3275010058 | | 4.8478736189 |
| **7** | 0.3257237271 | | 4.8715060442 |
| **8** | 0.3189922538 | | 4.9621986291 |
| **9** | 0.3167524354 | | 4.9928003732 |
| **10** | 0.3104845594 | | 5.0795999270 |
| **11** | 0.3062492345 | | 5.1392498814 |
| **12** | 0.3007722707 | | 5.2176220546 |
| **13** | 0.3207475634 | | 4.9383663407 |
| **14** | 0.2986808650 | | 5.2479259959 |
| **15** | 0.2936728425 | | 5.3213621310 |
| **16** | 0.2899835370 | | 5.3762665719 |
| **17** | 0.2898786292 | | 5.3778380112 |
| **18** | 0.2891608015 | | 5.3886058018 |
| **19** | 0.2895279261 | | 5.3830954053 |
| **20** | 0.2893480239 | | 5.3857947930 |
| **21** | 0.2895550910 | | 5.3826879480 |
| **22** | 0.2892207364 | | 5.3877057240 |
| **23** | 0.2897925035 | | 5.3791285323 |
| **24** | 0.2894351998 | | 5.3844865309 |
| **25** | 0.3131593245 | | 5.0423465243 |
| **26** | 0.2896917174 | | 5.3806392161 |
| **27** | 0.2887093789 | | 5.3953910760 |
| **28** | 0.2887919122 | | 5.3941497362 |
| **29** | 0.2890112238 | | 5.3908529097 |
| **30** | 0.2892812160 | | 5.3867976570 |
| **31** | 0.2890097299 | | 5.3908753593 |
| **32** | 0.2886712360 | | 5.3959648826 |
| **33** | 0.2890599948 | | 5.3901200942 |
| **34** | 0.2889487365 | | 5.3917920019 |
| **35** | 0.2888148595 | | 5.3938046604 |
| **36** | 0.2888093301 | | 5.3938878084 |
| **37** | 0.3133563868 | | 5.0396144908 |
| **38** | 0.2891678610 | | 5.3884997758 |
| **39** | 0.2883404777 | | 5.4009438643 |
| **40** | 0.2888224094 | | 5.3936911333 |
| **41** | 0.2889244717 | | 5.3921567219 |
| **42** | 0.2885451116 | | 5.3978627891 |
| **43** | 0.2883039027 | | 5.4014947860 |
| **44** | 0.2886598823 | | 5.3961356979 |
| **45** | 0.2888494684 | | 5.3932842735 |
| **46** | 0.2885818441 | | 5.3973099565 |
| **47** | 0.2885741444 | | 5.3974258331 |
| **48** | 0.2881909045 | | 5.4031972994 |
| **49** | 0.3138610207 | | 5.0326261726 |
| **50** | 0.2892658620 | | 5.3870281697 |
| **Total** | 14.9489820715 | | 262.4391209140 |
| **Average** | 0.2989796414 | | 5.2487824183 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_171835** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0003365772 | | 34.7291526043 |
| **2** | 0.0003045812 | | 35.1629687083 |
| **3** | 0.0002949057 | | 35.3031680535 |
| **4** | 0.0002892161 | | 35.3877753955 |
| **5** | 0.0002933529 | | 35.3260957043 |
| **6** | 0.0002966531 | | 35.2775112627 |
| **7** | 0.0002940055 | | 35.3164456582 |
| **8** | 0.0002987482 | | 35.2469475838 |
| **9** | 0.0002910578 | | 35.3602074974 |
| **10** | 0.0002815908 | | 35.5038155042 |
| **11** | 0.0002906675 | | 35.3660352678 |
| **12** | 0.0003007032 | | 35.2186196697 |
| **13** | 0.0002912919 | | 35.3567156983 |
| **14** | 0.0002942530 | | 35.3127907619 |
| **15** | 0.0002883291 | | 35.4011159136 |
| **16** | 0.0002915220 | | 35.3532863664 |
| **17** | 0.0002961927 | | 35.2842560411 |
| **18** | 0.0002935034 | | 35.3238686872 |
| **19** | 0.0002961549 | | 35.2848103800 |
| **20** | 0.0003035185 | | 35.1781477159 |
| **21** | 0.0002957208 | | 35.2911814001 |
| **22** | 0.0002991458 | | 35.2411710346 |
| **23** | 0.0002989596 | | 35.2438754427 |
| **24** | 0.0003077712 | | 35.1177196228 |
| **25** | 0.0002989950 | | 35.2433606321 |
| **26** | 0.0002941183 | | 35.3147802635 |
| **27** | 0.0003028204 | | 35.1881493152 |
| **28** | 0.0003121375 | | 35.0565410058 |
| **29** | 0.0003115455 | | 35.0647851589 |
| **30** | 0.0003212129 | | 34.9320701019 |
| **31** | 0.0002995400 | | 35.2354520516 |
| **32** | 0.0003190985 | | 34.9607525033 |
| **33** | 0.0003275620 | | 34.8470647363 |
| **34** | 0.0003272208 | | 34.8515912515 |
| **35** | 0.0003190043 | | 34.9620345364 |
| **36** | 0.0003207593 | | 34.9382079639 |
| **37** | 0.0003076728 | | 35.1191095649 |
| **38** | 0.0003190313 | | 34.9616676690 |
| **39** | 0.0003096088 | | 35.0918671379 |
| **40** | 0.0003175395 | | 34.9820219825 |
| **41** | 0.0003108403 | | 35.0746266975 |
| **42** | 0.0003291669 | | 34.8258382751 |
| **43** | 0.0003169751 | | 34.9897489855 |
| **44** | 0.0003232850 | | 34.9041445426 |
| **45** | 0.0003164025 | | 34.9976008550 |
| **46** | 0.0003211077 | | 34.9334923461 |
| **47** | 0.0003130977 | | 35.0432016775 |
| **48** | 0.0003274824 | | 34.8481202062 |
| **49** | 0.0003018835 | | 35.2016061608 |
| **50** | 0.0003064622 | | 35.1362302725 |
| **Total** | 0.0153029922 | | 1757.2917478679 |
| **Average** | 0.0003060598 | | 35.1458349574 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_171931** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0030338771 | | 25.1800202168 |
| **2** | 0.0025558031 | | 25.9247261104 |
| **3** | 0.0026147303 | | 25.8257310332 |
| **4** | 0.0025838104 | | 25.8773936221 |
| **5** | 0.0025753803 | | 25.8915862329 |
| **6** | 0.0026288818 | | 25.8022893546 |
| **7** | 0.0026204120 | | 25.8163041529 |
| **8** | 0.0025781594 | | 25.8869024128 |
| **9** | 0.0025470042 | | 25.9397034494 |
| **10** | 0.0024842863 | | 26.0479835138 |
| **11** | 0.0026136438 | | 25.8275359706 |
| **12** | 0.0026092936 | | 25.8347705181 |
| **13** | 0.0026975800 | | 25.6902566048 |
| **14** | 0.0026179822 | | 25.8203331885 |
| **15** | 0.0025602565 | | 25.9171652108 |
| **16** | 0.0025308303 | | 25.9673697771 |
| **17** | 0.0025917013 | | 25.8641505900 |
| **18** | 0.0025430561 | | 25.9464405461 |
| **19** | 0.0027985646 | | 25.5306466636 |
| **20** | 0.0027999049 | | 25.5285671800 |
| **21** | 0.0027691127 | | 25.5765937549 |
| **22** | 0.0027540143 | | 25.6003380534 |
| **23** | 0.0027487245 | | 25.6086878019 |
| **24** | 0.0027194881 | | 25.6551283211 |
| **25** | 0.0027975394 | | 25.5322378931 |
| **26** | 0.0026256254 | | 25.8076723169 |
| **27** | 0.0028475352 | | 25.4553090614 |
| **28** | 0.0028017547 | | 25.5256989789 |
| **29** | 0.0029451467 | | 25.3089307022 |
| **30** | 0.0029389819 | | 25.3180308480 |
| **31** | 0.0029710930 | | 25.2708375319 |
| **32** | 0.0029487256 | | 25.3036564510 |
| **33** | 0.0030303983 | | 25.1850028983 |
| **34** | 0.0030680477 | | 25.1313789337 |
| **35** | 0.0030981338 | | 25.0889982777 |
| **36** | 0.0031120694 | | 25.0695072774 |
| **37** | 0.0031402889 | | 25.0303039010 |
| **38** | 0.0030761595 | | 25.1199115536 |
| **39** | 0.0030948302 | | 25.0936316797 |
| **40** | 0.0030527204 | | 25.1531297119 |
| **41** | 0.0030628645 | | 25.1387220948 |
| **42** | 0.0030917353 | | 25.0979769603 |
| **43** | 0.0031192425 | | 25.0595086528 |
| **44** | 0.0031370947 | | 25.0347236725 |
| **45** | 0.0031214161 | | 25.0564833063 |
| **46** | 0.0030589761 | | 25.1442392107 |
| **47** | 0.0031379990 | | 25.0334720197 |
| **48** | 0.0030716700 | | 25.1262544001 |
| **49** | 0.0031625106 | | 24.9996800567 |
| **50** | 0.0030232721 | | 25.1952276286 |
| **Total** | 0.1421123288 | | 1273.8411502992 |
| **Average** | 0.0028422466 | | 25.4768230060 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_172041** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0009823531 | | 30.0773236826 |
| **2** | 0.0007908395 | | 31.0191166732 |
| **3** | 0.0007836812 | | 31.0586055330 |
| **4** | 0.0007860692 | | 31.0453924414 |
| **5** | 0.0007744934 | | 31.1098226286 |
| **6** | 0.0007751897 | | 31.1059198298 |
| **7** | 0.0007540170 | | 31.2261888767 |
| **8** | 0.0007452030 | | 31.2772540314 |
| **9** | 0.0007550538 | | 31.2202212672 |
| **10** | 0.0007346643 | | 31.3391104024 |
| **11** | 0.0007344769 | | 31.3402183425 |
| **12** | 0.0007356581 | | 31.3332397972 |
| **13** | 0.0007670288 | | 31.1518830620 |
| **14** | 0.0007169367 | | 31.4451917030 |
| **15** | 0.0007373488 | | 31.3232699813 |
| **16** | 0.0007211730 | | 31.4196052590 |
| **17** | 0.0007570201 | | 31.2089260797 |
| **18** | 0.0007403398 | | 31.3056888597 |
| **19** | 0.0007481197 | | 31.2602888100 |
| **20** | 0.0007556214 | | 31.2169577018 |
| **21** | 0.0007554811 | | 31.2177641188 |
| **22** | 0.0007680183 | | 31.1462843984 |
| **23** | 0.0007802215 | | 31.0778210698 |
| **24** | 0.0007930983 | | 31.0067297216 |
| **25** | 0.0008046527 | | 30.9439153663 |
| **26** | 0.0007950067 | | 30.9962922558 |
| **27** | 0.0008014769 | | 30.9610899182 |
| **28** | 0.0008013919 | | 30.9615507561 |
| **29** | 0.0007961253 | | 30.9901859160 |
| **30** | 0.0008088783 | | 30.9211682083 |
| **31** | 0.0008120726 | | 30.9040512749 |
| **32** | 0.0008116967 | | 30.9060624231 |
| **33** | 0.0007956709 | | 30.9926650954 |
| **34** | 0.0008107909 | | 30.9109113192 |
| **35** | 0.0007838031 | | 31.0579301928 |
| **36** | 0.0007888612 | | 31.0299938592 |
| **37** | 0.0007913570 | | 31.0162753068 |
| **38** | 0.0007718867 | | 31.1244641533 |
| **39** | 0.0007613455 | | 31.1841822482 |
| **40** | 0.0007770693 | | 31.0954027261 |
| **41** | 0.0007681162 | | 31.1457308385 |
| **42** | 0.0007712357 | | 31.1281286199 |
| **43** | 0.0007789416 | | 31.0849510286 |
| **44** | 0.0007846990 | | 31.0529688639 |
| **45** | 0.0007793149 | | 31.0828701129 |
| **46** | 0.0007752163 | | 31.1057710834 |
| **47** | 0.0007990058 | | 30.9745004477 |
| **48** | 0.0008036378 | | 30.9493966056 |
| **49** | 0.0008118721 | | 30.9051240632 |
| **50** | 0.0007909589 | | 31.0184605712 |
| **Total** | 0.0389671908 | | 1554.3768675260 |
| **Average** | 0.0007793438 | | 31.0875373505 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Star Citizen: 325a Dream Weapons Combat Test AC - ULTRA 1080p60** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0318079136 | | 14.9746481700 |
| **2** | 0.0318401639 | | 14.9702470566 |
| **3** | 0.0312432347 | | 15.0524400938 |
| **4** | 0.0313420587 | | 15.0387247966 |
| **5** | 0.0303978977 | | 15.1715645115 |
| **6** | 0.0303702314 | | 15.1755189851 |
| **7** | 0.0297660727 | | 15.2627846211 |
| **8** | 0.0299778204 | | 15.2319994608 |
| **9** | 0.0293981091 | | 15.3168060215 |
| **10** | 0.0290411051 | | 15.3698686172 |
| **11** | 0.0294725555 | | 15.3058220624 |
| **12** | 0.0315607551 | | 15.0085261527 |
| **13** | 0.0320142781 | | 14.9465628652 |
| **14** | 0.0286023302 | | 15.4359858387 |
| **15** | 0.0289967182 | | 15.3765115270 |
| **16** | 0.0292344537 | | 15.3410501738 |
| **17** | 0.0279710559 | | 15.5329113830 |
| **18** | 0.0278470524 | | 15.5522076872 |
| **19** | 0.0252193632 | | 15.9826588322 |
| **20** | 0.0247691166 | | 16.0608948217 |
| **21** | 0.0247834738 | | 16.0583781984 |
| **22** | 0.0296268338 | | 15.2831475892 |
| **23** | 0.0301155508 | | 15.2120918975 |
| **24** | 0.0293877551 | | 15.3183358811 |
| **25** | 0.0301087526 | | 15.2130723727 |
| **26** | 0.0292590569 | | 15.3373967618 |
| **27** | 0.0286634014 | | 15.4267227464 |
| **28** | 0.0293650737 | | 15.3216890471 |
| **29** | 0.0289937383 | | 15.3769578496 |
| **30** | 0.0292997374 | | 15.3313627203 |
| **31** | 0.0283391798 | | 15.4761272271 |
| **32** | 0.0286520389 | | 15.4284446816 |
| **33** | 0.0290020520 | | 15.3757127337 |
| **34** | 0.0334339068 | | 14.7581287186 |
| **35** | 0.0340297587 | | 14.6814112982 |
| **36** | 0.0286530030 | | 15.4282985528 |
| **37** | 0.0310968373 | | 15.0728377927 |
| **38** | 0.0284450073 | | 15.4599395009 |
| **39** | 0.0290105710 | | 15.3744372292 |
| **40** | 0.0274077205 | | 15.6212708249 |
| **41** | 0.0271505948 | | 15.6622065090 |
| **42** | 0.0275642653 | | 15.5965357854 |
| **43** | 0.0265006691 | | 15.7674316048 |
| **44** | 0.0272283576 | | 15.6497855431 |
| **45** | 0.0318419508 | | 14.9700033259 |
| **46** | 0.0317282401 | | 14.9855401642 |
| **47** | 0.0293661496 | | 15.3215299284 |
| **48** | 0.0297086170 | | 15.2711756493 |
| **49** | 0.0282477912 | | 15.4901550597 |
| **50** | 0.0272557060 | | 15.6454256339 |
| **Total** | 1.4651380771 | | 767.0232865054 |
| **Average** | 0.0293027615 | | 15.3404657301 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Wreckfest 2016 - Racing 2 1080p60 HD HQ** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0025282677 | | 25.9717693865 |
| **2** | 0.0023251291 | | 26.3355292516 |
| **3** | 0.0023929891 | | 26.2105928103 |
| **4** | 0.0023333977 | | 26.3201123077 |
| **5** | 0.0023245016 | | 26.3367015122 |
| **6** | 0.0023267557 | | 26.3324921943 |
| **7** | 0.0023831798 | | 26.2284319612 |
| **8** | 0.0023255015 | | 26.3348337026 |
| **9** | 0.0023548974 | | 26.2802800667 |
| **10** | 0.0023437467 | | 26.3008931731 |
| **11** | 0.0023486010 | | 26.2919075259 |
| **12** | 0.0023538488 | | 26.2822143876 |
| **13** | 0.0023847890 | | 26.2255004429 |
| **14** | 0.0023580497 | | 26.2744705164 |
| **15** | 0.0023248381 | | 26.3360729224 |
| **16** | 0.0023369024 | | 26.3135941819 |
| **17** | 0.0023339064 | | 26.3191656037 |
| **18** | 0.0023130590 | | 26.3581329761 |
| **19** | 0.0023248250 | | 26.3360972738 |
| **20** | 0.0023099801 | | 26.3639176447 |
| **21** | 0.0022900218 | | 26.4016039229 |
| **22** | 0.0022852857 | | 26.4105949463 |
| **23** | 0.0023071716 | | 26.3692009826 |
| **24** | 0.0023256874 | | 26.3344866024 |
| **25** | 0.0023373569 | | 26.3127496477 |
| **26** | 0.0023123165 | | 26.3595272918 |
| **27** | 0.0023140021 | | 26.3563624278 |
| **28** | 0.0022533529 | | 26.4717078013 |
| **29** | 0.0023287518 | | 26.3287680163 |
| **30** | 0.0023002954 | | 26.3821638602 |
| **31** | 0.0023001700 | | 26.3824005687 |
| **32** | 0.0023217327 | | 26.3418777471 |
| **33** | 0.0022995220 | | 26.3836242287 |
| **34** | 0.0023486729 | | 26.2917746375 |
| **35** | 0.0023188625 | | 26.3472499530 |
| **36** | 0.0023409105 | | 26.3061518252 |
| **37** | 0.0023559623 | | 26.2783166803 |
| **38** | 0.0022821150 | | 26.4166246741 |
| **39** | 0.0022852181 | | 26.4107234727 |
| **40** | 0.0022912236 | | 26.3993252801 |
| **41** | 0.0023187106 | | 26.3475344954 |
| **42** | 0.0023245698 | | 26.3365741603 |
| **43** | 0.0023002581 | | 26.3822342357 |
| **44** | 0.0022927411 | | 26.3964498765 |
| **45** | 0.0022993548 | | 26.3839401700 |
| **46** | 0.0022406743 | | 26.4962126334 |
| **47** | 0.0023310505 | | 26.3244831492 |
| **48** | 0.0022876616 | | 26.4060821226 |
| **49** | 0.0023570716 | | 26.2762722548 |
| **50** | 0.0023367059 | | 26.3139594239 |
| **Total** | 0.1163145961 | | 1316.7016869297 |
| **Average** | 0.0023262919 | | 26.3340337386 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Wreckfest 2016 - New Update Racing New Track 1080p60** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0007016196 | | 31.5389826645 |
| **2** | 0.0005486987 | | 32.6066604207 |
| **3** | 0.0005340934 | | 32.7238279414 |
| **4** | 0.0005332584 | | 32.7306227440 |
| **5** | 0.0005339030 | | 32.7253759952 |
| **6** | 0.0005382436 | | 32.6902111109 |
| **7** | 0.0005247950 | | 32.8001030105 |
| **8** | 0.0005400689 | | 32.6755086150 |
| **9** | 0.0005392235 | | 32.6823122027 |
| **10** | 0.0005337917 | | 32.7262820103 |
| **11** | 0.0005392454 | | 32.6821358762 |
| **12** | 0.0005410942 | | 32.6672709730 |
| **13** | 0.0005146873 | | 32.8845656731 |
| **14** | 0.0005125278 | | 32.9028260306 |
| **15** | 0.0005014785 | | 32.9974769334 |
| **16** | 0.0005188217 | | 32.8498184109 |
| **17** | 0.0005089906 | | 32.9329021556 |
| **18** | 0.0005095516 | | 32.9281185994 |
| **19** | 0.0005157931 | | 32.8752444842 |
| **20** | 0.0005180120 | | 32.8566017214 |
| **21** | 0.0005013352 | | 32.9987184090 |
| **22** | 0.0005090723 | | 32.9322057052 |
| **23** | 0.0005019413 | | 32.9934702704 |
| **24** | 0.0004949130 | | 33.0547115404 |
| **25** | 0.0004974078 | | 33.0328743376 |
| **26** | 0.0004962237 | | 33.0432246544 |
| **27** | 0.0004929366 | | 33.0720896652 |
| **28** | 0.0005013952 | | 32.9981987058 |
| **29** | 0.0005018988 | | 32.9938382745 |
| **30** | 0.0004984992 | | 33.0233553025 |
| **31** | 0.0004873167 | | 33.1218871811 |
| **32** | 0.0004983594 | | 33.0245730901 |
| **33** | 0.0004884582 | | 33.1117258232 |
| **34** | 0.0004908883 | | 33.0901734040 |
| **35** | 0.0004982296 | | 33.0257050221 |
| **36** | 0.0004947852 | | 33.0558326947 |
| **37** | 0.0005063382 | | 32.9555930357 |
| **38** | 0.0004986490 | | 33.0220505476 |
| **39** | 0.0004912975 | | 33.0865541587 |
| **40** | 0.0005079311 | | 32.9419522799 |
| **41** | 0.0004973848 | | 33.0330747774 |
| **42** | 0.0004937642 | | 33.0648042104 |
| **43** | 0.0005033253 | | 32.9815124076 |
| **44** | 0.0005062938 | | 32.9559736847 |
| **45** | 0.0004978741 | | 33.0288045155 |
| **46** | 0.0004941150 | | 33.0617197112 |
| **47** | 0.0004920494 | | 33.0799129018 |
| **48** | 0.0005007982 | | 33.0033721697 |
| **49** | 0.0004902789 | | 33.0955681875 |
| **50** | 0.0004770239 | | 33.2145984498 |
| **Total** | 0.0256186819 | | 1645.5749226911 |
| **Average** | 0.0005123736 | | 32.9114984538 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **DiRT Rally 2016 - Driving Rally With A BMW 1080p60** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0035094224 | | 24.5476435734 |
| **2** | 0.0032540142 | | 24.8758055359 |
| **3** | 0.0032636801 | | 24.8629241768 |
| **4** | 0.0031951618 | | 24.9550715097 |
| **5** | 0.0032588616 | | 24.8693408438 |
| **6** | 0.0031871504 | | 24.9659744129 |
| **7** | 0.0031736201 | | 24.9844506805 |
| **8** | 0.0032156086 | | 24.9273681686 |
| **9** | 0.0031873591 | | 24.9656900211 |
| **10** | 0.0031894693 | | 24.9628157331 |
| **11** | 0.0031742899 | | 24.9835341957 |
| **12** | 0.0031662273 | | 24.9945790638 |
| **13** | 0.0032274999 | | 24.9113375598 |
| **14** | 0.0031460167 | | 25.0223898323 |
| **15** | 0.0031234134 | | 25.0537053440 |
| **16** | 0.0031191021 | | 25.0597040550 |
| **17** | 0.0031017009 | | 25.0840008354 |
| **18** | 0.0030935208 | | 25.0954695396 |
| **19** | 0.0030889163 | | 25.1019385366 |
| **20** | 0.0030586089 | | 25.1447604745 |
| **21** | 0.0030516838 | | 25.1546047086 |
| **22** | 0.0030718165 | | 25.1260473371 |
| **23** | 0.0030699142 | | 25.1287376673 |
| **24** | 0.0030493007 | | 25.1579974474 |
| **25** | 0.0031700478 | | 24.9893418810 |
| **26** | 0.0030340959 | | 25.1797069142 |
| **27** | 0.0030289798 | | 25.1870362967 |
| **28** | 0.0030506301 | | 25.1561044374 |
| **29** | 0.0030645258 | | 25.1363671357 |
| **30** | 0.0030507000 | | 25.1560049734 |
| **31** | 0.0030385186 | | 25.1733810094 |
| **32** | 0.0030548401 | | 25.1501151923 |
| **33** | 0.0030343244 | | 25.1793799445 |
| **34** | 0.0030238335 | | 25.1944213119 |
| **35** | 0.0030345257 | | 25.1790918084 |
| **36** | 0.0030462114 | | 25.1623995698 |
| **37** | 0.0031575408 | | 25.0065102233 |
| **38** | 0.0030605688 | | 25.1419785477 |
| **39** | 0.0030116746 | | 25.2119195327 |
| **40** | 0.0029993711 | | 25.2296980072 |
| **41** | 0.0030427318 | | 25.1673632606 |
| **42** | 0.0030056546 | | 25.2206093188 |
| **43** | 0.0030313660 | | 25.1836161835 |
| **44** | 0.0030018812 | | 25.2260649422 |
| **45** | 0.0030199535 | | 25.1999974934 |
| **46** | 0.0029920712 | | 25.2402807711 |
| **47** | 0.0029976373 | | 25.2322091342 |
| **48** | 0.0029889867 | | 25.2447601215 |
| **49** | 0.0030449980 | | 25.1641299053 |
| **50** | 0.0029638595 | | 25.2814238477 |
| **Total** | 0.1549258873 | | 1254.5298030173 |
| **Average** | 0.0030985177 | | 25.0905960603 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **FlatOut: Ultimate Carnage 1080p60 Action** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0109282141 | | 19.6145080654 |
| **2** | 0.0107744379 | | 19.6760537616 |
| **3** | 0.0108125528 | | 19.6607175897 |
| **4** | 0.0108528524 | | 19.6445610343 |
| **5** | 0.0108281478 | | 19.6544582310 |
| **6** | 0.0108476615 | | 19.6466387648 |
| **7** | 0.0106535920 | | 19.7250393777 |
| **8** | 0.0106976950 | | 19.7070978656 |
| **9** | 0.0107303282 | | 19.6938699451 |
| **10** | 0.0107979034 | | 19.6666056019 |
| **11** | 0.0106833167 | | 19.7129389610 |
| **12** | 0.0107214746 | | 19.6974547927 |
| **13** | 0.0108323147 | | 19.6527872970 |
| **14** | 0.0106571895 | | 19.7235731196 |
| **15** | 0.0106705478 | | 19.7181328565 |
| **16** | 0.0105768804 | | 19.7564240485 |
| **17** | 0.0107095067 | | 19.7023053209 |
| **18** | 0.0107174778 | | 19.6990740556 |
| **19** | 0.0107294730 | | 19.6942160959 |
| **20** | 0.0107197840 | | 19.6981396382 |
| **21** | 0.0107447921 | | 19.6880198484 |
| **22** | 0.0107396381 | | 19.6901035132 |
| **23** | 0.0107686513 | | 19.6783868662 |
| **24** | 0.0106964372 | | 19.7076085304 |
| **25** | 0.0110231464 | | 19.5769442568 |
| **26** | 0.0109202792 | | 19.6176625733 |
| **27** | 0.0109642197 | | 19.6002227036 |
| **28** | 0.0109224122 | | 19.6168143763 |
| **29** | 0.0111289200 | | 19.5354698128 |
| **30** | 0.0112095674 | | 19.5041114818 |
| **31** | 0.0114076984 | | 19.4280197007 |
| **32** | 0.0114619379 | | 19.4074195010 |
| **33** | 0.0114415181 | | 19.4151634706 |
| **34** | 0.0114127373 | | 19.4261017820 |
| **35** | 0.0115495577 | | 19.3743464539 |
| **36** | 0.0115610631 | | 19.3700222771 |
| **37** | 0.0098206623 | | 20.0785922240 |
| **38** | 0.0096615489 | | 20.1495324168 |
| **39** | 0.0096378371 | | 20.1602041853 |
| **40** | 0.0095658317 | | 20.1927726630 |
| **41** | 0.0096336994 | | 20.1620690749 |
| **42** | 0.0096414223 | | 20.1585889424 |
| **43** | 0.0093182190 | | 20.3066708481 |
| **44** | 0.0095010523 | | 20.2222829084 |
| **45** | 0.0094891745 | | 20.2277156845 |
| **46** | 0.0095761177 | | 20.1881052679 |
| **47** | 0.0095901869 | | 20.1817293018 |
| **48** | 0.0095571184 | | 20.1967303580 |
| **49** | 0.0096166004 | | 20.1697843062 |
| **50** | 0.0094949170 | | 20.2250882790 |
| **Total** | 0.5269983145 | | 989.0008800315 |
| **Average** | 0.0105399663 | | 19.7800176006 |

# PROCESSING TIME

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_171254** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 15.5585722923 | | 14.3325448036 |
| **2** | 14.5145673752 | | 14.2529060841 |
| **3** | 14.5917885303 | | 14.3380620480 |
| **4** | 14.5580148697 | | 14.2239577770 |
| **5** | 14.4152879715 | | 14.3137876987 |
| **6** | 14.6325039864 | | 14.3212211132 |
| **7** | 14.5662786961 | | 14.3324224949 |
| **8** | 14.6765601635 | | 14.2834722996 |
| **9** | 14.5174908638 | | 14.3803238869 |
| **10** | 14.7292463779 | | 14.3162417412 |
| **11** | 14.6743538380 | | 14.3660442829 |
| **12** | 14.6938092709 | | 14.3292498589 |
| **13** | 14.6761136055 | | 14.3693680763 |
| **14** | 14.6656172276 | | 14.2611825466 |
| **15** | 14.5802888870 | | 14.2561645508 |
| **16** | 14.5797276497 | | 14.2116501331 |
| **17** | 14.4299638271 | | 14.2527062893 |
| **18** | 14.6005306244 | | 14.1999599934 |
| **19** | 14.4178845882 | | 14.2519981861 |
| **20** | 14.5686435699 | | 14.2113783360 |
| **21** | 14.4413504601 | | 14.2603673935 |
| **22** | 14.7128844261 | | 14.2344651222 |
| **23** | 14.6743535995 | | 14.2640838623 |
| **24** | 14.7166478634 | | 14.2110784054 |
| **25** | 14.6382813454 | | 14.2415659428 |
| **26** | 14.7052099705 | | 14.2045235634 |
| **27** | 14.7468538284 | | 14.2485723495 |
| **28** | 14.7546033859 | | 14.2284688950 |
| **29** | 14.6469404697 | | 14.2484052181 |
| **30** | 14.7511184216 | | 14.2372815609 |
| **31** | 14.7122745514 | | 14.2473306656 |
| **32** | 14.6354458332 | | 14.1978387833 |
| **33** | 14.6032526493 | | 14.2470467091 |
| **34** | 14.6448202133 | | 14.2173106670 |
| **35** | 14.5793707371 | | 14.2686173916 |
| **36** | 14.8117442131 | | 14.2211120129 |
| **37** | 14.6772406101 | | 14.2538309097 |
| **38** | 14.6858313084 | | 14.2867634296 |
| **39** | 14.6800789833 | | 14.3564743996 |
| **40** | 14.7124564648 | | 14.3150088787 |
| **41** | 14.6442003250 | | 14.3813621998 |
| **42** | 14.6862924099 | | 14.3336629868 |
| **43** | 14.6293802261 | | 14.3759455681 |
| **44** | 14.6862993240 | | 14.3338000774 |
| **45** | 14.6623616219 | | 14.3713684082 |
| **46** | 14.6184930801 | | 14.3112874031 |
| **47** | 14.6583485603 | | 14.2636146545 |
| **48** | 14.6202507019 | | 14.3147585392 |
| **49** | 14.5591664314 | | 14.2480804920 |
| **50** | 14.5937767029 | | 14.2154543400 |
| **Total** | 732.5365729332 | | 713.9441230297 |
| **Average** | 14.6507314587 | | 14.2788824606 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_171657\_01** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.6226985455 | | 14.6272814274 |
| **2** | 14.3791003227 | | 14.6023275852 |
| **3** | 14.3840203285 | | 14.3240818977 |
| **4** | 14.4084043503 | | 14.2602374554 |
| **5** | 14.4220845699 | | 14.2710576057 |
| **6** | 14.4049961567 | | 14.3429205418 |
| **7** | 14.4651985168 | | 14.3072366714 |
| **8** | 14.6587982178 | | 14.3511767387 |
| **9** | 14.5263533592 | | 14.2282199860 |
| **10** | 14.6935319901 | | 14.3711941242 |
| **11** | 14.7047576904 | | 14.2235040665 |
| **12** | 14.6961398125 | | 14.2928454876 |
| **13** | 14.6447138786 | | 14.2394731045 |
| **14** | 14.5911111832 | | 14.2246761322 |
| **15** | 14.5930058956 | | 14.2148621082 |
| **16** | 14.4240980148 | | 14.2422573566 |
| **17** | 14.3928632736 | | 14.2130119801 |
| **18** | 14.5237774849 | | 14.2183535099 |
| **19** | 14.3929626942 | | 14.2074835300 |
| **20** | 14.5358784199 | | 14.2378363609 |
| **21** | 14.5028040409 | | 14.2174239159 |
| **22** | 14.7441971302 | | 14.2386345863 |
| **23** | 14.6722643375 | | 14.1900537014 |
| **24** | 14.6954114437 | | 14.2586584091 |
| **25** | 14.6809828281 | | 14.2231266499 |
| **26** | 14.6480944157 | | 14.2267787457 |
| **27** | 14.6345162392 | | 14.1990957260 |
| **28** | 14.5822939873 | | 14.2419219017 |
| **29** | 14.5818111897 | | 14.2087941170 |
| **30** | 14.5778799057 | | 14.2213661671 |
| **31** | 14.5708894730 | | 14.2224013805 |
| **32** | 14.5741558075 | | 14.2260084152 |
| **33** | 14.5648112297 | | 14.2027928829 |
| **34** | 14.5692300797 | | 14.2243850231 |
| **35** | 14.5598964691 | | 14.2145617008 |
| **36** | 14.5705690384 | | 14.2266156673 |
| **37** | 14.5811085701 | | 14.2192723751 |
| **38** | 14.5630550385 | | 14.2399466038 |
| **39** | 14.5563268661 | | 14.2089507580 |
| **40** | 14.5755934715 | | 14.2343065739 |
| **41** | 14.5665085316 | | 14.2125189304 |
| **42** | 14.5569558144 | | 14.2363932133 |
| **43** | 14.5554585457 | | 14.2070736885 |
| **44** | 14.5709459782 | | 14.2276329994 |
| **45** | 14.5671563148 | | 14.1938188076 |
| **46** | 14.5598995686 | | 14.2197055817 |
| **47** | 14.5625364780 | | 14.2042903900 |
| **48** | 14.5764482021 | | 14.2303020954 |
| **49** | 14.5748622417 | | 14.1909604073 |
| **50** | 14.5645875931 | | 14.2144129276 |
| **Total** | 728.1257455349 | | 712.5822420120 |
| **Average** | 14.5625149107 | | 14.2516448402 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_171835** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.5390467644 | | 14.3613195419 |
| **2** | 14.4973125458 | | 14.2551574707 |
| **3** | 14.4465291500 | | 14.2970352173 |
| **4** | 14.5087535381 | | 14.2986915112 |
| **5** | 14.4502711296 | | 14.3590321541 |
| **6** | 14.5377244949 | | 14.3136219978 |
| **7** | 14.4942777157 | | 14.3492376804 |
| **8** | 14.7640798092 | | 14.3079106808 |
| **9** | 14.6177191734 | | 14.3369219303 |
| **10** | 14.8461453915 | | 14.2893884182 |
| **11** | 14.7702436447 | | 14.2680537701 |
| **12** | 14.7824177742 | | 14.2054996490 |
| **13** | 14.8035686016 | | 14.2302236557 |
| **14** | 14.7926158905 | | 14.1922924519 |
| **15** | 14.6334555149 | | 14.2414448261 |
| **16** | 14.5350518227 | | 14.2140858173 |
| **17** | 14.4679799080 | | 14.2275412083 |
| **18** | 14.6061925888 | | 14.2098636627 |
| **19** | 14.4674079418 | | 14.2307713032 |
| **20** | 14.5235621929 | | 14.2126710415 |
| **21** | 14.4946737289 | | 14.2505991459 |
| **22** | 14.8279325962 | | 14.2072300911 |
| **23** | 14.8063652515 | | 14.2250330448 |
| **24** | 14.8610005379 | | 14.2083659172 |
| **25** | 14.8101050854 | | 14.2497658730 |
| **26** | 14.8701839447 | | 14.2264013290 |
| **27** | 14.6991753578 | | 14.2285275459 |
| **28** | 14.7576682568 | | 14.2087538242 |
| **29** | 14.7053422928 | | 14.2311892509 |
| **30** | 14.7751510143 | | 14.2168304920 |
| **31** | 14.6992785931 | | 14.2259094715 |
| **32** | 14.7547445297 | | 14.2058794498 |
| **33** | 14.7373287678 | | 15.2982654572 |
| **34** | 14.7697827816 | | 14.2510490417 |
| **35** | 14.7297527790 | | 14.2306380272 |
| **36** | 14.8738889694 | | 14.2440521717 |
| **37** | 14.8210160732 | | 14.2603449821 |
| **38** | 14.8141617775 | | 14.2507066727 |
| **39** | 14.7606551647 | | 14.2281837463 |
| **40** | 14.7623753548 | | 14.2234680653 |
| **41** | 14.6862080097 | | 14.2325391769 |
| **42** | 14.7867040634 | | 14.2351522446 |
| **43** | 14.8386588097 | | 14.2402279377 |
| **44** | 14.7613024712 | | 14.2282135487 |
| **45** | 14.7195894718 | | 14.2277779579 |
| **46** | 14.8052721024 | | 14.1988844872 |
| **47** | 14.7912623882 | | 14.2361848354 |
| **48** | 14.8543801308 | | 14.2068402767 |
| **49** | 14.8089778423 | | 14.2328710556 |
| **50** | 14.8474259377 | | 14.2025516033 |
| **Total** | 735.3147196770 | | 713.3132007122 |
| **Average** | 14.7062943935 | | 14.2662640142 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_171931** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.5428736210 | | 14.3422796726 |
| **2** | 14.4200696945 | | 14.6012563705 |
| **3** | 14.5034348965 | | 14.5579571724 |
| **4** | 14.4716615677 | | 14.4119625092 |
| **5** | 14.5388746262 | | 14.2684109211 |
| **6** | 14.5414843559 | | 14.2173533440 |
| **7** | 14.5035009384 | | 14.2742674351 |
| **8** | 14.6302335262 | | 14.2065384388 |
| **9** | 14.5696868896 | | 14.2603864670 |
| **10** | 14.6698005199 | | 14.3805525303 |
| **11** | 14.7235918045 | | 14.2640359402 |
| **12** | 14.6590008736 | | 14.2118465900 |
| **13** | 14.7174060345 | | 14.2499709129 |
| **14** | 14.6353318691 | | 14.2217674255 |
| **15** | 14.6345174313 | | 14.3111326694 |
| **16** | 14.4770197868 | | 14.2019846439 |
| **17** | 14.6483445168 | | 14.2329220772 |
| **18** | 14.6395814419 | | 14.2365150452 |
| **19** | 14.5956106186 | | 14.2299051285 |
| **20** | 14.5523424149 | | 14.2095198631 |
| **21** | 14.5838053226 | | 14.2233612537 |
| **22** | 14.6271829605 | | 14.2053155899 |
| **23** | 14.6186726093 | | 14.2235035896 |
| **24** | 14.6803276539 | | 14.1880335808 |
| **25** | 14.6506986618 | | 14.2314224243 |
| **26** | 14.6316304207 | | 14.2049329281 |
| **27** | 14.7418835163 | | 14.2369415760 |
| **28** | 14.6786248684 | | 14.1972479820 |
| **29** | 14.6685588360 | | 14.2180199623 |
| **30** | 14.5868558884 | | 14.2239511013 |
| **31** | 14.6180002689 | | 14.1782984734 |
| **32** | 14.5625085831 | | 14.1716353893 |
| **33** | 14.6147818565 | | 14.2443554401 |
| **34** | 14.5798385143 | | 14.1737267971 |
| **35** | 14.6141152382 | | 14.1965391636 |
| **36** | 14.6041455269 | | 14.2129192352 |
| **37** | 14.6013782024 | | 14.2186915874 |
| **38** | 14.6943194866 | | 14.1702692509 |
| **39** | 14.7622060776 | | 14.2029178143 |
| **40** | 14.6784880161 | | 14.1843426228 |
| **41** | 14.6067018509 | | 14.2031083107 |
| **42** | 14.5608217716 | | 14.1752185822 |
| **43** | 14.6259834766 | | 14.2167961597 |
| **44** | 14.7003128529 | | 14.1763155460 |
| **45** | 14.7666549683 | | 14.1998360157 |
| **46** | 14.6182670593 | | 14.1911330223 |
| **47** | 14.6164369583 | | 14.1829173565 |
| **48** | 14.6614954472 | | 14.1754803658 |
| **49** | 15.0767076015 | | 14.1895344257 |
| **50** | 15.0783672333 | | 14.1564037800 |
| **Total** | 731.7841391563 | | 711.8637344837 |
| **Average** | 14.6356827831 | | 14.2372746897 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **VID\_20200717\_172041** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.5073621273 | | 14.2118692398 |
| **2** | 14.4857318401 | | 14.1704912186 |
| **3** | 14.4198138714 | | 14.3171589375 |
| **4** | 14.4963529110 | | 14.2230901718 |
| **5** | 14.4349761009 | | 14.1113231182 |
| **6** | 14.4881079197 | | 14.1858596802 |
| **7** | 14.4649333954 | | 14.1201863289 |
| **8** | 14.7339115143 | | 14.1562223434 |
| **9** | 14.5742869377 | | 14.1205716133 |
| **10** | 14.7582600117 | | 14.1525871754 |
| **11** | 14.9936060905 | | 14.1216251850 |
| **12** | 14.9253880978 | | 14.1652023792 |
| **13** | 14.9557611942 | | 14.1197545528 |
| **14** | 14.9449105263 | | 14.1687815189 |
| **15** | 14.7290048599 | | 14.1566438675 |
| **16** | 14.4167311192 | | 14.1370484829 |
| **17** | 14.3785028458 | | 14.1411824226 |
| **18** | 14.5441277027 | | 14.1672747135 |
| **19** | 14.3608283997 | | 14.1219666004 |
| **20** | 14.4226729870 | | 14.3474013805 |
| **21** | 14.3780441284 | | 14.3147137165 |
| **22** | 14.6445178986 | | 14.1506133080 |
| **23** | 14.6187765598 | | 14.1031110287 |
| **24** | 14.6839046478 | | 14.1703455448 |
| **25** | 14.6204824448 | | 14.1439950466 |
| **26** | 14.8452675343 | | 14.1488764286 |
| **27** | 14.7768158913 | | 14.1277689934 |
| **28** | 14.8328220844 | | 14.1321558952 |
| **29** | 14.7973530293 | | 14.1114108562 |
| **30** | 14.8489692211 | | 14.1633396149 |
| **31** | 14.7934775352 | | 14.1250326633 |
| **32** | 14.8406510353 | | 14.1512582302 |
| **33** | 14.7706205845 | | 14.1125595570 |
| **34** | 14.8292510509 | | 14.1669223309 |
| **35** | 14.7741279602 | | 14.1236562729 |
| **36** | 14.8467798233 | | 14.1471955776 |
| **37** | 14.7830579281 | | 14.1163349152 |
| **38** | 14.8603346348 | | 14.1671457291 |
| **39** | 14.7520408630 | | 14.1340255737 |
| **40** | 14.8352811337 | | 14.1615257263 |
| **41** | 14.8051540852 | | 14.1181161404 |
| **42** | 14.8488636017 | | 14.1737446785 |
| **43** | 14.7846558094 | | 14.1103034019 |
| **44** | 14.8737156391 | | 14.1647822857 |
| **45** | 14.8197591305 | | 14.1174542904 |
| **46** | 14.8369154930 | | 14.1485571861 |
| **47** | 14.5991947651 | | 14.1118016243 |
| **48** | 14.8851444721 | | 14.1672360897 |
| **49** | 14.6030886173 | | 14.1206123829 |
| **50** | 14.6725490093 | | 14.1430928707 |
| **Total** | 734.8968870640 | | 707.7639288902 |
| **Average** | 14.6979377413 | | 14.1552785778 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Star Citizen: 325a Dream Weapons Combat Test AC - ULTRA 1080p60** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.5425541401 | | 14.1539649963 |
| **2** | 14.3391182423 | | 14.1041355133 |
| **3** | 14.2956748009 | | 14.2564833164 |
| **4** | 14.3017854691 | | 14.1066076756 |
| **5** | 14.3827092648 | | 14.1299474239 |
| **6** | 14.3917031288 | | 14.0902597904 |
| **7** | 14.3978497982 | | 14.1235949993 |
| **8** | 14.5775492191 | | 14.1012384892 |
| **9** | 14.4422068596 | | 14.1136331558 |
| **10** | 14.5964045525 | | 14.0869507790 |
| **11** | 14.5955102444 | | 14.1030371189 |
| **12** | 14.5991561413 | | 14.0843412876 |
| **13** | 14.5955941677 | | 14.1090626717 |
| **14** | 14.5904071331 | | 14.0896096230 |
| **15** | 14.4948089123 | | 14.1089832783 |
| **16** | 14.3207674026 | | 14.0913419724 |
| **17** | 14.3298039436 | | 14.1040418148 |
| **18** | 14.9739112854 | | 14.1818804741 |
| **19** | 14.3194775581 | | 14.3061838150 |
| **20** | 14.3359246254 | | 14.2990441322 |
| **21** | 14.3303008080 | | 14.3459339142 |
| **22** | 14.5588154793 | | 14.1071662903 |
| **23** | 14.4857919216 | | 14.1203448772 |
| **24** | 14.5061273575 | | 14.0906660557 |
| **25** | 14.5031778812 | | 14.1058361530 |
| **26** | 14.6719713211 | | 14.0911338329 |
| **27** | 14.4903259277 | | 14.1145658493 |
| **28** | 14.7182805538 | | 14.0938849449 |
| **29** | 14.4929289818 | | 14.0975594521 |
| **30** | 14.7123758793 | | 14.0819485188 |
| **31** | 15.0977039337 | | 14.1067690849 |
| **32** | 15.0746297836 | | 14.0785181522 |
| **33** | 14.5190503597 | | 14.1144626141 |
| **34** | 14.6971051693 | | 14.0797038078 |
| **35** | 14.4677567482 | | 14.1035377979 |
| **36** | 14.4850296974 | | 14.1033263206 |
| **37** | 14.4645974636 | | 14.1142630577 |
| **38** | 14.4777317047 | | 14.0822463036 |
| **39** | 14.4679830074 | | 14.1114456654 |
| **40** | 14.7062602043 | | 14.0925815105 |
| **41** | 14.7435534000 | | 14.1164126396 |
| **42** | 14.5042867661 | | 14.1028287411 |
| **43** | 14.4867715836 | | 14.1128613949 |
| **44** | 14.7065904140 | | 14.1031363010 |
| **45** | 14.6422026157 | | 14.1953666210 |
| **46** | 14.4949202538 | | 14.2762296200 |
| **47** | 14.4862349033 | | 14.2891948223 |
| **48** | 14.4969484806 | | 14.0791070461 |
| **49** | 14.4660007954 | | 14.2209219933 |
| **50** | 14.4940781593 | | 14.2667872906 |
| **Total** | 726.8724484444 | | 706.7430830002 |
| **Average** | 14.5374489689 | | 14.1348616600 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Wreckfest 2016 - Racing 2 1080p60 HD HQ** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.7779972553 | | 14.2895169258 |
| **2** | 14.5153157711 | | 14.2672231197 |
| **3** | 14.5010972023 | | 14.3771052361 |
| **4** | 14.5904643536 | | 14.3062162399 |
| **5** | 14.4591839314 | | 14.3915803432 |
| **6** | 14.5070409775 | | 14.3368728161 |
| **7** | 14.6183111668 | | 14.3603241444 |
| **8** | 14.7836890221 | | 14.3206241131 |
| **9** | 14.5902934074 | | 14.3111374378 |
| **10** | 14.7659425735 | | 14.2462255955 |
| **11** | 14.6958355904 | | 14.3776109219 |
| **12** | 14.7865543365 | | 14.2238168716 |
| **13** | 14.7427239418 | | 14.2463672161 |
| **14** | 14.8676915169 | | 14.2187955379 |
| **15** | 14.6370632648 | | 14.2433757782 |
| **16** | 14.5140914917 | | 14.2157618999 |
| **17** | 14.4711780548 | | 14.2690079212 |
| **18** | 14.6460518837 | | 14.2433784008 |
| **19** | 14.4376540184 | | 14.2492029667 |
| **20** | 14.5170724392 | | 14.2208116055 |
| **21** | 14.4393289089 | | 14.2866189480 |
| **22** | 14.7253804207 | | 14.2331304550 |
| **23** | 14.5861539841 | | 14.2433562279 |
| **24** | 14.6681077480 | | 14.2317674160 |
| **25** | 14.6096968651 | | 14.2948794365 |
| **26** | 14.6767711639 | | 14.2368566990 |
| **27** | 14.6432933807 | | 14.2544717789 |
| **28** | 14.6596665382 | | 14.2368974686 |
| **29** | 14.5999214649 | | 14.2692146301 |
| **30** | 14.6441657543 | | 14.2337851524 |
| **31** | 14.5907795429 | | 14.2602913380 |
| **32** | 14.6385526657 | | 14.2524509430 |
| **33** | 14.7155733109 | | 14.2701652050 |
| **34** | 14.6572816372 | | 14.2222402096 |
| **35** | 14.7395415306 | | 14.2691085339 |
| **36** | 14.8063724041 | | 14.2395172119 |
| **37** | 14.7092316151 | | 14.2681262493 |
| **38** | 14.6726040840 | | 14.2149643898 |
| **39** | 14.6132509708 | | 14.2696819305 |
| **40** | 14.7540643215 | | 14.2397382259 |
| **41** | 14.6098608971 | | 14.2602250576 |
| **42** | 14.6558980942 | | 14.2480261326 |
| **43** | 14.6242098808 | | 14.2578377724 |
| **44** | 14.6587507725 | | 14.2386791706 |
| **45** | 14.5814676285 | | 14.2619724274 |
| **46** | 14.6531982422 | | 14.2357220650 |
| **47** | 14.5962116718 | | 14.2530655861 |
| **48** | 14.6546018124 | | 14.2385931015 |
| **49** | 14.6007940769 | | 14.2777681351 |
| **50** | 14.6545374393 | | 14.2260904312 |
| **Total** | 731.8645210266 | | 713.2401974201 |
| **Average** | 14.6372904205 | | 14.2648039484 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Wreckfest 2016 - New Update Racing New Track 1080p60** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.5134279728 | | 14.2872354984 |
| **2** | 14.5481903553 | | 14.2565941811 |
| **3** | 14.4923310280 | | 14.3087596893 |
| **4** | 14.5070807934 | | 14.2622122765 |
| **5** | 14.4871876240 | | 14.2386097908 |
| **6** | 14.5212481022 | | 14.2523844242 |
| **7** | 14.5597486496 | | 14.2607243061 |
| **8** | 14.8073043823 | | 14.2585117817 |
| **9** | 14.6813709736 | | 14.2561130524 |
| **10** | 14.8378193378 | | 14.2638680935 |
| **11** | 14.7768785954 | | 14.2244246006 |
| **12** | 14.7520732880 | | 14.2898509502 |
| **13** | 14.6734077930 | | 14.2632367611 |
| **14** | 14.6464331150 | | 14.2789921761 |
| **15** | 14.5602617264 | | 14.2247109413 |
| **16** | 14.4478352070 | | 14.2348451614 |
| **17** | 14.4384315014 | | 14.2349951267 |
| **18** | 14.5641214848 | | 14.2700104713 |
| **19** | 14.3961296082 | | 14.2542364597 |
| **20** | 14.4694857597 | | 14.2481870651 |
| **21** | 14.4008638859 | | 14.2608211040 |
| **22** | 14.6415755749 | | 14.2635755539 |
| **23** | 14.5493423939 | | 14.2507407665 |
| **24** | 14.5841565132 | | 14.2468638420 |
| **25** | 14.5504972935 | | 14.2483191490 |
| **26** | 14.6224944592 | | 14.2537329197 |
| **27** | 14.6523158550 | | 14.2480878830 |
| **28** | 14.7053272724 | | 14.2478764057 |
| **29** | 14.6753530502 | | 14.2728374004 |
| **30** | 14.6858882904 | | 14.2447080612 |
| **31** | 14.6246907711 | | 14.2462823391 |
| **32** | 14.6853246689 | | 14.2343859673 |
| **33** | 14.6475658417 | | 14.2384819984 |
| **34** | 14.6697437763 | | 14.2333948612 |
| **35** | 14.6369447708 | | 14.2406694889 |
| **36** | 14.6853046417 | | 14.2463991642 |
| **37** | 14.6576519012 | | 14.2455995083 |
| **38** | 14.7022199631 | | 14.2442026138 |
| **39** | 14.5892131329 | | 14.2488150597 |
| **40** | 14.5948457718 | | 14.2676775455 |
| **41** | 14.5443563461 | | 14.2484304905 |
| **42** | 14.5830566883 | | 14.2433102131 |
| **43** | 14.5406851768 | | 14.2375235558 |
| **44** | 14.5760450363 | | 14.2597799301 |
| **45** | 14.5518462658 | | 14.2635581493 |
| **46** | 14.6128304005 | | 14.2588706017 |
| **47** | 14.6679074764 | | 14.2668607235 |
| **48** | 14.6543648243 | | 14.2595095634 |
| **49** | 14.5492289066 | | 14.2451512814 |
| **50** | 14.5909364223 | | 14.2520689964 |
| **Total** | 730.1133446693 | | 712.6870379448 |
| **Average** | 14.6022668934 | | 14.2537407589 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **DiRT Rally 2016 - Driving Rally With A BMW 1080p60** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.5478951931 | | 14.2208633423 |
| **2** | 14.5711445808 | | 14.2010009289 |
| **3** | 14.3785867691 | | 14.2805490494 |
| **4** | 14.4331054688 | | 14.1496183872 |
| **5** | 14.3550455570 | | 14.1940367222 |
| **6** | 14.4092066288 | | 14.1705291271 |
| **7** | 14.4237320423 | | 14.1883647442 |
| **8** | 14.6436898708 | | 14.1607985497 |
| **9** | 14.4706933498 | | 14.1854882240 |
| **10** | 14.6890957355 | | 14.1712100506 |
| **11** | 14.6618640423 | | 14.1806886196 |
| **12** | 14.7023904324 | | 14.1786906719 |
| **13** | 14.6596338749 | | 14.1933395863 |
| **14** | 14.6349797249 | | 14.1788187027 |
| **15** | 14.5226104259 | | 14.1884961128 |
| **16** | 14.4183971882 | | 14.1802649498 |
| **17** | 14.3542034626 | | 14.1937556267 |
| **18** | 14.5702416897 | | 14.1625683308 |
| **19** | 14.3520510197 | | 14.1933739185 |
| **20** | 14.5536174774 | | 14.1677184105 |
| **21** | 14.3833451271 | | 14.1870002747 |
| **22** | 14.6474719048 | | 14.1615796089 |
| **23** | 14.5185165405 | | 14.1789412498 |
| **24** | 14.5762259960 | | 14.1859967709 |
| **25** | 14.5212109089 | | 14.1976349354 |
| **26** | 14.5866544247 | | 14.1649346352 |
| **27** | 14.5253376961 | | 14.1878442764 |
| **28** | 14.6118352413 | | 14.1647274494 |
| **29** | 14.5168480873 | | 14.1908178329 |
| **30** | 14.5933094025 | | 14.1557633877 |
| **31** | 14.5269529819 | | 14.2196509838 |
| **32** | 14.5961418152 | | 14.1592929363 |
| **33** | 14.5317277908 | | 14.1801242828 |
| **34** | 14.6734039783 | | 14.1591899395 |
| **35** | 14.5019967556 | | 14.1850135326 |
| **36** | 14.5811269283 | | 14.1648509502 |
| **37** | 14.5363869667 | | 14.2131254673 |
| **38** | 14.7319455147 | | 14.1796402931 |
| **39** | 14.5442254543 | | 14.1973791122 |
| **40** | 14.7823305130 | | 14.1627032757 |
| **41** | 14.6621947289 | | 14.1797888279 |
| **42** | 14.5988848209 | | 14.1559693813 |
| **43** | 14.6127886772 | | 14.2030477524 |
| **44** | 14.8128681183 | | 14.1763904095 |
| **45** | 14.7261817455 | | 14.2077465057 |
| **46** | 14.7957277298 | | 14.1854016781 |
| **47** | 14.5406889915 | | 14.2029232979 |
| **48** | 14.8480830193 | | 14.1726534367 |
| **49** | 14.6809420586 | | 14.2020180225 |
| **50** | 14.5637433529 | | 14.1654171944 |
| **Total** | 728.6812818050 | | 709.1877417564 |
| **Average** | 14.5736256361 | | 14.1837548351 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **FlatOut: Ultimate Carnage 1080p60 Action** | |
| **Resolution** | | **1080p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 14.8230304718 | | 14.3465092182 |
| **2** | 14.6893849373 | | 14.3913214207 |
| **3** | 14.5855627060 | | 14.4506125450 |
| **4** | 14.6081528664 | | 14.2801122665 |
| **5** | 14.5069036484 | | 14.3167808056 |
| **6** | 14.4859044552 | | 14.3034274578 |
| **7** | 14.4732472897 | | 14.3038318157 |
| **8** | 14.7242345810 | | 14.2838888168 |
| **9** | 14.5804288387 | | 14.2943620682 |
| **10** | 14.7443883419 | | 14.2915072441 |
| **11** | 14.8232383728 | | 14.3188421726 |
| **12** | 14.7202870846 | | 14.2881581783 |
| **13** | 14.7237122059 | | 14.3203799725 |
| **14** | 15.1832990646 | | 14.3061413765 |
| **15** | 15.1942811012 | | 14.3186407089 |
| **16** | 14.4519410133 | | 14.4141595364 |
| **17** | 14.4347262383 | | 14.3828182220 |
| **18** | 14.6005799770 | | 14.2880642414 |
| **19** | 14.4445779324 | | 14.3841538429 |
| **20** | 14.4880723953 | | 14.3621644974 |
| **21** | 14.4376115799 | | 14.3027377129 |
| **22** | 14.7041282654 | | 14.2890574932 |
| **23** | 14.5860252380 | | 14.3144361973 |
| **24** | 14.6429672241 | | 14.3750572205 |
| **25** | 14.5944108963 | | 14.3409388065 |
| **26** | 14.6074542999 | | 14.2665071487 |
| **27** | 14.5517024994 | | 14.3231370449 |
| **28** | 14.6215574741 | | 14.2991671562 |
| **29** | 14.5486955643 | | 14.3156001568 |
| **30** | 14.6076498032 | | 14.3031597137 |
| **31** | 14.5481832027 | | 14.3074343204 |
| **32** | 14.5789866447 | | 14.2940649986 |
| **33** | 14.5433902740 | | 14.3334734440 |
| **34** | 14.7785298824 | | 14.3718342781 |
| **35** | 14.6847224236 | | 14.3153457642 |
| **36** | 14.5970168114 | | 14.2869133949 |
| **37** | 14.5448727608 | | 14.3282215595 |
| **38** | 14.6097798347 | | 14.3164658546 |
| **39** | 14.5680530071 | | 14.3172688484 |
| **40** | 14.6109600067 | | 14.2870500088 |
| **41** | 14.5768673420 | | 14.3250689507 |
| **42** | 14.6310949326 | | 14.3067569733 |
| **43** | 14.5548150539 | | 14.3314838409 |
| **44** | 14.7655801773 | | 14.2880465984 |
| **45** | 14.5461218357 | | 14.3362247944 |
| **46** | 14.6161153316 | | 14.2995569706 |
| **47** | 14.5310029984 | | 14.3052008152 |
| **48** | 14.5888712406 | | 14.2933213711 |
| **49** | 14.5393414497 | | 14.3307437897 |
| **50** | 14.5988349915 | | 14.3065910339 |
| **Total** | 731.2012965679 | | 716.0567426682 |
| **Average** | 14.6240259314 | | 14.3211348534 |