# ENCRYPTION METRICS

|  |  |  |  |  |  |  |  |  |  |  |
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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Flight Simulator X - Flying PMDG Jetstream 41 1440p** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0260247557 | 0.0067247912 | | 0.0683499556 | 7.9999521810 | 7.9999503711 | 7.9999483998 | 7.9999815322 | 99.6100532837 | 33.4249951487 |
| **2** | 0.0105960287 | -0.0020076339 | | 0.0085270444 | 7.9999483579 | 7.9999474748 | 7.9999538458 | 7.9999845775 | 99.6097081820 | 33.4271597089 |
| **3** | -0.0149836318 | -0.0342222569 | | 0.0246169484 | 7.9999360066 | 7.9999516007 | 7.9999470213 | 7.9999827711 | 99.6080644083 | 33.4361844558 |
| **4** | 0.0079610163 | 0.0116987732 | | 0.0186870083 | 7.9999535576 | 7.9999390479 | 7.9999540046 | 7.9999838849 | 99.6060392065 | 33.4320325159 |
| **5** | -0.0318535844 | 0.0064530774 | | -0.0064432266 | 7.9999516833 | 7.9999380405 | 7.9999521644 | 7.9999808169 | 99.6086274689 | 33.4215584846 |
| **6** | 0.0223096355 | 0.0290212438 | | -0.0007826443 | 7.9999569252 | 7.9999450448 | 7.9999521348 | 7.9999853957 | 99.6090906317 | 33.4361392613 |
| **7** | 0.0294754921 | 0.0030476061 | | -0.0233688136 | 7.9999485341 | 7.9999473270 | 7.9999534772 | 7.9999838321 | 99.6113973639 | 33.4245136090 |
| **8** | -0.0010430344 | 0.0189498270 | | 0.0122889135 | 7.9999586694 | 7.9999541880 | 7.9999499733 | 7.9999847117 | 99.6102439978 | 33.4045167661 |
| **9** | -0.0118342657 | -0.0143039414 | | -0.0273415145 | 7.9999522186 | 7.9999490394 | 7.9999505071 | 7.9999843947 | 99.6072561439 | 33.4204485322 |
| **10** | 0.0047177876 | 0.0013349515 | | 0.0137270113 | 7.9999510744 | 7.9999437470 | 7.9999541631 | 7.9999850886 | 99.6074559396 | 33.4320842277 |
| **11** | 0.0336439134 | 0.0141138854 | | -0.0056545502 | 7.9999481388 | 7.9999554790 | 7.9999544185 | 7.9999825215 | 99.6105255281 | 33.4320143883 |
| **12** | -0.0176407723 | -0.0051871325 | | -0.0561954586 | 7.9999480619 | 7.9999411164 | 7.9999407146 | 7.9999821647 | 99.6103257324 | 33.4166599285 |
| **13** | -0.0048078762 | 0.0122369257 | | 0.0638152377 | 7.9999482460 | 7.9999544755 | 7.9999519044 | 7.9999844181 | 99.6122873629 | 33.4456539172 |
| **14** | 0.0012312027 | -0.0004334110 | | 0.0254052392 | 7.9999465780 | 7.9999540587 | 7.9999490719 | 7.9999836787 | 99.6108343033 | 33.4330993751 |
| **15** | 0.0044621815 | 0.0160094536 | | -0.0191188811 | 7.9999522593 | 7.9999547212 | 7.9999518756 | 7.9999847492 | 99.6063207368 | 33.4240799348 |
| **16** | -0.0002091102 | -0.0008347225 | | -0.0334529834 | 7.9999532016 | 7.9999526864 | 7.9999540410 | 7.9999830988 | 99.6101713448 | 33.4084517442 |
| **17** | -0.0123156910 | 0.0133186880 | | -0.0154991582 | 7.9999577483 | 7.9999526575 | 7.9999576913 | 7.9999851903 | 99.6104982832 | 33.4181521994 |
| **18** | 0.0312764618 | -0.0005485837 | | 0.0626387526 | 7.9999569842 | 7.9999504196 | 7.9999461341 | 7.9999849173 | 99.6105618546 | 33.4241987082 |
| **19** | 0.0218972789 | -0.0023492141 | | 0.0107670418 | 7.9999423898 | 7.9999488857 | 7.9999514913 | 7.9999821167 | 99.6101168551 | 33.4331236996 |
| **20** | 0.0040440189 | -0.0073819252 | | -0.0155804234 | 7.9999500232 | 7.9999496657 | 7.9999520029 | 7.9999824403 | 99.6080099186 | 33.4301016561 |
| **21** | 0.0134788810 | -0.0170945287 | | -0.0260820662 | 7.9999502031 | 7.9999498739 | 7.9999500889 | 7.9999867731 | 99.6093358355 | 33.4375889020 |
| **22** | -0.0109277931 | 0.0380412168 | | 0.0039779414 | 7.9999461995 | 7.9999494341 | 7.9999434379 | 7.9999819284 | 99.6067384914 | 33.4331874490 |
| **23** | 0.0108298330 | 0.0165540877 | | 0.0243635954 | 7.9999474537 | 7.9999506180 | 7.9999536867 | 7.9999840930 | 99.6077283883 | 33.4290601186 |
| **24** | 0.0021872574 | 0.0205227259 | | -0.0683727554 | 7.9999502058 | 7.9999506924 | 7.9999500847 | 7.9999841624 | 99.6113519557 | 33.4267476169 |
| **25** | -0.0289639063 | -0.0161727047 | | 0.0313688228 | 7.9999651198 | 7.9999569141 | 7.9999527134 | 7.9999849759 | 99.6113156293 | 33.4256366674 |
| **26** | -0.0211002110 | 0.0433720784 | | -0.0230898599 | 7.9999477502 | 7.9999512174 | 7.9999542542 | 7.9999837548 | 99.6098988961 | 33.4364212190 |
| **27** | 0.0086246576 | 0.0180770079 | | 0.1079485275 | 7.9999535396 | 7.9999589487 | 7.9999486258 | 7.9999854521 | 99.6104710383 | 33.4267991151 |
| **28** | -0.0134423295 | -0.0236124393 | | 0.0358221509 | 7.9999498749 | 7.9999455908 | 7.9999536475 | 7.9999826899 | 99.6063389000 | 33.4277141509 |
| **29** | 0.0309544525 | -0.0180436914 | | -0.0515298068 | 7.9999542939 | 7.9999494259 | 7.9999505685 | 7.9999836690 | 99.6086365506 | 33.4194265825 |
| **30** | -0.0185759043 | 0.0318545572 | | -0.0160712068 | 7.9999569430 | 7.9999530693 | 7.9999478824 | 7.9999857310 | 99.6087818565 | 33.4211643421 |
| **31** | 0.0054002912 | -0.0117315684 | | 0.0134541052 | 7.9999425271 | 7.9999531063 | 7.9999460344 | 7.9999834648 | 99.6077011434 | 33.4282711927 |
| **32** | -0.0254969241 | -0.0066047768 | | 0.0058755484 | 7.9999527865 | 7.9999513065 | 7.9999446043 | 7.9999843275 | 99.6077647148 | 33.4330595228 |
| **33** | -0.0154842172 | 0.0202032392 | | -0.0194742307 | 7.9999517346 | 7.9999520061 | 7.9999521349 | 7.9999828051 | 99.6088726727 | 33.4375365491 |
| **34** | -0.0017568072 | 0.0053362799 | | -0.0272070036 | 7.9999489695 | 7.9999480200 | 7.9999446866 | 7.9999805729 | 99.6118060369 | 33.4344050988 |
| **35** | -0.0032457531 | -0.0221226806 | | -0.0217958022 | 7.9999465850 | 7.9999497598 | 7.9999538704 | 7.9999832515 | 99.6114064455 | 33.4225533318 |
| **36** | 0.0081853801 | 0.0109896847 | | -0.0188441951 | 7.9999444063 | 7.9999545257 | 7.9999492503 | 7.9999813688 | 99.6070381850 | 33.4324725651 |
| **37** | 0.0128640311 | -0.0220533890 | | 0.0569265202 | 7.9999506373 | 7.9999496684 | 7.9999518915 | 7.9999840728 | 99.6118786899 | 33.4238325229 |
| **38** | -0.0051021163 | -0.0071566811 | | -0.0135097418 | 7.9999527313 | 7.9999381811 | 7.9999460270 | 7.9999835414 | 99.6011260486 | 33.4158044396 |
| **39** | 0.0089789673 | -0.0320222550 | | 0.0447794080 | 7.9999494251 | 7.9999447391 | 7.9999502215 | 7.9999818583 | 99.6097172637 | 33.4218076059 |
| **40** | -0.0023379840 | -0.0033913250 | | -0.0452942777 | 7.9999533578 | 7.9999455582 | 7.9999469422 | 7.9999823569 | 99.6117606288 | 33.4276094807 |
| **41** | -0.0198685292 | 0.0021448332 | | -0.0547332954 | 7.9999560535 | 7.9999499265 | 7.9999498303 | 7.9999828082 | 99.6071471644 | 33.4295239580 |
| **42** | -0.0147615156 | -0.0311825920 | | -0.0321529259 | 7.9999528136 | 7.9999486039 | 7.9999505313 | 7.9999814400 | 99.6081098164 | 33.4302586791 |
| **43** | -0.0221292821 | 0.0073573435 | | 0.0307315431 | 7.9999500700 | 7.9999488377 | 7.9999474789 | 7.9999849747 | 99.6096355291 | 33.4314062757 |
| **44** | 0.0060165289 | 0.0128791215 | | -0.0263877419 | 7.9999529964 | 7.9999483385 | 7.9999538447 | 7.9999840615 | 99.6071562460 | 33.4233592813 |
| **45** | 0.0058787191 | -0.0169682213 | | -0.0264574955 | 7.9999475663 | 7.9999492230 | 7.9999443103 | 7.9999838098 | 99.6098625696 | 33.4213575848 |
| **46** | 0.0144519328 | -0.0033281019 | | 0.0369093918 | 7.9999522188 | 7.9999593895 | 7.9999447756 | 7.9999843279 | 99.6083186938 | 33.4269562450 |
| **47** | -0.0253791494 | -0.0120131601 | | -0.0184171056 | 7.9999518758 | 7.9999414585 | 7.9999556208 | 7.9999859088 | 99.6098716512 | 33.4329809935 |
| **48** | -0.0055093983 | 0.0157822265 | | -0.0481111432 | 7.9999538723 | 7.9999511720 | 7.9999508848 | 7.9999830625 | 99.6092995090 | 33.4314027143 |
| **49** | -0.0124946361 | 0.0238524955 | | -0.0071122812 | 7.9999510954 | 7.9999449003 | 7.9999487378 | 7.9999827567 | 99.6098898145 | 33.4246579534 |
| **50** | 0.0077987522 | 0.0188574876 | | -0.0183550677 | 7.9999424180 | 7.9999456943 | 7.9999484673 | 7.9999812173 | 99.6072198174 | 33.4190807686 |
| **Total** | -0.0079749655 | 0.1079666716 | | -0.0654549492 | 399.9975385637 | 399.9974702468 | 399.9975101719 | 399.9991775182 | 4980.4537687281 | 1671.3572511879 |
| **Average** | -0.0001594993 | 0.0021593301 | | -0.0013090982 | 7.9999507713 | 7.9999494049 | 7.9999502034 | 7.9999835504 | 99.6090753746 | 33.4271450238 |

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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 July - 2 Racing Clips 1440p60** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0376434669 | 0.0308746868 | | -0.0002419870 | 7.9999504566 | 7.9999497881 | 7.9999545541 | 7.9999847622 | 99.6070108822 | 33.4293290670 |
| **2** | -0.0004358770 | 0.0082641603 | | -0.0090546519 | 7.9999483990 | 7.9999559260 | 7.9999585049 | 7.9999844899 | 99.6071018098 | 33.4158942099 |
| **3** | 0.0276131334 | 0.0232556201 | | 0.0031463450 | 7.9999500160 | 7.9999472462 | 7.9999497849 | 7.9999827961 | 99.6111753666 | 33.4274683316 |
| **4** | 0.0363936571 | -0.0096517176 | | 0.0836610786 | 7.9999496690 | 7.9999483834 | 7.9999554279 | 7.9999829526 | 99.6119300658 | 33.4284566968 |
| **5** | -0.0082264938 | 0.0180019482 | | -0.0068644630 | 7.9999518487 | 7.9999435068 | 7.9999485920 | 7.9999841024 | 99.6072836650 | 33.4378982273 |
| **6** | 0.0362583252 | 0.0114278952 | | -0.0151517611 | 7.9999579794 | 7.9999531343 | 7.9999503639 | 7.9999839198 | 99.6104115747 | 33.4123421854 |
| **7** | 0.0072507079 | 0.0236801143 | | 0.0063925242 | 7.9999539325 | 7.9999503112 | 7.9999438410 | 7.9999836748 | 99.6088112488 | 33.4314932510 |
| **8** | -0.0196577001 | -0.0050249337 | | -0.0028473351 | 7.9999440938 | 7.9999488140 | 7.9999534505 | 7.9999833081 | 99.6076473755 | 33.4201468050 |
| **9** | 0.0362203118 | 0.0222832591 | | -0.0272825325 | 7.9999588434 | 7.9999477407 | 7.9999499156 | 7.9999855036 | 99.6084839095 | 33.4258200458 |
| **10** | 0.0113827224 | -0.0075464891 | | -0.0187237172 | 7.9999545195 | 7.9999401419 | 7.9999491493 | 7.9999834838 | 99.6086657647 | 33.4227352465 |
| **11** | 0.0067203832 | -0.0253426253 | | 0.0698959675 | 7.9999583363 | 7.9999430439 | 7.9999503467 | 7.9999831182 | 99.6135758554 | 33.4382205033 |
| **12** | 0.0064047338 | -0.0140336965 | | 0.0197779311 | 7.9999539367 | 7.9999502202 | 7.9999402956 | 7.9999831406 | 99.6115027060 | 33.4379745352 |
| **13** | -0.0179150512 | 0.0087919845 | | -0.0343983660 | 7.9999522295 | 7.9999462961 | 7.9999468398 | 7.9999818510 | 99.6073018506 | 33.4255305394 |
| **14** | -0.0091807654 | -0.0343380413 | | -0.0032155475 | 7.9999395634 | 7.9999499429 | 7.9999496247 | 7.9999825111 | 99.6121664775 | 33.4326575166 |
| **15** | -0.0127267968 | 0.0222238243 | | 0.0324307082 | 7.9999528644 | 7.9999599642 | 7.9999487165 | 7.9999839874 | 99.6102297195 | 33.4167030734 |
| **16** | -0.0032904602 | 0.0154614318 | | -0.0136720020 | 7.9999456682 | 7.9999507722 | 7.9999493851 | 7.9999822352 | 99.6101751629 | 33.4318479043 |
| **17** | 0.0400676135 | -0.0039549148 | | -0.0311497300 | 7.9999457461 | 7.9999537188 | 7.9999478908 | 7.9999824595 | 99.6075746334 | 33.4382300952 |
| **18** | 0.0330861821 | -0.0322613054 | | -0.0074587967 | 7.9999480658 | 7.9999479813 | 7.9999581193 | 7.9999841941 | 99.6095295769 | 33.4396080229 |
| **19** | 0.0266881369 | 0.0465333216 | | -0.0362127380 | 7.9999523864 | 7.9999468291 | 7.9999454750 | 7.9999817988 | 99.6068472125 | 33.4191551948 |
| **20** | -0.0267001085 | 0.0140337956 | | -0.0157981777 | 7.9999489903 | 7.9999504902 | 7.9999464145 | 7.9999829869 | 99.6091476810 | 33.4388873770 |
| **21** | -0.0061043369 | 0.0099861500 | | 0.0126344709 | 7.9999553326 | 7.9999533116 | 7.9999509577 | 7.9999854969 | 99.6107752851 | 33.4162966448 |
| **22** | 0.0027022746 | -0.0047797011 | | 0.0315230037 | 7.9999525907 | 7.9999456872 | 7.9999460471 | 7.9999807121 | 99.6098569163 | 33.4307801646 |
| **23** | -0.0009070468 | 0.0071570864 | | 0.0343313367 | 7.9999511239 | 7.9999492180 | 7.9999490403 | 7.9999856386 | 99.6104934096 | 33.4224583274 |
| **24** | -0.0252111317 | -0.0107774534 | | 0.0312099536 | 7.9999530290 | 7.9999506271 | 7.9999463633 | 7.9999828334 | 99.6103570182 | 33.4307324187 |
| **25** | 0.0123769515 | -0.0227747377 | | 0.0490846188 | 7.9999518385 | 7.9999570764 | 7.9999445785 | 7.9999840277 | 99.6092749796 | 33.4293461471 |
| **26** | 0.0303651691 | -0.0167735611 | | -0.0156981295 | 7.9999552428 | 7.9999533851 | 7.9999363840 | 7.9999816814 | 99.6084657239 | 33.4168591123 |
| **27** | -0.0617690362 | -0.0124361037 | | 0.0310610258 | 7.9999493435 | 7.9999573950 | 7.9999510995 | 7.9999857078 | 99.6067199139 | 33.4267258631 |
| **28** | -0.0049659588 | 0.0135316856 | | 0.0490314530 | 7.9999475783 | 7.9999478274 | 7.9999533000 | 7.9999831282 | 99.6115208915 | 33.4520495939 |
| **29** | 0.0190371092 | 0.0270919732 | | 0.0493081767 | 7.9999485636 | 7.9999492142 | 7.9999465997 | 7.9999843438 | 99.6094113710 | 33.4318109627 |
| **30** | -0.0191377521 | 0.0126394461 | | -0.0138537622 | 7.9999518950 | 7.9999550805 | 7.9999513910 | 7.9999841361 | 99.6077383031 | 33.4325739345 |
| **31** | -0.0090076683 | -0.0220870801 | | 0.0269452516 | 7.9999553149 | 7.9999506760 | 7.9999545404 | 7.9999850660 | 99.6120573644 | 33.4179149779 |
| **32** | -0.0292610687 | 0.0210374586 | | -0.0475437767 | 7.9999500818 | 7.9999528306 | 7.9999452530 | 7.9999809624 | 99.6093204434 | 33.4277271008 |
| **33** | -0.0087239415 | 0.0010251173 | | 0.0095769815 | 7.9999489345 | 7.9999447234 | 7.9999478395 | 7.9999848341 | 99.6096386901 | 33.4475087761 |
| **34** | -0.0004074885 | -0.0074254950 | | -0.0507231774 | 7.9999580688 | 7.9999543839 | 7.9999418301 | 7.9999854278 | 99.6068290270 | 33.4147068737 |
| **35** | 0.0066862248 | -0.0113820167 | | 0.0104173489 | 7.9999505374 | 7.9999455532 | 7.9999529805 | 7.9999842790 | 99.6100387715 | 33.4250270858 |
| **36** | -0.0155838968 | 0.0044050407 | | -0.0509276267 | 7.9999546717 | 7.9999498467 | 7.9999442952 | 7.9999841624 | 99.6143578329 | 33.4301073003 |
| **37** | 0.0277234608 | -0.0103490282 | | -0.0205913671 | 7.9999472386 | 7.9999528167 | 7.9999494097 | 7.9999819443 | 99.6084111674 | 33.4102987389 |
| **38** | 0.0187594694 | -0.0036480686 | | -0.0060304584 | 7.9999551403 | 7.9999473579 | 7.9999556200 | 7.9999831001 | 99.6102660905 | 33.4370129490 |
| **39** | 0.0081965000 | -0.0134862711 | | 0.0307389242 | 7.9999457126 | 7.9999543731 | 7.9999427457 | 7.9999835970 | 99.6088748982 | 33.4328706081 |
| **40** | 0.0181650457 | -0.0166693974 | | 0.0020591674 | 7.9999508863 | 7.9999545674 | 7.9999453602 | 7.9999816053 | 99.6100933281 | 33.4267623411 |
| **41** | -0.0224764184 | 0.0092137297 | | 0.0222202916 | 7.9999426172 | 7.9999514814 | 7.9999568287 | 7.9999848393 | 99.6105661517 | 33.4122975773 |
| **42** | 0.0170576157 | -0.0064787583 | | -0.0606948500 | 7.9999476979 | 7.9999417335 | 7.9999531329 | 7.9999826686 | 99.6127575070 | 33.4196751938 |
| **43** | 0.0017096997 | -0.0098790949 | | 0.0184107848 | 7.9999358401 | 7.9999507429 | 7.9999570193 | 7.9999800660 | 99.6069836039 | 33.4332829916 |
| **44** | -0.0281019397 | -0.0121977568 | | 0.0087639357 | 7.9999499923 | 7.9999403831 | 7.9999512587 | 7.9999823413 | 99.6066653573 | 33.4209773484 |
| **45** | 0.0081264212 | -0.0024843614 | | -0.0094617191 | 7.9999413652 | 7.9999495908 | 7.9999477188 | 7.9999813076 | 99.6169583624 | 33.4400082113 |
| **46** | -0.0039092527 | 0.0295450584 | | -0.0228334479 | 7.9999536028 | 7.9999446681 | 7.9999466504 | 7.9999811384 | 99.6081292918 | 33.4218168420 |
| **47** | -0.0043264116 | 0.0163287228 | | -0.0155134387 | 7.9999441665 | 7.9999456578 | 7.9999432419 | 7.9999800253 | 99.6068835836 | 33.4246959310 |
| **48** | -0.0281003914 | -0.0070645859 | | -0.0033857423 | 7.9999482064 | 7.9999473828 | 7.9999423763 | 7.9999795230 | 99.6094932059 | 33.4248629525 |
| **49** | 0.0204815047 | 0.0214675683 | | 0.0193299978 | 7.9999429464 | 7.9999501924 | 7.9999556162 | 7.9999820564 | 99.6071381809 | 33.4245253437 |
| **50** | 0.0099902792 | -0.0004869260 | | 0.0393612028 | 7.9999500159 | 7.9999501709 | 7.9999496317 | 7.9999838940 | 99.6087021357 | 33.4260354551 |
| **Total** | 0.1409801067 | 0.0949269576 | | 0.1519831785 | 399.9975071203 | 399.9974822069 | 399.9974558027 | 399.9991578203 | 4980.4753513443 | 1671.3781465960 |
| **Average** | 0.0028195947 | 0.0018985369 | | 0.0030396542 | 7.9999501424 | 7.9999496441 | 7.9999491161 | 7.9999831564 | 99.6095070269 | 33.4275629319 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Forza Motorsport 6: Apex (Beta) - Heavy Rain Gameplay 1440p60** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0097056685 | 0.0122221375 | | 0.0075470745 | 7.9999445936 | 7.9999535052 | 7.9999497083 | 7.9999826318 | 99.6056586372 | 33.4256453681 |
| **2** | 0.0031172469 | -0.0255777857 | | 0.0032431132 | 7.9999460854 | 7.9999560901 | 7.9999505578 | 7.9999830397 | 99.6105414497 | 33.4313419827 |
| **3** | -0.0164409359 | 0.0042021023 | | -0.0135321228 | 7.9999465160 | 7.9999467386 | 7.9999493852 | 7.9999830924 | 99.6113190828 | 33.4276111523 |
| **4** | -0.0121100434 | 0.0108186021 | | 0.0114454609 | 7.9999459027 | 7.9999533125 | 7.9999522409 | 7.9999819631 | 99.6075755932 | 33.4355979371 |
| **5** | 0.0163728710 | -0.0015158790 | | -0.0114270229 | 7.9999481606 | 7.9999419298 | 7.9999496705 | 7.9999820868 | 99.6048448351 | 33.4248481258 |
| **6** | 0.0091295176 | 0.0042616360 | | 0.0000320647 | 7.9999506132 | 7.9999536760 | 7.9999536244 | 7.9999856113 | 99.6118977865 | 33.4232698107 |
| **7** | -0.0090586593 | 0.0020177576 | | 0.0090918948 | 7.9999476361 | 7.9999493309 | 7.9999537000 | 7.9999832653 | 99.6060384115 | 33.4285725734 |
| **8** | 0.0280814803 | -0.0055926373 | | -0.0416617886 | 7.9999496711 | 7.9999545186 | 7.9999392809 | 7.9999834842 | 99.6112648293 | 33.4164338023 |
| **9** | -0.0084328644 | 0.0136643507 | | 0.0198615303 | 7.9999520218 | 7.9999501002 | 7.9999469983 | 7.9999825419 | 99.6090856481 | 33.4236545139 |
| **10** | -0.0058473893 | -0.0051877333 | | 0.0090514544 | 7.9999473070 | 7.9999446809 | 7.9999503556 | 7.9999817323 | 99.6093388310 | 33.4386702439 |
| **11** | -0.0226969864 | -0.0161280566 | | 0.0362502999 | 7.9999455241 | 7.9999516632 | 7.9999540382 | 7.9999832089 | 99.6084798177 | 33.4336956260 |
| **12** | 0.0237948091 | -0.0041604821 | | 0.0310670567 | 7.9999512504 | 7.9999475738 | 7.9999475391 | 7.9999800849 | 99.6098451968 | 33.4216025270 |
| **13** | -0.0294044700 | 0.0132445610 | | -0.0149873539 | 7.9999528747 | 7.9999420581 | 7.9999520634 | 7.9999829824 | 99.6091941551 | 33.4221577564 |
| **14** | 0.0025131130 | -0.0148598174 | | 0.0013721950 | 7.9999552014 | 7.9999567029 | 7.9999536160 | 7.9999854726 | 99.6136700666 | 33.4198458847 |
| **15** | -0.0388764084 | 0.0132543195 | | 0.0252531992 | 7.9999370549 | 7.9999577412 | 7.9999525828 | 7.9999825357 | 99.6085340712 | 33.4294196723 |
| **16** | 0.0151281820 | -0.0063328420 | | -0.0097779357 | 7.9999509512 | 7.9999423696 | 7.9999473565 | 7.9999833345 | 99.6139955874 | 33.4367271185 |
| **17** | 0.0018940341 | 0.0236525874 | | -0.0143155385 | 7.9999430866 | 7.9999576367 | 7.9999514390 | 7.9999815659 | 99.6066623264 | 33.4281484744 |
| **18** | -0.0115507025 | -0.0154589455 | | 0.0139841337 | 7.9999469338 | 7.9999526079 | 7.9999517720 | 7.9999839974 | 99.6079915365 | 33.4274989221 |
| **19** | -0.0033966356 | 0.0051804557 | | 0.0279948521 | 7.9999538334 | 7.9999520189 | 7.9999532613 | 7.9999833713 | 99.6114999277 | 33.4142570324 |
| **20** | 0.0254466776 | 0.0082570555 | | -0.0214478381 | 7.9999534129 | 7.9999463870 | 7.9999517110 | 7.9999824445 | 99.6087058738 | 33.4343918789 |
| **21** | -0.0033612217 | -0.0128319705 | | -0.0589270866 | 7.9999476897 | 7.9999490574 | 7.9999574263 | 7.9999836719 | 99.6083080150 | 33.4166484758 |
| **22** | 0.0070008373 | -0.0091092256 | | -0.0011563575 | 7.9999473459 | 7.9999505495 | 7.9999510652 | 7.9999824376 | 99.6081362124 | 33.4131201208 |
| **23** | -0.0208616300 | 0.0227235906 | | 0.0375728477 | 7.9999537742 | 7.9999532351 | 7.9999521789 | 7.9999847845 | 99.6106137876 | 33.4299291585 |
| **24** | 0.0468974578 | 0.0116912169 | | 0.0181514380 | 7.9999550313 | 7.9999536495 | 7.9999475461 | 7.9999824645 | 99.6123498987 | 33.4315903076 |
| **25** | 0.0166076280 | 0.0060054949 | | 0.0396350161 | 7.9999522016 | 7.9999469903 | 7.9999562488 | 7.9999835986 | 99.6079282407 | 33.4191245972 |
| **26** | 0.0457023258 | 0.0110874286 | | -0.0024034374 | 7.9999583637 | 7.9999448657 | 7.9999508347 | 7.9999831205 | 99.6102520978 | 33.4216675957 |
| **27** | -0.0001013759 | -0.0049040289 | | 0.0071723595 | 7.9999518576 | 7.9999482839 | 7.9999529417 | 7.9999833352 | 99.6094292535 | 33.4294005949 |
| **28** | 0.0455108391 | -0.0296595909 | | 0.0537018268 | 7.9999503899 | 7.9999542464 | 7.9999466206 | 7.9999866305 | 99.6102068866 | 33.4313894634 |
| **29** | 0.0024048521 | 0.0251438983 | | -0.0312690420 | 7.9999344676 | 7.9999459457 | 7.9999495402 | 7.9999825297 | 99.6079282407 | 33.4267028499 |
| **30** | 0.0268015784 | -0.0024088721 | | -0.0023995056 | 7.9999565086 | 7.9999533786 | 7.9999570005 | 7.9999837481 | 99.6101074219 | 33.4213847685 |
| **31** | 0.0132246056 | 0.0003199347 | | 0.0414328966 | 7.9999525266 | 7.9999572143 | 7.9999392555 | 7.9999847097 | 99.6134168837 | 33.4390679963 |
| **32** | 0.0018169123 | 0.0006307601 | | 0.0142656691 | 7.9999482115 | 7.9999491691 | 7.9999469139 | 7.9999844451 | 99.6082537616 | 33.4169326505 |
| **33** | -0.0228307348 | -0.0135194510 | | 0.0559248506 | 7.9999457324 | 7.9999552164 | 7.9999487576 | 7.9999828317 | 99.6122052228 | 33.4217163175 |
| **34** | -0.0091190916 | 0.0166503932 | | 0.0181218896 | 7.9999418949 | 7.9999512602 | 7.9999485939 | 7.9999833151 | 99.6069155093 | 33.4237566736 |
| **35** | 0.0010435359 | -0.0153540545 | | 0.0097290210 | 7.9999477319 | 7.9999477359 | 7.9999498232 | 7.9999836298 | 99.6076750579 | 33.4344380121 |
| **36** | -0.0032544360 | -0.0169221152 | | -0.0269378954 | 7.9999575424 | 7.9999476951 | 7.9999519255 | 7.9999823330 | 99.6070873119 | 33.4123834792 |
| **37** | -0.0182503360 | -0.0033045816 | | 0.0286098019 | 7.9999439486 | 7.9999391906 | 7.9999509399 | 7.9999828859 | 99.6121961806 | 33.4264637091 |
| **38** | -0.0327437322 | 0.0376366286 | | 0.0083142987 | 7.9999548300 | 7.9999518598 | 7.9999504556 | 7.9999846845 | 99.6107132523 | 33.4311717757 |
| **39** | 0.0161507311 | 0.0173242329 | | 0.0101567733 | 7.9999569012 | 7.9999557432 | 7.9999466269 | 7.9999831037 | 99.6075213397 | 33.4350460765 |
| **40** | 0.0001960504 | -0.0145376283 | | 0.0488764591 | 7.9999452445 | 7.9999446445 | 7.9999465647 | 7.9999814501 | 99.6062554253 | 33.4197038683 |
| **41** | -0.0226615649 | 0.0099234037 | | 0.0087040949 | 7.9999381069 | 7.9999549893 | 7.9999488597 | 7.9999833893 | 99.6109302662 | 33.4234199120 |
| **42** | -0.0044233346 | 0.0057334060 | | 0.0420393346 | 7.9999445348 | 7.9999458406 | 7.9999495383 | 7.9999831329 | 99.6109935619 | 33.4272848868 |
| **43** | 0.0313564219 | 0.0187547040 | | 0.0428979963 | 7.9999443883 | 7.9999454013 | 7.9999489374 | 7.9999830175 | 99.6099989149 | 33.4231568358 |
| **44** | -0.0042959082 | 0.0096631147 | | 0.0195447925 | 7.9999563667 | 7.9999399738 | 7.9999465122 | 7.9999817414 | 99.6098723235 | 33.4334468756 |
| **45** | 0.0394060399 | 0.0158639015 | | 0.0358311747 | 7.9999471445 | 7.9999456528 | 7.9999473269 | 7.9999816830 | 99.6082447193 | 33.4330801860 |
| **46** | -0.0222851108 | 0.0192411114 | | -0.0145261352 | 7.9999564812 | 7.9999486079 | 7.9999580323 | 7.9999855798 | 99.6103606047 | 33.4267200124 |
| **47** | 0.0255933428 | 0.0122276123 | | -0.0181456493 | 7.9999463885 | 7.9999546276 | 7.9999496564 | 7.9999817195 | 99.6087058738 | 33.4292585075 |
| **48** | 0.0373095636 | -0.0273698812 | | -0.0466334260 | 7.9999460500 | 7.9999515069 | 7.9999407981 | 7.9999812805 | 99.6076660156 | 33.4239446813 |
| **49** | 0.0182767390 | -0.0031292932 | | -0.0238669008 | 7.9999530119 | 7.9999543764 | 7.9999541956 | 7.9999838839 | 99.6080638744 | 33.4322212790 |
| **50** | 0.0083972538 | -0.0323824926 | | -0.0243685921 | 7.9999466805 | 7.9999517320 | 7.9999563984 | 7.9999824946 | 99.6060112847 | 33.4233433543 |
| **Total** | 0.1968767426 | 0.0711490334 | | 0.3590932418 | 399.9974499784 | 399.9975032816 | 399.9975124161 | 399.9991560788 | 4980.4644911024 | 1671.3209054246 |
| **Average** | 0.0039375145 | 0.0014229797 | | 0.0071817414 | 7.9999489996 | 7.9999500656 | 7.9999502483 | 7.9999831216 | 99.6092898220 | 33.4264181085 |

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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 Hard 2 - 1440p60** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0102294100 | -0.0091827761 | | 0.0331743085 | 7.9999450942 | 7.9999476556 | 7.9999448822 | 7.9999820155 | 99.6065266927 | 33.4254192056 |
| **2** | 0.0056895191 | 0.0083597154 | | 0.0176900239 | 7.9999453545 | 7.9999440519 | 7.9999392759 | 7.9999807895 | 99.6081000434 | 33.4171398775 |
| **3** | -0.0061778169 | -0.0047944919 | | -0.0162499860 | 7.9999507101 | 7.9999522502 | 7.9999521288 | 7.9999848487 | 99.6067708333 | 33.4251059184 |
| **4** | 0.0133516358 | 0.0109546910 | | -0.0354472309 | 7.9999540796 | 7.9999524641 | 7.9999440397 | 7.9999802953 | 99.6081452546 | 33.4246848689 |
| **5** | -0.0014448475 | 0.0011932295 | | -0.0258585191 | 7.9999525028 | 7.9999512199 | 7.9999407912 | 7.9999835800 | 99.6094111690 | 33.4294655218 |
| **6** | -0.0087636573 | -0.0148509883 | | 0.0017108778 | 7.9999472977 | 7.9999445004 | 7.9999504043 | 7.9999825372 | 99.6081452546 | 33.4298678130 |
| **7** | 0.0104129424 | 0.0163354530 | | -0.0492315164 | 7.9999571256 | 7.9999526469 | 7.9999468156 | 7.9999852478 | 99.6071777344 | 33.4297303000 |
| **8** | 0.0090280895 | 0.0284784658 | | 0.0126110212 | 7.9999470638 | 7.9999524085 | 7.9999586814 | 7.9999855808 | 99.6063548900 | 33.4149253075 |
| **9** | -0.0041140421 | 0.0054995509 | | -0.0536666843 | 7.9999505592 | 7.9999499526 | 7.9999574570 | 7.9999840602 | 99.6102973090 | 33.4185842610 |
| **10** | -0.0079209353 | 0.0235838201 | | -0.0081525845 | 7.9999499881 | 7.9999530231 | 7.9999508297 | 7.9999828055 | 99.6120062934 | 33.4273834650 |
| **11** | -0.0202128565 | 0.0056744531 | | 0.0548370049 | 7.9999423152 | 7.9999537705 | 7.9999491700 | 7.9999826492 | 99.6079191985 | 33.4326866533 |
| **12** | 0.0084342259 | -0.0001294616 | | 0.0208307555 | 7.9999563972 | 7.9999533893 | 7.9999488355 | 7.9999840434 | 99.6087330006 | 33.4245764329 |
| **13** | 0.0122625790 | -0.0034961664 | | 0.0126343755 | 7.9999574583 | 7.9999529449 | 7.9999462029 | 7.9999832605 | 99.6088234230 | 33.4194474940 |
| **14** | -0.0013459429 | 0.0192148618 | | -0.0387107756 | 7.9999499032 | 7.9999545670 | 7.9999475812 | 7.9999821273 | 99.6091308594 | 33.4336648469 |
| **15** | -0.0164707534 | 0.0129878322 | | -0.0310035781 | 7.9999491688 | 7.9999541031 | 7.9999532303 | 7.9999844073 | 99.6073585793 | 33.4335347804 |
| **16** | -0.0110999484 | -0.0218735517 | | -0.0046474428 | 7.9999463716 | 7.9999427860 | 7.9999527626 | 7.9999840115 | 99.6086335359 | 33.4297967871 |
| **17** | -0.0020834002 | -0.0019959753 | | -0.0078087530 | 7.9999493478 | 7.9999611061 | 7.9999466041 | 7.9999853390 | 99.6085883247 | 33.4318141652 |
| **18** | 0.0072655882 | 0.0054786417 | | -0.0260721422 | 7.9999481554 | 7.9999468399 | 7.9999470756 | 7.9999815017 | 99.6075936777 | 33.4198094321 |
| **19** | -0.0267119784 | 0.0369896965 | | 0.0272083169 | 7.9999544524 | 7.9999515855 | 7.9999476013 | 7.9999812739 | 99.6114728009 | 33.4363029131 |
| **20** | -0.0179049422 | -0.0050602757 | | -0.0176700852 | 7.9999558714 | 7.9999577670 | 7.9999552974 | 7.9999861953 | 99.6044108073 | 33.4358009444 |
| **21** | -0.0136026434 | 0.0044395884 | | -0.0208434343 | 7.9999530069 | 7.9999560844 | 7.9999553311 | 7.9999827937 | 99.6107584635 | 33.4238857826 |
| **22** | -0.0173230435 | -0.0099922991 | | 0.0334473911 | 7.9999455085 | 7.9999496572 | 7.9999459918 | 7.9999824690 | 99.6088234230 | 33.4275394880 |
| **23** | 0.0075527790 | -0.0076772010 | | -0.0062880963 | 7.9999479431 | 7.9999561102 | 7.9999538139 | 7.9999825596 | 99.6115993924 | 33.4233979624 |
| **24** | -0.0060034276 | 0.0160561264 | | -0.0408817672 | 7.9999524687 | 7.9999546744 | 7.9999521625 | 7.9999833656 | 99.6075575087 | 33.4112845804 |
| **25** | -0.0241610737 | 0.0471991072 | | -0.0953230482 | 7.9999536404 | 7.9999510669 | 7.9999438964 | 7.9999812384 | 99.6114004630 | 33.4304876146 |
| **26** | 0.0392387878 | 0.0093220787 | | 0.0248302243 | 7.9999559042 | 7.9999545786 | 7.9999424536 | 7.9999829570 | 99.6075755932 | 33.4205983768 |
| **27** | -0.0144332952 | 0.0244662177 | | -0.0216694062 | 7.9999576939 | 7.9999546478 | 7.9999413278 | 7.9999813502 | 99.6064001013 | 33.4276910786 |
| **28** | 0.0337950025 | 0.0219870862 | | -0.0046014090 | 7.9999491856 | 7.9999508336 | 7.9999528486 | 7.9999836065 | 99.6096462674 | 33.4285458722 |
| **29** | 0.0136234175 | 0.0014483265 | | -0.0205394785 | 7.9999492455 | 7.9999457429 | 7.9999532990 | 7.9999805518 | 99.6053692853 | 33.4269184454 |
| **30** | 0.0082125877 | -0.0034865417 | | 0.0121934540 | 7.9999472281 | 7.9999481733 | 7.9999498689 | 7.9999818015 | 99.6109393084 | 33.4352216733 |
| **31** | 0.0143172813 | 0.0265715094 | | 0.0160676680 | 7.9999525785 | 7.9999471991 | 7.9999476537 | 7.9999823668 | 99.6100802951 | 33.4348804793 |
| **32** | -0.0182767500 | -0.0007073824 | | -0.0441828414 | 7.9999489374 | 7.9999471628 | 7.9999475953 | 7.9999833328 | 99.6121148003 | 33.4320796172 |
| **33** | 0.0001342755 | 0.0004084271 | | -0.0118500867 | 7.9999570981 | 7.9999594521 | 7.9999541005 | 7.9999863455 | 99.6070421007 | 33.4232699525 |
| **34** | 0.0390999314 | 0.0248582034 | | -0.0095576305 | 7.9999470952 | 7.9999484213 | 7.9999444636 | 7.9999834650 | 99.6111382378 | 33.4377316943 |
| **35** | 0.0166314128 | -0.0073510150 | | 0.0095514379 | 7.9999586098 | 7.9999452933 | 7.9999479637 | 7.9999832786 | 99.6095648872 | 33.4329327087 |
| **36** | -0.0491039372 | 0.0165155065 | | 0.0331943638 | 7.9999559890 | 7.9999537279 | 7.9999517503 | 7.9999853812 | 99.6130190249 | 33.4375118436 |
| **37** | -0.0042759216 | -0.0087549759 | | 0.0352081706 | 7.9999463295 | 7.9999511033 | 7.9999494151 | 7.9999845327 | 99.6079011140 | 33.4209838247 |
| **38** | -0.0075009740 | -0.0118239234 | | 0.0277003954 | 7.9999491496 | 7.9999510291 | 7.9999466133 | 7.9999832373 | 99.6098542390 | 33.4204027806 |
| **39** | 0.0015966778 | 0.0183999266 | | -0.0435741513 | 7.9999530121 | 7.9999584709 | 7.9999541578 | 7.9999838975 | 99.6078378183 | 33.4264862260 |
| **40** | -0.0221088977 | -0.0107658569 | | -0.0032351055 | 7.9999519309 | 7.9999496285 | 7.9999564220 | 7.9999844946 | 99.6109483507 | 33.4279718847 |
| **41** | -0.0265374165 | -0.0303164320 | | 0.0238772363 | 7.9999534870 | 7.9999576392 | 7.9999392514 | 7.9999858670 | 99.6076750579 | 33.4274800929 |
| **42** | 0.0108970133 | -0.0212482583 | | -0.0096843006 | 7.9999565829 | 7.9999542534 | 7.9999517515 | 7.9999845807 | 99.6109212240 | 33.4278075640 |
| **43** | -0.0013767171 | -0.0056216174 | | -0.0080625794 | 7.9999470709 | 7.9999534304 | 7.9999415119 | 7.9999812076 | 99.6082085503 | 33.4236590528 |
| **44** | 0.0113366314 | -0.0083496787 | | 0.0054782712 | 7.9999443484 | 7.9999443962 | 7.9999459402 | 7.9999823133 | 99.6125578704 | 33.4293746029 |
| **45** | -0.0039088940 | 0.0150991870 | | 0.0572132581 | 7.9999546794 | 7.9999535143 | 7.9999457020 | 7.9999819554 | 99.6102068866 | 33.4243953398 |
| **46** | -0.0345432428 | 0.0078919845 | | 0.0380047481 | 7.9999498928 | 7.9999488968 | 7.9999458847 | 7.9999808956 | 99.6080186632 | 33.4310301494 |
| **47** | -0.0101403573 | -0.0178283517 | | -0.0066206954 | 7.9999529026 | 7.9999509261 | 7.9999469704 | 7.9999825915 | 99.6048538773 | 33.4288417487 |
| **48** | 0.0065960436 | -0.0203449608 | | 0.0012261730 | 7.9999475744 | 7.9999486829 | 7.9999413344 | 7.9999818545 | 99.6092212818 | 33.4286832789 |
| **49** | 0.0119311639 | -0.0032529920 | | 0.0704910985 | 7.9999457441 | 7.9999411948 | 7.9999468420 | 7.9999824341 | 99.6079824942 | 33.4177396444 |
| **50** | -0.0098359315 | 0.0257588580 | | 0.0162203060 | 7.9999589782 | 7.9999471259 | 7.9999509564 | 7.9999834422 | 99.6088686343 | 33.4201724693 |
| **Total** | -0.0957466487 | 0.2062673713 | | -0.0760324485 | 399.9975530326 | 399.9975621501 | 399.9974269405 | 399.9991567374 | 4980.4436848958 | 1671.3487468172 |
| **Average** | -0.0019149306 | 0.0041253240 | | -0.0015206478 | 7.9999510607 | 7.9999512430 | 7.9999485388 | 7.9999831347 | 99.6088736979 | 33.4269749363 |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Project Cars 2016 - 1440p60 Racing Merc HQ HD** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0082448428 | -0.0218203452 | | 0.0071177668 | 7.9999573213 | 7.9999496376 | 7.9999481449 | 7.9999843633 | 99.6096733941 | 33.4266395541 |
| **2** | -0.0569374193 | 0.0403863900 | | 0.0136196137 | 7.9999538646 | 7.9999493569 | 7.9999534718 | 7.9999825972 | 99.6100893374 | 33.4299705755 |
| **3** | 0.0176141814 | -0.0141157774 | | 0.0590842565 | 7.9999451126 | 7.9999532870 | 7.9999461814 | 7.9999834171 | 99.6078016493 | 33.4290019560 |
| **4** | -0.0089315162 | 0.0186113196 | | -0.0416830640 | 7.9999466894 | 7.9999480704 | 7.9999516776 | 7.9999830924 | 99.6086154514 | 33.4394960314 |
| **5** | 0.0066927212 | 0.0049122125 | | -0.0260215297 | 7.9999520430 | 7.9999588488 | 7.9999480304 | 7.9999827072 | 99.6067889178 | 33.4281326593 |
| **6** | 0.0008151109 | -0.0079183390 | | -0.0174248011 | 7.9999511310 | 7.9999536033 | 7.9999479567 | 7.9999827409 | 99.6075665509 | 33.4191103778 |
| **7** | 0.0058361241 | -0.0129427489 | | -0.0505746999 | 7.9999465770 | 7.9999478435 | 7.9999515237 | 7.9999824333 | 99.6097005208 | 33.4173137723 |
| **8** | 0.0226166230 | 0.0099949066 | | -0.0425607819 | 7.9999526300 | 7.9999483224 | 7.9999550593 | 7.9999851165 | 99.6083713108 | 33.4306608002 |
| **9** | 0.0120716741 | -0.0253245783 | | 0.0122903658 | 7.9999554973 | 7.9999485104 | 7.9999430926 | 7.9999827493 | 99.6082989728 | 33.4164444757 |
| **10** | -0.0004764079 | -0.0099876556 | | -0.0302313572 | 7.9999499766 | 7.9999556055 | 7.9999506574 | 7.9999843233 | 99.6098813657 | 33.4323432607 |
| **11** | -0.0090455013 | -0.0210757511 | | -0.0059065410 | 7.9999508926 | 7.9999511330 | 7.9999452708 | 7.9999810958 | 99.6093207465 | 33.4248227720 |
| **12** | 0.0086206731 | -0.0268815244 | | -0.0347274531 | 7.9999468185 | 7.9999495514 | 7.9999436486 | 7.9999817490 | 99.6096553096 | 33.4321927339 |
| **13** | -0.0104384251 | 0.0386582993 | | -0.0178696046 | 7.9999445533 | 7.9999513348 | 7.9999548839 | 7.9999844670 | 99.6083170573 | 33.4275174321 |
| **14** | 0.0390082530 | -0.0038709930 | | -0.0063896927 | 7.9999553770 | 7.9999452504 | 7.9999474791 | 7.9999845913 | 99.6100712529 | 33.4166495751 |
| **15** | -0.0086477218 | 0.0081075591 | | 0.0004488558 | 7.9999480457 | 7.9999466944 | 7.9999568331 | 7.9999829069 | 99.6098813657 | 33.4317723581 |
| **16** | 0.0093807652 | 0.0335678890 | | 0.0401891391 | 7.9999534196 | 7.9999434409 | 7.9999460382 | 7.9999819557 | 99.6085159867 | 33.4298168219 |
| **17** | 0.0072572115 | 0.0237605695 | | 0.0126296008 | 7.9999497468 | 7.9999477811 | 7.9999476580 | 7.9999849145 | 99.6092574508 | 33.4262530070 |
| **18** | 0.0178351521 | -0.0023167496 | | 0.0437350441 | 7.9999530578 | 7.9999461574 | 7.9999527247 | 7.9999831454 | 99.6116265191 | 33.4307585629 |
| **19** | -0.0052615043 | 0.0172095028 | | -0.0106609181 | 7.9999555462 | 7.9999541257 | 7.9999566707 | 7.9999858179 | 99.6108669705 | 33.4275046311 |
| **20** | -0.0005581590 | 0.0050121152 | | -0.0480025851 | 7.9999486055 | 7.9999567307 | 7.9999547175 | 7.9999832132 | 99.6056948061 | 33.4234652650 |
| **21** | -0.0033311822 | 0.0230143790 | | 0.0603466872 | 7.9999428540 | 7.9999555637 | 7.9999447129 | 7.9999798854 | 99.6104781539 | 33.4281074120 |
| **22** | 0.0075749835 | -0.0109027722 | | 0.0533386961 | 7.9999527200 | 7.9999518275 | 7.9999449221 | 7.9999842352 | 99.6101888021 | 33.4400108011 |
| **23** | -0.0050115718 | 0.0078357611 | | 0.0118226882 | 7.9999510320 | 7.9999441378 | 7.9999473335 | 7.9999812934 | 99.6069607205 | 33.4270550719 |
| **24** | -0.0185035651 | -0.0140827009 | | -0.0064167351 | 7.9999521183 | 7.9999553819 | 7.9999497710 | 7.9999852414 | 99.6085069444 | 33.4290955698 |
| **25** | -0.0157883537 | -0.0301140662 | | -0.0135031588 | 7.9999407842 | 7.9999512922 | 7.9999507228 | 7.9999832534 | 99.6108850550 | 33.4192011549 |
| **26** | 0.0196478890 | -0.0214831614 | | -0.0107348450 | 7.9999527691 | 7.9999464653 | 7.9999494939 | 7.9999847367 | 99.6098451968 | 33.4147340729 |
| **27** | -0.0106931682 | 0.0691125454 | | -0.0264990090 | 7.9999515944 | 7.9999509757 | 7.9999486328 | 7.9999817984 | 99.6089861834 | 33.4330779874 |
| **28** | -0.0100387507 | -0.0139074281 | | -0.0390994289 | 7.9999530726 | 7.9999481883 | 7.9999518709 | 7.9999831378 | 99.6111291956 | 33.4381934516 |
| **29** | 0.0530100282 | 0.0122611489 | | -0.0422376140 | 7.9999484465 | 7.9999415343 | 7.9999520809 | 7.9999818634 | 99.6106228299 | 33.4231998131 |
| **30** | -0.0001863247 | 0.0254212325 | | -0.0033650863 | 7.9999523181 | 7.9999595360 | 7.9999507828 | 7.9999837200 | 99.6085883247 | 33.4219035452 |
| **31** | -0.0068109007 | -0.0273489663 | | 0.0030142488 | 7.9999561910 | 7.9999492731 | 7.9999453833 | 7.9999817019 | 99.6128291377 | 33.4153931640 |
| **32** | -0.0141208332 | -0.0308580457 | | 0.0133069302 | 7.9999553705 | 7.9999483541 | 7.9999530083 | 7.9999845585 | 99.6108036748 | 33.4331671688 |
| **33** | 0.0128561660 | -0.0151016733 | | -0.0006183238 | 7.9999525174 | 7.9999516459 | 7.9999540358 | 7.9999830437 | 99.6056495949 | 33.4197497178 |
| **34** | -0.0058250895 | -0.0351125609 | | -0.0210266670 | 7.9999612974 | 7.9999484472 | 7.9999420671 | 7.9999867813 | 99.6080186632 | 33.4229314534 |
| **35** | 0.0281960591 | -0.0071139083 | | -0.0123459131 | 7.9999455574 | 7.9999467260 | 7.9999573847 | 7.9999823173 | 99.6111924913 | 33.4246705077 |
| **36** | 0.0120488167 | 0.0242983503 | | -0.0111382879 | 7.9999444524 | 7.9999491341 | 7.9999543071 | 7.9999821401 | 99.6095920139 | 33.4275823589 |
| **37** | 0.0180999473 | -0.0155101930 | | -0.0218135948 | 7.9999521363 | 7.9999475397 | 7.9999480003 | 7.9999822603 | 99.6104781539 | 33.4299834474 |
| **38** | 0.0117198172 | 0.0177638326 | | 0.0395437425 | 7.9999562665 | 7.9999527216 | 7.9999547376 | 7.9999852461 | 99.6107584635 | 33.4242224733 |
| **39** | 0.0033555844 | -0.0173605924 | | -0.0330664516 | 7.9999498444 | 7.9999514609 | 7.9999400729 | 7.9999830885 | 99.6101435909 | 33.4360249084 |
| **40** | -0.0238133569 | -0.0140662908 | | 0.0145442888 | 7.9999455963 | 7.9999409666 | 7.9999632281 | 7.9999842547 | 99.6090404369 | 33.4254722535 |
| **41** | -0.0071737843 | 0.0344432577 | | 0.0315173812 | 7.9999500719 | 7.9999536246 | 7.9999450467 | 7.9999842114 | 99.6106047454 | 33.4267466072 |
| **42** | -0.0011202488 | 0.0204035726 | | -0.0232249252 | 7.9999535533 | 7.9999417602 | 7.9999432721 | 7.9999824734 | 99.6105233652 | 33.4316829640 |
| **43** | -0.0307467799 | 0.0498758286 | | -0.0400827993 | 7.9999480561 | 7.9999427025 | 7.9999459078 | 7.9999813808 | 99.6127025463 | 33.4340569258 |
| **44** | -0.0081902449 | 0.0199580738 | | -0.0051652697 | 7.9999563010 | 7.9999439531 | 7.9999486029 | 7.9999822523 | 99.6076660156 | 33.4133959624 |
| **45** | -0.0045192461 | 0.0351591701 | | -0.0261688785 | 7.9999535537 | 7.9999447897 | 7.9999488024 | 7.9999841427 | 99.6063006366 | 33.4149143150 |
| **46** | -0.0013132812 | 0.0345911686 | | 0.0192178183 | 7.9999500017 | 7.9999513871 | 7.9999519588 | 7.9999819414 | 99.6088324653 | 33.4279029154 |
| **47** | -0.0083969478 | 0.0085035994 | | 0.0069392352 | 7.9999484529 | 7.9999513409 | 7.9999497679 | 7.9999829075 | 99.6102792245 | 33.4282740021 |
| **48** | -0.0012467974 | 0.0155720778 | | -0.0013579393 | 7.9999511529 | 7.9999576709 | 7.9999579899 | 7.9999844321 | 99.6081362124 | 33.4256572472 |
| **49** | -0.0209930688 | -0.0121554986 | | 0.0054833255 | 7.9999571012 | 7.9999505452 | 7.9999526238 | 7.9999830211 | 99.6096643519 | 33.4235777080 |
| **50** | -0.0227820670 | -0.0023282074 | | 0.0104963822 | 7.9999481442 | 7.9999518078 | 7.9999463840 | 7.9999840515 | 99.6087420428 | 33.4284560881 |
| **Total** | -0.0148892797 | 0.1847342338 | | -0.2112318889 | 399.9975502334 | 399.9974860398 | 399.9974946258 | 399.9991627691 | 4980.4681441696 | 1671.3283076904 |
| **Average** | -0.0002977856 | 0.0036946679 | | -0.0042246126 | 7.9999510047 | 7.9999497208 | 7.9999498925 | 7.9999832554 | 99.6093628834 | 33.4265661538 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Bears Panasonic G85 - 4K UHD** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0258996031 | -0.0031607080 | | -0.0394829378 | 7.9999484147 | 7.9999489206 | 7.9999587418 | 7.9999835512 | 99.6103334780 | 33.4268183778 |
| **2** | -0.0134364627 | -0.0145948538 | | -0.0261647612 | 7.9999467885 | 7.9999547308 | 7.9999588179 | 7.9999813557 | 99.6120243779 | 33.4318112221 |
| **3** | -0.0181371986 | 0.0234108427 | | -0.0326065996 | 7.9999400315 | 7.9999483897 | 7.9999492211 | 7.9999834968 | 99.6092122396 | 33.4191755529 |
| **4** | 0.0141580241 | 0.0015357986 | | 0.0564347908 | 7.9999503152 | 7.9999524358 | 7.9999581505 | 7.9999849508 | 99.6043294271 | 33.4242212677 |
| **5** | 0.0174892886 | -0.0047350299 | | 0.0384978335 | 7.9999401351 | 7.9999530538 | 7.9999505226 | 7.9999831925 | 99.6109212240 | 33.4309043026 |
| **6** | 0.0301241062 | -0.0236329856 | | -0.0332886573 | 7.9999472500 | 7.9999433366 | 7.9999519399 | 7.9999824893 | 99.6046549479 | 33.4216214626 |
| **7** | -0.0053189806 | 0.0118435866 | | 0.0446455855 | 7.9999494415 | 7.9999445262 | 7.9999498268 | 7.9999835539 | 99.6075846354 | 33.4244664012 |
| **8** | -0.0305553985 | 0.0060528434 | | -0.0151101594 | 7.9999494717 | 7.9999441351 | 7.9999546916 | 7.9999846005 | 99.6086335359 | 33.4201607676 |
| **9** | -0.0000767006 | 0.0064008769 | | -0.0528857300 | 7.9999533461 | 7.9999443635 | 7.9999473406 | 7.9999832382 | 99.6107313368 | 33.4335426879 |
| **10** | -0.0081679046 | 0.0234050657 | | -0.0084653949 | 7.9999409637 | 7.9999480313 | 7.9999509795 | 7.9999815515 | 99.6091399016 | 33.4226078474 |
| **11** | -0.0129669636 | -0.0089442487 | | 0.0452495114 | 7.9999543814 | 7.9999509603 | 7.9999502608 | 7.9999848138 | 99.6100622106 | 33.4267543375 |
| **12** | 0.0050326460 | -0.0230951582 | | -0.0245757652 | 7.9999531322 | 7.9999542732 | 7.9999529010 | 7.9999842722 | 99.6118164063 | 33.4383225252 |
| **13** | -0.0002883606 | -0.0007974906 | | 0.0343784684 | 7.9999570631 | 7.9999489312 | 7.9999432908 | 7.9999837054 | 99.6067617911 | 33.4146807059 |
| **14** | -0.0140482453 | 0.0133211297 | | 0.0224131960 | 7.9999490783 | 7.9999435720 | 7.9999591696 | 7.9999812733 | 99.6061830874 | 33.4230269821 |
| **15** | -0.0113996001 | 0.0117891110 | | -0.0149177904 | 7.9999456304 | 7.9999426519 | 7.9999472946 | 7.9999821710 | 99.6064091435 | 33.4258638004 |
| **16** | 0.0220776818 | 0.0068451480 | | 0.0496684421 | 7.9999521399 | 7.9999506183 | 7.9999512526 | 7.9999812699 | 99.6095920139 | 33.4229534740 |
| **17** | -0.0331919394 | 0.0116054121 | | -0.0511924769 | 7.9999463405 | 7.9999477298 | 7.9999558073 | 7.9999825253 | 99.6103606047 | 33.4360029233 |
| **18** | -0.0203405916 | -0.0026883273 | | -0.0142433801 | 7.9999435341 | 7.9999527210 | 7.9999475795 | 7.9999859446 | 99.6097095631 | 33.4238579112 |
| **19** | 0.0192070274 | -0.0153634018 | | 0.0523549121 | 7.9999485017 | 7.9999540051 | 7.9999464154 | 7.9999848363 | 99.6115722656 | 33.4314361994 |
| **20** | -0.0076086156 | -0.0017542565 | | 0.0210536644 | 7.9999481178 | 7.9999449696 | 7.9999487799 | 7.9999837348 | 99.6058937355 | 33.4337812968 |
| **21** | 0.0098422264 | 0.0274916677 | | 0.0389196084 | 7.9999435737 | 7.9999524358 | 7.9999550874 | 7.9999831663 | 99.6088324653 | 33.4215489118 |
| **22** | -0.0287166616 | -0.0004616697 | | -0.0230646234 | 7.9999511324 | 7.9999463672 | 7.9999533573 | 7.9999843000 | 99.6094473380 | 33.4257711795 |
| **23** | -0.0274500132 | -0.0032478665 | | -0.0226424086 | 7.9999535353 | 7.9999556589 | 7.9999503806 | 7.9999838359 | 99.6118525752 | 33.4278162517 |
| **24** | 0.0057567234 | -0.0424851983 | | 0.0097828937 | 7.9999505539 | 7.9999483926 | 7.9999569987 | 7.9999812476 | 99.6120424624 | 33.4292784005 |
| **25** | -0.0388473244 | -0.0054513593 | | 0.0127385192 | 7.9999616680 | 7.9999477926 | 7.9999531892 | 7.9999843724 | 99.6095106337 | 33.4328465414 |
| **26** | 0.0017884479 | 0.0259513901 | | 0.0396079539 | 7.9999426114 | 7.9999487212 | 7.9999521639 | 7.9999845794 | 99.6142487703 | 33.4358153765 |
| **27** | 0.0270495221 | -0.0183787113 | | -0.0555319347 | 7.9999617019 | 7.9999527905 | 7.9999542889 | 7.9999881331 | 99.6104781539 | 33.4295138180 |
| **28** | -0.0103995945 | -0.0123051089 | | -0.0032522194 | 7.9999509474 | 7.9999542372 | 7.9999487715 | 7.9999821373 | 99.6143211082 | 33.4181688141 |
| **29** | 0.0290062275 | 0.0101865619 | | -0.0033757655 | 7.9999588549 | 7.9999445833 | 7.9999491884 | 7.9999838416 | 99.6061469184 | 33.4253207693 |
| **30** | -0.0155546111 | 0.0045915430 | | -0.0107080073 | 7.9999471276 | 7.9999487589 | 7.9999478363 | 7.9999799931 | 99.6077202691 | 33.4374246480 |
| **31** | -0.0062084779 | 0.0119081598 | | 0.0219920079 | 7.9999564038 | 7.9999470560 | 7.9999542570 | 7.9999836040 | 99.6119068287 | 33.4258791545 |
| **32** | 0.0390500449 | -0.0009903808 | | 0.0315469357 | 7.9999572712 | 7.9999525724 | 7.9999525765 | 7.9999844467 | 99.6088686343 | 33.4131408647 |
| **33** | -0.0247552248 | -0.0059589865 | | -0.0154602297 | 7.9999493193 | 7.9999450177 | 7.9999460957 | 7.9999832471 | 99.6078468605 | 33.4298308994 |
| **34** | -0.0358324260 | -0.0275960915 | | 0.0322232216 | 7.9999430896 | 7.9999497800 | 7.9999516522 | 7.9999818722 | 99.6101526331 | 33.4244427140 |
| **35** | 0.0213057558 | -0.0253432238 | | -0.0061502688 | 7.9999605043 | 7.9999474486 | 7.9999507083 | 7.9999835028 | 99.6108036748 | 33.4321335515 |
| **36** | 0.0282577300 | -0.0132304160 | | -0.0665637345 | 7.9999537415 | 7.9999430317 | 7.9999524829 | 7.9999838188 | 99.6080910012 | 33.4426002519 |
| **37** | 0.0123617402 | -0.0095702511 | | -0.0215133459 | 7.9999406706 | 7.9999579120 | 7.9999475327 | 7.9999840315 | 99.6102340133 | 33.4148525086 |
| **38** | 0.0053502639 | -0.0119093179 | | -0.0162327961 | 7.9999524322 | 7.9999454212 | 7.9999503731 | 7.9999828518 | 99.6095468027 | 33.4287993033 |
| **39** | -0.0184884010 | 0.0146238458 | | -0.0231269958 | 7.9999475032 | 7.9999529190 | 7.9999533694 | 7.9999835197 | 99.6110568576 | 33.4302099291 |
| **40** | 0.0203477343 | -0.0247513056 | | -0.0367068062 | 7.9999513290 | 7.9999452402 | 7.9999514605 | 7.9999833382 | 99.6090223524 | 33.4186984415 |
| **41** | -0.0113721136 | -0.0134845766 | | -0.0162739927 | 7.9999411338 | 7.9999463243 | 7.9999457659 | 7.9999822218 | 99.6088234230 | 33.4294222963 |
| **42** | 0.0315221097 | 0.0119769166 | | -0.0170573045 | 7.9999438406 | 7.9999571051 | 7.9999511151 | 7.9999854593 | 99.6103877315 | 33.4208529426 |
| **43** | -0.0131322871 | 0.0275344091 | | -0.0496249664 | 7.9999494909 | 7.9999550573 | 7.9999465059 | 7.9999843349 | 99.6114999277 | 33.4227374884 |
| **44** | -0.0281152369 | -0.0093442920 | | 0.0239811596 | 7.9999466200 | 7.9999458889 | 7.9999494967 | 7.9999843862 | 99.6107675058 | 33.4173323887 |
| **45** | -0.0135351659 | -0.0212676977 | | -0.0043206842 | 7.9999421225 | 7.9999462466 | 7.9999436257 | 7.9999839005 | 99.6094925492 | 33.4258741901 |
| **46** | 0.0216497876 | 0.0045029543 | | 0.0190886137 | 7.9999461926 | 7.9999508875 | 7.9999461270 | 7.9999831634 | 99.6087601273 | 33.4251388251 |
| **47** | 0.0033368489 | -0.0026960065 | | -0.0069394092 | 7.9999467079 | 7.9999501639 | 7.9999540008 | 7.9999827026 | 99.6086606626 | 33.4368311221 |
| **48** | -0.0013518861 | 0.0022972261 | | -0.0445395608 | 7.9999440862 | 7.9999525113 | 7.9999593458 | 7.9999838525 | 99.6118073640 | 33.4296064744 |
| **49** | -0.0163951555 | 0.0144135804 | | 0.0525496535 | 7.9999559922 | 7.9999502444 | 7.9999496818 | 7.9999830020 | 99.6109393084 | 33.4219786490 |
| **50** | 0.0208194878 | -0.0000868781 | | 0.0255287731 | 7.9999544019 | 7.9999561894 | 7.9999522400 | 7.9999843813 | 99.6108940972 | 33.4310646517 |
| **Total** | -0.0542585141 | -0.0756377292 | | -0.0833629623 | 399.9974686374 | 399.9974691115 | 399.9975626590 | 399.9991737709 | 4980.4800889757 | 1671.3369414035 |
| **Average** | -0.0010851699 | -0.0015127534 | | -0.0016672577 | 7.9999493727 | 7.9999493822 | 7.9999512532 | 7.9999834754 | 99.6096017795 | 33.4267388281 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Jackdaw Bird Panasonic G85 Clip High Quality - 4K UHD** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.024665456 | 0.000949029 | | -0.008122315 | 7.999955308 | 7.999946018 | 7.999953483 | 7.999984343 | 99.60600224 | 33.42989636 |
| **2** | -0.006501107 | -0.019992861 | | 0.038786752 | 7.999950283 | 7.99994492 | 7.999955544 | 7.999982313 | 99.60735858 | 33.42101772 |
| **3** | 0.024788662 | 0.015385038 | | -0.038811434 | 7.999954386 | 7.999950999 | 7.999952239 | 7.999984134 | 99.61210576 | 33.44099807 |
| **4** | -0.014819055 | -0.023147093 | | 0.022888148 | 7.999947108 | 7.999946377 | 7.999950354 | 7.99998303 | 99.61122866 | 33.43195288 |
| **5** | 0.014393319 | 0.000587165 | | -0.050842379 | 7.999952994 | 7.99994865 | 7.999950607 | 7.999983541 | 99.60870587 | 33.41497832 |
| **6** | -0.004046009 | 0.01527304 | | -0.083288926 | 7.999947172 | 7.999943307 | 7.999954639 | 7.999982669 | 99.60922128 | 33.42480699 |
| **7** | 0.010736008 | -0.012701862 | | -0.035769162 | 7.999953919 | 7.999946389 | 7.99994851 | 7.999982531 | 99.60942925 | 33.41695425 |
| **8** | 0.008179405 | -0.009755571 | | -0.012555801 | 7.999945708 | 7.999946895 | 7.999952895 | 7.999979047 | 99.60993562 | 33.43176619 |
| **9** | -0.010847209 | 0.016657297 | | -0.009161737 | 7.999948484 | 7.999959151 | 7.999952588 | 7.999984197 | 99.60876013 | 33.43195356 |
| **10** | -0.0133696 | -0.000921926 | | 0.011256619 | 7.999946295 | 7.999949007 | 7.999951654 | 7.999981738 | 99.60705114 | 33.42543179 |
| **11** | 0.009206669 | 0.016714262 | | -0.031086067 | 7.999940041 | 7.999952155 | 7.999950525 | 7.99998284 | 99.60877821 | 33.42634659 |
| **12** | -0.027151845 | 0.012568773 | | 0.002595457 | 7.999952128 | 7.999950915 | 7.999955315 | 7.99998347 | 99.60932979 | 33.4214926 |
| **13** | 0.006493477 | -0.041452657 | | -0.029273548 | 7.999952082 | 7.999954517 | 7.999947369 | 7.999986154 | 99.61043294 | 33.42382355 |
| **14** | 0.007687592 | 0.0112961 | | 0.011210838 | 7.999947375 | 7.999953281 | 7.99994794 | 7.999981408 | 99.61002604 | 33.42330435 |
| **15** | 0.007721701 | -0.000643219 | | -0.000886111 | 7.999951092 | 7.999959376 | 7.999943298 | 7.999984452 | 99.60904948 | 33.44288794 |
| **16** | 0.000823262 | -0.027512821 | | 0.019708541 | 7.999956524 | 7.999957765 | 7.999945 | 7.999984167 | 99.60950159 | 33.43506966 |
| **17** | -0.032158514 | -0.004284675 | | -0.006683403 | 7.999940882 | 7.999949548 | 7.999949255 | 7.999984062 | 99.60913086 | 33.42364476 |
| **18** | 0.012009792 | 0.026205404 | | 0.023909472 | 7.999956715 | 7.999944559 | 7.99995368 | 7.999984302 | 99.6092032 | 33.43430202 |
| **19** | -0.023033432 | 0.019427 | | -0.053266051 | 7.999954946 | 7.999949102 | 7.999961274 | 7.999984205 | 99.61016168 | 33.42050842 |
| **20** | 0.007976447 | -0.026719745 | | -0.053083492 | 7.9999442 | 7.999951629 | 7.999951321 | 7.99998184 | 99.60990849 | 33.41058457 |
| **21** | -0.012278766 | -0.035678894 | | 0.007575376 | 7.999946335 | 7.999950336 | 7.99995508 | 7.999981173 | 99.60715965 | 33.4324123 |
| **22** | -0.015391918 | 0.02877475 | | 0.040598775 | 7.999954746 | 7.999955513 | 7.999955699 | 7.999986261 | 99.60969148 | 33.43110093 |
| **23** | 0.032998465 | -0.005587499 | | 0.028769317 | 7.999952016 | 7.999948339 | 7.999952188 | 7.999983746 | 99.6096101 | 33.4264085 |
| **24** | -0.002172421 | 0.013193858 | | 0.02769181 | 7.999948863 | 7.999947426 | 7.999951434 | 7.999982319 | 99.61317274 | 33.43495356 |
| **25** | 0.023742762 | -0.033267985 | | 0.035736773 | 7.999945624 | 7.999939288 | 7.999947523 | 7.999982852 | 99.60660807 | 33.42438481 |
| **26** | 0.005915259 | 0.025003251 | | 0.012029294 | 7.999945863 | 7.999950444 | 7.999952329 | 7.999985051 | 99.61063187 | 33.42161164 |
| **27** | -0.016551854 | -0.017906607 | | 0.014516115 | 7.999956514 | 7.999949496 | 7.99994855 | 7.999984673 | 99.61229565 | 33.42686309 |
| **28** | -0.00498682 | -0.025609071 | | -0.027815327 | 7.999957862 | 7.999957707 | 7.999948761 | 7.999987001 | 99.60885959 | 33.4102449 |
| **29** | 0.018321983 | -0.01980671 | | -0.042793029 | 7.999957287 | 7.999955854 | 7.999952453 | 7.999984433 | 99.60924841 | 33.42153473 |
| **30** | 0.029434725 | -0.010600296 | | -0.0065867 | 7.999949408 | 7.999949287 | 7.999943163 | 7.999980862 | 99.60684317 | 33.42500202 |
| **31** | 0.043180806 | 3.24E-05 | | 0.03894826 | 7.999947184 | 7.999944416 | 7.999948365 | 7.999982285 | 99.61159939 | 33.42507769 |
| **32** | 0.004660231 | 0.007414769 | | -0.079640197 | 7.999955061 | 7.999953225 | 7.999948518 | 7.999982998 | 99.60895001 | 33.42677547 |
| **33** | 0.024254242 | -0.00837032 | | -0.010596523 | 7.999952315 | 7.999950352 | 7.999948818 | 7.999982967 | 99.6099537 | 33.4347668 |
| **34** | 0.005727467 | -0.006219501 | | -0.027812769 | 7.999951016 | 7.999944583 | 7.99995152 | 7.999983977 | 99.61225948 | 33.43281041 |
| **35** | -0.016443482 | 0.007830065 | | 0.026397804 | 7.999940438 | 7.999954569 | 7.99995155 | 7.999981786 | 99.60871492 | 33.42988795 |
| **36** | 0.011018785 | -0.000318741 | | -0.00370145 | 7.999952896 | 7.999951775 | 7.999953678 | 7.999984245 | 99.60828089 | 33.42725985 |
| **37** | 0.021556945 | 0.022420697 | | -0.003024865 | 7.999955747 | 7.999954704 | 7.999948271 | 7.999983406 | 99.6079192 | 33.42391177 |
| **38** | 0.019860525 | -0.024022914 | | 0.033995732 | 7.999948529 | 7.999955068 | 7.999945013 | 7.999980927 | 99.61235894 | 33.42841832 |
| **39** | 0.014645976 | 0.028916655 | | 0.038021847 | 7.999940935 | 7.999945358 | 7.999949901 | 7.999982884 | 99.61046007 | 33.41540231 |
| **40** | -0.002034556 | -0.004015793 | | 0.051813062 | 7.999949271 | 7.99994995 | 7.999952299 | 7.999984004 | 99.60660807 | 33.41160294 |
| **41** | 0.01171467 | 0.022238838 | | -0.08614095 | 7.999946812 | 7.999956675 | 7.999940364 | 7.999983709 | 99.60758464 | 33.42571448 |
| **42** | -0.010879386 | 0.015992051 | | -0.048922638 | 7.999952213 | 7.999956074 | 7.999946837 | 7.999984008 | 99.60691551 | 33.43935345 |
| **43** | 0.022469834 | -0.024140866 | | -0.018114793 | 7.999944086 | 7.999957326 | 7.999951339 | 7.999984585 | 99.61030635 | 33.42547931 |
| **44** | -0.031913944 | 0.003682085 | | 0.009423098 | 7.999953523 | 7.999944491 | 7.999948325 | 7.999980504 | 99.60986328 | 33.416173 |
| **45** | -0.014168147 | -0.005126937 | | 0.009480342 | 7.999948922 | 7.999951707 | 7.999948272 | 7.999983537 | 99.61115632 | 33.41684085 |
| **46** | -0.000823651 | -0.001282076 | | 0.030586063 | 7.999948146 | 7.999949842 | 7.999948966 | 7.999985538 | 99.60694264 | 33.43867712 |
| **47** | 0.020357667 | 0.000308512 | | 0.026046438 | 7.999943608 | 7.999953934 | 7.999947353 | 7.999984172 | 99.61119249 | 33.43303927 |
| **48** | -0.010721229 | -0.006437626 | | -0.033138979 | 7.999948566 | 7.999946762 | 7.999943939 | 7.999983028 | 99.60811813 | 33.43150169 |
| **49** | 0.015320679 | 0.001678719 | | -0.018784174 | 7.999950566 | 7.999949185 | 7.999944668 | 7.999984017 | 99.60796441 | 33.4221535 |
| **50** | -0.003254997 | 0.009868179 | | 0.004859299 | 7.99994983 | 7.999953314 | 7.999952011 | 7.999984282 | 99.60833514 | 33.42407308 |
| **Total** | 0.136983959 | -0.073106336 | | -0.253057587 | 399.9974918 | 399.9975316 | 399.9975047 | 399.9991697 | 4980.464925 | 1671.315156 |
| **Average** | 0.002739672 | -0.001462126 | | -0.005061109 | 7.999949836 | 7.999950631 | 7.999950094 | 7.999983394 | 99.6092985 | 33.42630313 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Drifting in Real World by Drift Mechaniks 4K UHD** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0034882291 | -0.0005836546 | | 0.0134319057 | 7.9999427600 | 7.9999435059 | 7.9999516957 | 7.9999812222 | 99.6088776765 | 33.4184697613 |
| **2** | 0.0050637765 | -0.0092909585 | | 0.0448585963 | 7.9999416277 | 7.9999461625 | 7.9999477842 | 7.9999803246 | 99.6094021267 | 33.4300272048 |
| **3** | 0.0094915256 | 0.0016562292 | | 0.0331563320 | 7.9999474073 | 7.9999517799 | 7.9999481026 | 7.9999829300 | 99.6107313368 | 33.4343830849 |
| **4** | -0.0023115846 | 0.0093838742 | | -0.0504831945 | 7.9999547533 | 7.9999501331 | 7.9999450376 | 7.9999846641 | 99.6085431134 | 33.4300020638 |
| **5** | 0.0213200508 | 0.0072472241 | | -0.0523409793 | 7.9999523045 | 7.9999532880 | 7.9999442314 | 7.9999827379 | 99.6078106916 | 33.4195445120 |
| **6** | -0.0144710995 | -0.0047217034 | | 0.0227638358 | 7.9999512522 | 7.9999542241 | 7.9999525128 | 7.9999820209 | 99.6112829138 | 33.4205500451 |
| **7** | -0.0109046584 | 0.0042676160 | | 0.0287696356 | 7.9999561571 | 7.9999561588 | 7.9999522482 | 7.9999842552 | 99.6101797598 | 33.4418633621 |
| **8** | -0.0031754090 | 0.0149637484 | | -0.0126271365 | 7.9999528480 | 7.9999476955 | 7.9999482992 | 7.9999843935 | 99.6065990307 | 33.4231290708 |
| **9** | 0.0174715658 | -0.0025669444 | | -0.0065906993 | 7.9999519237 | 7.9999444144 | 7.9999519766 | 7.9999842077 | 99.6099356192 | 33.4246435228 |
| **10** | -0.0153841717 | 0.0160002058 | | 0.0090961668 | 7.9999571567 | 7.9999345062 | 7.9999521600 | 7.9999837890 | 99.6112286603 | 33.4210280430 |
| **11** | 0.0342409618 | 0.0250504492 | | 0.0275547779 | 7.9999494983 | 7.9999486190 | 7.9999498917 | 7.9999833285 | 99.6101435909 | 33.4235613965 |
| **12** | -0.0175657477 | -0.0019821814 | | -0.0175346875 | 7.9999523548 | 7.9999414881 | 7.9999556344 | 7.9999843039 | 99.6106409144 | 33.4135627298 |
| **13** | -0.0231364621 | 0.0100476632 | | -0.0066704695 | 7.9999522501 | 7.9999537097 | 7.9999485209 | 7.9999819022 | 99.6090856481 | 33.4221864788 |
| **14** | 0.0031515988 | 0.0279143732 | | 0.0169739307 | 7.9999450375 | 7.9999481208 | 7.9999524153 | 7.9999813684 | 99.6071325231 | 33.4216280226 |
| **15** | -0.0123974621 | -0.0138288491 | | 0.0011107319 | 7.9999518371 | 7.9999540797 | 7.9999540593 | 7.9999850219 | 99.6092212818 | 33.4366738225 |
| **16** | 0.0449632221 | 0.0073245629 | | 0.0402575640 | 7.9999455783 | 7.9999475799 | 7.9999540019 | 7.9999813326 | 99.6081723814 | 33.4176866320 |
| **17** | -0.0143022014 | 0.0080810794 | | 0.0463535561 | 7.9999480436 | 7.9999553039 | 7.9999455735 | 7.9999833756 | 99.6095468027 | 33.4283411983 |
| **18** | -0.0002180129 | 0.0003173122 | | 0.0466145448 | 7.9999508627 | 7.9999524001 | 7.9999488511 | 7.9999837403 | 99.6092484086 | 33.4335825802 |
| **19** | 0.0210952528 | 0.0046885222 | | -0.0145590187 | 7.9999468715 | 7.9999485860 | 7.9999530260 | 7.9999827814 | 99.6082266348 | 33.4232234648 |
| **20** | 0.0117136068 | 0.0280977883 | | 0.0255146138 | 7.9999432363 | 7.9999478581 | 7.9999541352 | 7.9999852261 | 99.6107494213 | 33.4415820242 |
| **21** | -0.0096819982 | -0.0161009193 | | -0.0273994373 | 7.9999483550 | 7.9999554016 | 7.9999561167 | 7.9999848709 | 99.6097457321 | 33.4292252817 |
| **22** | 0.0195633167 | -0.0038766670 | | -0.0048193973 | 7.9999503990 | 7.9999486306 | 7.9999458325 | 7.9999808531 | 99.6081452546 | 33.4343229805 |
| **23** | 0.0023592365 | 0.0020568681 | | -0.0242836410 | 7.9999512624 | 7.9999550382 | 7.9999435809 | 7.9999847582 | 99.6118887442 | 33.4255666119 |
| **24** | 0.0018032084 | -0.0221417451 | | 0.0081474318 | 7.9999534106 | 7.9999526330 | 7.9999499999 | 7.9999847096 | 99.6067889178 | 33.4366769429 |
| **25** | -0.0134075125 | 0.0121451509 | | -0.0222457589 | 7.9999495634 | 7.9999538330 | 7.9999569007 | 7.9999830229 | 99.6079734520 | 33.4175917416 |
| **26** | -0.0100439666 | -0.0421270344 | | -0.0247947266 | 7.9999449154 | 7.9999463028 | 7.9999575545 | 7.9999836436 | 99.6096010561 | 33.4242144594 |
| **27** | 0.0239939091 | -0.0140757798 | | 0.0093906936 | 7.9999503315 | 7.9999553563 | 7.9999538741 | 7.9999848368 | 99.6112015336 | 33.4237534467 |
| **28** | -0.0085494747 | -0.0127593715 | | 0.0240231284 | 7.9999524440 | 7.9999542733 | 7.9999548527 | 7.9999850955 | 99.6099717882 | 33.4239801057 |
| **29** | 0.0135221873 | 0.0350065591 | | 0.0374205527 | 7.9999526306 | 7.9999478364 | 7.9999471089 | 7.9999835351 | 99.6075846354 | 33.4231596726 |
| **30** | -0.0026651342 | 0.0171073009 | | 0.0372506407 | 7.9999489514 | 7.9999486619 | 7.9999461943 | 7.9999827935 | 99.6089409722 | 33.4380552294 |
| **31** | -0.0496247078 | 0.0187863951 | | 0.0433784526 | 7.9999434601 | 7.9999459859 | 7.9999490449 | 7.9999835709 | 99.6084707755 | 33.4239534754 |
| **32** | -0.0016008621 | 0.0117433823 | | -0.0307771307 | 7.9999473096 | 7.9999451708 | 7.9999524463 | 7.9999831284 | 99.6092393663 | 33.4301340097 |
| **33** | 0.0202664299 | -0.0252569387 | | -0.0088491954 | 7.9999456070 | 7.9999518790 | 7.9999523028 | 7.9999819843 | 99.6104600694 | 33.4215455077 |
| **34** | -0.0276674018 | -0.0050887771 | | 0.0264398281 | 7.9999546093 | 7.9999461123 | 7.9999518183 | 7.9999832091 | 99.6109212240 | 33.4224075351 |
| **35** | -0.0083996122 | -0.0019289372 | | -0.0412240365 | 7.9999506914 | 7.9999490470 | 7.9999458659 | 7.9999839372 | 99.6110026042 | 33.4305714416 |
| **36** | -0.0035165027 | 0.0153492027 | | 0.0154818936 | 7.9999533374 | 7.9999477543 | 7.9999458000 | 7.9999848157 | 99.6081090856 | 33.4315435007 |
| **37** | -0.0194878869 | -0.0116016130 | | 0.0237736440 | 7.9999505200 | 7.9999512060 | 7.9999561369 | 7.9999833594 | 99.6098994502 | 33.4277693029 |
| **38** | 0.0168376914 | 0.0211005839 | | -0.0275351592 | 7.9999502972 | 7.9999435936 | 7.9999530706 | 7.9999837498 | 99.6090856481 | 33.4213592374 |
| **39** | -0.0121291031 | 0.0029147082 | | -0.0218114863 | 7.9999453705 | 7.9999502896 | 7.9999477783 | 7.9999809202 | 99.6096191406 | 33.4260108876 |
| **40** | -0.0061596990 | -0.0288256332 | | -0.0038251571 | 7.9999522177 | 7.9999474808 | 7.9999526583 | 7.9999821889 | 99.6057038484 | 33.4142086653 |
| **41** | -0.0014705368 | 0.0055388269 | | -0.0239236345 | 7.9999469094 | 7.9999450196 | 7.9999522136 | 7.9999825453 | 99.6086064091 | 33.4180862992 |
| **42** | 0.0274786143 | -0.0048240106 | | -0.0212649895 | 7.9999442392 | 7.9999466987 | 7.9999442345 | 7.9999818782 | 99.6114095052 | 33.4304489989 |
| **43** | 0.0183758262 | -0.0344288992 | | 0.0428838484 | 7.9999522211 | 7.9999515416 | 7.9999506882 | 7.9999851484 | 99.6085159867 | 33.4233626444 |
| **44** | 0.0048921547 | -0.0020714192 | | -0.0091061014 | 7.9999488287 | 7.9999414500 | 7.9999387420 | 7.9999801841 | 99.6136429398 | 33.4284758746 |
| **45** | -0.0041242278 | -0.0362390443 | | 0.0348858042 | 7.9999458793 | 7.9999457747 | 7.9999534399 | 7.9999845211 | 99.6102882668 | 33.4241608442 |
| **46** | 0.0239632947 | -0.0020840615 | | 0.0108697460 | 7.9999561069 | 7.9999538897 | 7.9999561444 | 7.9999853259 | 99.6064453125 | 33.4292271611 |
| **47** | 0.0095592731 | 0.0165284553 | | -0.0086995687 | 7.9999519866 | 7.9999446827 | 7.9999534481 | 7.9999837223 | 99.6088776765 | 33.4335416951 |
| **48** | 0.0198533650 | -0.0125632609 | | -0.0130237666 | 7.9999515032 | 7.9999532732 | 7.9999508585 | 7.9999823883 | 99.6134620949 | 33.4381406874 |
| **49** | 0.0121522450 | -0.0007132542 | | -0.0279645915 | 7.9999521302 | 7.9999471976 | 7.9999543755 | 7.9999841917 | 99.6094382957 | 33.4237605387 |
| **50** | 0.0150468958 | -0.0137248104 | | -0.0388231448 | 7.9999510930 | 7.9999451612 | 7.9999516839 | 7.9999817515 | 99.6077293113 | 33.4454950825 |
| **Total** | 0.1022955441 | -0.0000883863 | | 0.1292247469 | 399.9974903416 | 399.9974507894 | 399.9975349234 | 399.9991635659 | 4980.4695276331 | 1671.3464188823 |
| **Average** | 0.0020459080 | -0.0000017677 | | 0.0025844892 | 7.9999498068 | 7.9999490158 | 7.9999506985 | 7.9999832713 | 99.6093905527 | 33.4269283776 |

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| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **ARTE Carnival Ultra -HD Demo Video 4K UHD** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | 0.0219410538 | -0.0015189675 | | 0.0053706624 | 7.9999536719 | 7.9999442598 | 7.9999501227 | 7.9999820552 | 99.6101255064 | 33.4193887726 |
| **2** | 0.0158702767 | 0.0110848909 | | 0.0073574998 | 7.9999472103 | 7.9999465961 | 7.9999503014 | 7.9999825339 | 99.6068702980 | 33.4301253929 |
| **3** | 0.0127831249 | -0.0163709717 | | -0.0319941020 | 7.9999511254 | 7.9999520628 | 7.9999520270 | 7.9999824394 | 99.6085792824 | 33.4134579461 |
| **4** | -0.0347339282 | 0.0380023815 | | 0.0375420349 | 7.9999430749 | 7.9999494505 | 7.9999459922 | 7.9999808167 | 99.6097186053 | 33.4118825388 |
| **5** | 0.0321377775 | -0.0334875290 | | 0.0310551462 | 7.9999524458 | 7.9999497981 | 7.9999528018 | 7.9999849816 | 99.6105233652 | 33.4237932326 |
| **6** | 0.0227127490 | -0.0419112843 | | -0.0019953823 | 7.9999553834 | 7.9999593339 | 7.9999475460 | 7.9999848577 | 99.6114456742 | 33.4399920074 |
| **7** | 0.0089085592 | 0.0162921990 | | 0.0201744101 | 7.9999544050 | 7.9999497840 | 7.9999594537 | 7.9999867331 | 99.6090766059 | 33.4283132915 |
| **8** | -0.0075484602 | -0.0048423664 | | 0.0322292372 | 7.9999503268 | 7.9999562130 | 7.9999441002 | 7.9999850172 | 99.6094202112 | 33.4335290359 |
| **9** | 0.0175993192 | -0.0206887970 | | 0.0250229505 | 7.9999441194 | 7.9999471018 | 7.9999503758 | 7.9999850292 | 99.6083713108 | 33.4307516482 |
| **10** | 0.0061383608 | -0.0087931959 | | -0.0079455802 | 7.9999435152 | 7.9999446881 | 7.9999494354 | 7.9999808738 | 99.6096281829 | 33.4243974319 |
| **11** | 0.0083874009 | -0.0196628603 | | -0.0265326116 | 7.9999448130 | 7.9999416948 | 7.9999544561 | 7.9999809271 | 99.6104781539 | 33.4276952274 |
| **12** | 0.0187776625 | 0.0190620394 | | 0.0186408459 | 7.9999517069 | 7.9999470933 | 7.9999563521 | 7.9999800487 | 99.6077926071 | 33.4229923024 |
| **13** | 0.0232003772 | -0.0092780935 | | -0.0269462463 | 7.9999614534 | 7.9999501224 | 7.9999507849 | 7.9999843888 | 99.6069335938 | 33.4338171467 |
| **14** | 0.0122406287 | -0.0156887730 | | -0.0423868499 | 7.9999483870 | 7.9999452888 | 7.9999485682 | 7.9999825916 | 99.6111924913 | 33.4215460396 |
| **15** | -0.0209173135 | -0.0210112464 | | 0.0044912916 | 7.9999468524 | 7.9999493155 | 7.9999463721 | 7.9999831000 | 99.6082537616 | 33.4237145828 |
| **16** | -0.0053123262 | -0.0012430486 | | 0.0283402400 | 7.9999432929 | 7.9999489400 | 7.9999572370 | 7.9999830421 | 99.6074490017 | 33.4260083700 |
| **17** | 0.0075919452 | -0.0019436255 | | -0.0376418189 | 7.9999519726 | 7.9999482878 | 7.9999487577 | 7.9999821092 | 99.6118887442 | 33.4196418846 |
| **18** | -0.0235469903 | -0.0098893584 | | -0.0108050291 | 7.9999438388 | 7.9999445224 | 7.9999477710 | 7.9999817182 | 99.6098994502 | 33.4280876609 |
| **19** | -0.0208571121 | -0.0260827329 | | 0.0092168818 | 7.9999557666 | 7.9999446057 | 7.9999550360 | 7.9999845068 | 99.6109483507 | 33.4256228866 |
| **20** | -0.0262462039 | 0.0211711453 | | -0.0166126832 | 7.9999515839 | 7.9999524536 | 7.9999512611 | 7.9999847434 | 99.6088324653 | 33.4330665339 |
| **21** | 0.0448827363 | -0.0159378903 | | 0.0311313595 | 7.9999479411 | 7.9999554762 | 7.9999478115 | 7.9999808449 | 99.6048357928 | 33.4198641465 |
| **22** | -0.0005333809 | 0.0070515782 | | 0.0219351031 | 7.9999441755 | 7.9999515095 | 7.9999450898 | 7.9999841891 | 99.6071234809 | 33.4265432808 |
| **23** | 0.0203705879 | 0.0079154872 | | 0.0852180662 | 7.9999527167 | 7.9999514717 | 7.9999535055 | 7.9999853328 | 99.6058394821 | 33.4312475533 |
| **24** | -0.0070242180 | -0.0139160117 | | -0.0699759343 | 7.9999459791 | 7.9999514300 | 7.9999514912 | 7.9999822754 | 99.6116898148 | 33.4311101112 |
| **25** | -0.0010304218 | -0.0213957960 | | 0.0231961891 | 7.9999548654 | 7.9999423789 | 7.9999526477 | 7.9999854631 | 99.6100983796 | 33.4326787457 |
| **26** | 0.0088226111 | 0.0362441718 | | -0.0132976947 | 7.9999524054 | 7.9999592543 | 7.9999500558 | 7.9999849439 | 99.6085069444 | 33.4299317825 |
| **27** | -0.0197413165 | -0.0401929718 | | -0.0087967391 | 7.9999537669 | 7.9999522209 | 7.9999550713 | 7.9999838629 | 99.6116536458 | 33.4322365267 |
| **28** | -0.0220059869 | 0.0169954787 | | 0.0275892687 | 7.9999514809 | 7.9999449840 | 7.9999573246 | 7.9999832677 | 99.6072500723 | 33.4323669124 |
| **29** | -0.0152861327 | -0.0256505310 | | 0.0205584325 | 7.9999567042 | 7.9999526890 | 7.9999477497 | 7.9999832332 | 99.6069878472 | 33.4185879488 |
| **30** | 0.0348220424 | 0.0008571464 | | -0.0142334070 | 7.9999488981 | 7.9999495815 | 7.9999435872 | 7.9999827010 | 99.6088324653 | 33.4196884433 |
| **31** | -0.0033657088 | 0.0200567396 | | -0.0151729581 | 7.9999541721 | 7.9999572218 | 7.9999513662 | 7.9999847715 | 99.6109212240 | 33.4333258159 |
| **32** | -0.0109836218 | 0.0185667364 | | -0.0063529301 | 7.9999529916 | 7.9999429510 | 7.9999474608 | 7.9999806652 | 99.6146918403 | 33.4211794563 |
| **33** | -0.0222931599 | -0.0067138454 | | -0.0149113293 | 7.9999485839 | 7.9999415588 | 7.9999464992 | 7.9999822020 | 99.6062463831 | 33.4290438695 |
| **34** | 0.0020065891 | -0.0050131273 | | -0.0492392332 | 7.9999531023 | 7.9999533194 | 7.9999486505 | 7.9999847850 | 99.6097276476 | 33.4323154602 |
| **35** | 0.0034601621 | 0.0277408761 | | -0.0201403488 | 7.9999508385 | 7.9999420968 | 7.9999420660 | 7.9999819736 | 99.6135615596 | 33.4320407533 |
| **36** | 0.0007854411 | -0.0408462706 | | -0.0323204918 | 7.9999502445 | 7.9999500853 | 7.9999566403 | 7.9999846021 | 99.6093117043 | 33.4371187010 |
| **37** | 0.0126706026 | -0.0103790199 | | -0.0181203008 | 7.9999586044 | 7.9999490457 | 7.9999529897 | 7.9999851695 | 99.6100260417 | 33.4233658003 |
| **38** | -0.0056205314 | -0.0179529242 | | -0.0054857870 | 7.9999568935 | 7.9999460654 | 7.9999457266 | 7.9999825376 | 99.6088324653 | 33.4169362320 |
| **39** | -0.0027660616 | -0.0202950944 | | -0.0046464264 | 7.9999449863 | 7.9999428334 | 7.9999447260 | 7.9999817000 | 99.6100531684 | 33.4343490789 |
| **40** | 0.0277736267 | -0.0006814905 | | -0.0094905422 | 7.9999587839 | 7.9999561722 | 7.9999430355 | 7.9999837145 | 99.6079824942 | 33.4327984934 |
| **41** | -0.0081263038 | -0.0150290882 | | 0.0011923940 | 7.9999523895 | 7.9999493167 | 7.9999575782 | 7.9999842120 | 99.6067889178 | 33.4313506704 |
| **42** | 0.0019606501 | 0.0164043241 | | 0.0183886462 | 7.9999598479 | 7.9999421154 | 7.9999520865 | 7.9999823131 | 99.6096191406 | 33.4221974004 |
| **43** | -0.0075930313 | 0.0120095603 | | 0.0161378230 | 7.9999516927 | 7.9999466549 | 7.9999454195 | 7.9999818135 | 99.6107313368 | 33.4445968506 |
| **44** | 0.0116787086 | 0.0036390333 | | -0.0282933609 | 7.9999500263 | 7.9999491812 | 7.9999520375 | 7.9999835715 | 99.6102520978 | 33.4281366663 |
| **45** | -0.0409818141 | -0.0062486066 | | -0.0072636018 | 7.9999485784 | 7.9999535511 | 7.9999500078 | 7.9999819099 | 99.6107313368 | 33.4316524686 |
| **46** | 0.0225227392 | -0.0077204672 | | 0.0180722089 | 7.9999495032 | 7.9999596501 | 7.9999485863 | 7.9999833306 | 99.6092031973 | 33.4392487703 |
| **47** | 0.0080765336 | -0.0352522213 | | -0.0160295963 | 7.9999487656 | 7.9999521122 | 7.9999528284 | 7.9999841291 | 99.6085883247 | 33.4264964739 |
| **48** | 0.0082944751 | -0.0030985144 | | 0.0620106168 | 7.9999505744 | 7.9999456645 | 7.9999526038 | 7.9999828736 | 99.6094382957 | 33.4281108870 |
| **49** | 0.0035284782 | 0.0039164531 | | 0.0033642684 | 7.9999504241 | 7.9999496933 | 7.9999509109 | 7.9999818981 | 99.6118977865 | 33.4183906151 |
| **50** | 0.0014066666 | -0.0345442489 | | -0.0610298317 | 7.9999573791 | 7.9999443535 | 7.9999522642 | 7.9999851014 | 99.6105595341 | 33.4203317547 |
| **Total** | 0.1148378623 | -0.2762707290 | | -0.0494252399 | 399.9975522609 | 399.9974562511 | 399.9975165711 | 399.9991619012 | 4980.4694100839 | 1671.3750656022 |
| **Average** | 0.0022967532 | -0.0055253584 | | -0.0009885045 | 7.9999510452 | 7.9999491250 | 7.9999503314 | 7.9999832380 | 99.6093882017 | 33.4275013120 |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Encryption Algorithm** | | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | | | | | | | |
| **Video Stream** | | | **Max Payne 3 - Part 1 of Part 1 in 4K UHD** | | | | | | | |
| **Resolution** | | | **1440p** | | | | | | | |
| **Frame Number** | **Correlation Coefficient** | | | | **E(i)** | | | | **Differential Attacks** | |
| **CCh** | **CCv** | | **CCd** | **Red** | **Green** | **Blue** | **Combined** | **NPCR** | **UACI** |
| **1** | -0.0049161096 | 0.0029908512 | | -0.0527308766 | 7.9999541621 | 7.9999532707 | 7.9999644364 | 7.9999850400 | 99.6118525752 | 33.4253656613 |
| **2** | -0.0266005393 | 0.0366337302 | | -0.0176915487 | 7.9999483351 | 7.9999497735 | 7.9999423645 | 7.9999818887 | 99.6078016493 | 33.4386539324 |
| **3** | 0.0020990621 | 0.0386602863 | | -0.0322877342 | 7.9999499326 | 7.9999588909 | 7.9999574556 | 7.9999850633 | 99.6114095052 | 33.4367881448 |
| **4** | -0.0069737460 | -0.0126262740 | | 0.0113917739 | 7.9999542398 | 7.9999457778 | 7.9999507476 | 7.9999830339 | 99.6099084925 | 33.4230143584 |
| **5** | 0.0160769291 | 0.0297424403 | | 0.0007776508 | 7.9999529377 | 7.9999508465 | 7.9999526376 | 7.9999824767 | 99.6073585793 | 33.4257974906 |
| **6** | -0.0039149307 | -0.0241364476 | | -0.0193093105 | 7.9999494804 | 7.9999512251 | 7.9999458175 | 7.9999824311 | 99.6069968895 | 33.4247331297 |
| **7** | 0.0095023265 | 0.0085339299 | | -0.0116529333 | 7.9999456614 | 7.9999524032 | 7.9999507546 | 7.9999843751 | 99.6093750000 | 33.4098852663 |
| **8** | 0.0022034086 | -0.0034182667 | | 0.0259245557 | 7.9999528948 | 7.9999525552 | 7.9999530516 | 7.9999855259 | 99.6107584635 | 33.4396877270 |
| **9** | 0.0151146898 | 0.0200550980 | | -0.0049772533 | 7.9999481443 | 7.9999513065 | 7.9999411419 | 7.9999824421 | 99.6092936198 | 33.4361647973 |
| **10** | 0.0038045764 | -0.0135125716 | | -0.0471613934 | 7.9999520401 | 7.9999506122 | 7.9999534966 | 7.9999834950 | 99.6065447772 | 33.4247916738 |
| **11** | 0.0016211199 | -0.0179769260 | | 0.0247621826 | 7.9999569595 | 7.9999552280 | 7.9999583346 | 7.9999855089 | 99.6078287760 | 33.4200138223 |
| **12** | 0.0028153322 | -0.0177989628 | | -0.0003362088 | 7.9999561030 | 7.9999498204 | 7.9999492310 | 7.9999852124 | 99.6093207465 | 33.4322378387 |
| **13** | -0.0194034603 | 0.0103862321 | | -0.0055851667 | 7.9999486711 | 7.9999535524 | 7.9999493142 | 7.9999851166 | 99.6075575087 | 33.4188530107 |
| **14** | -0.0300703138 | -0.0156588720 | | -0.0162450566 | 7.9999534596 | 7.9999482385 | 7.9999630608 | 7.9999858174 | 99.6080457899 | 33.4300502891 |
| **15** | 0.0005206663 | 0.0137687148 | | -0.0430070456 | 7.9999477944 | 7.9999515462 | 7.9999519874 | 7.9999834702 | 99.6088415075 | 33.4397849577 |
| **16** | 0.0060085703 | -0.0045063720 | | -0.0153879999 | 7.9999516727 | 7.9999535576 | 7.9999497294 | 7.9999847399 | 99.6113823785 | 33.4166976940 |
| **17** | 0.0166613446 | 0.0246903198 | | -0.0277296201 | 7.9999518111 | 7.9999493107 | 7.9999517431 | 7.9999855433 | 99.6079553675 | 33.4274240310 |
| **18** | 0.0203417297 | -0.0059600488 | | -0.0279531685 | 7.9999572146 | 7.9999503847 | 7.9999483713 | 7.9999834802 | 99.6105143229 | 33.4255884906 |
| **19** | -0.0176443729 | -0.0017037740 | | -0.0003660866 | 7.9999500738 | 7.9999567847 | 7.9999426862 | 7.9999820907 | 99.6106680411 | 33.4297857591 |
| **20** | 0.0142624390 | -0.0233065780 | | -0.0475973778 | 7.9999528777 | 7.9999569266 | 7.9999534900 | 7.9999853931 | 99.6105233652 | 33.4255014014 |
| **21** | -0.0175136287 | 0.0333007565 | | 0.0286523787 | 7.9999512789 | 7.9999530796 | 7.9999482584 | 7.9999848799 | 99.6092484086 | 33.4201857313 |
| **22** | 0.0015835185 | -0.0056206338 | | 0.0071504983 | 7.9999558318 | 7.9999529252 | 7.9999549227 | 7.9999841430 | 99.6090404369 | 33.4334454927 |
| **23** | -0.0285637973 | -0.0191742644 | | -0.0055714874 | 7.9999468926 | 7.9999537956 | 7.9999448098 | 7.9999847574 | 99.6065809462 | 33.4301393641 |
| **24** | -0.0163775354 | 0.0074687979 | | 0.0146311745 | 7.9999463715 | 7.9999434331 | 7.9999528042 | 7.9999819870 | 99.6105233652 | 33.4355605980 |
| **25** | 0.0133480702 | 0.0226308315 | | -0.0233129844 | 7.9999477181 | 7.9999554213 | 7.9999434194 | 7.9999847386 | 99.6085973669 | 33.4253628955 |
| **26** | 0.0565694420 | -0.0123362572 | | -0.0171398007 | 7.9999455436 | 7.9999571157 | 7.9999514875 | 7.9999832966 | 99.6068250868 | 33.4330764981 |
| **27** | -0.0062544168 | 0.0170429529 | | 0.0106656676 | 7.9999507356 | 7.9999464679 | 7.9999546749 | 7.9999838969 | 99.6120695891 | 33.4374958158 |
| **28** | 0.0035479878 | 0.0375972735 | | -0.0649603389 | 7.9999546436 | 7.9999495410 | 7.9999481212 | 7.9999844626 | 99.6094563802 | 33.4276058333 |
| **29** | -0.0109362848 | -0.0097551335 | | 0.0046189975 | 7.9999524303 | 7.9999460192 | 7.9999539709 | 7.9999858538 | 99.6079463252 | 33.4235443049 |
| **30** | -0.0201422712 | -0.0121630959 | | 0.0510576535 | 7.9999419920 | 7.9999500032 | 7.9999545921 | 7.9999824780 | 99.6100441262 | 33.4340645141 |
| **31** | 0.0098916421 | -0.0049989958 | | 0.0298562888 | 7.9999484508 | 7.9999460593 | 7.9999536208 | 7.9999825380 | 99.6136791088 | 33.4128126135 |
| **32** | 0.0046772554 | 0.0234421214 | | -0.0112576160 | 7.9999513965 | 7.9999436873 | 7.9999467356 | 7.9999817994 | 99.6063096788 | 33.4251410236 |
| **33** | -0.0075953768 | 0.0455385084 | | 0.0001363658 | 7.9999528643 | 7.9999422416 | 7.9999569389 | 7.9999841460 | 99.6117621528 | 33.4268850422 |
| **34** | 0.0076649444 | 0.0152845506 | | 0.0419780135 | 7.9999454356 | 7.9999466607 | 7.9999562093 | 7.9999848038 | 99.6086425781 | 33.4222476469 |
| **35** | -0.0065305826 | 0.0033851102 | | -0.0031074602 | 7.9999492825 | 7.9999528047 | 7.9999537806 | 7.9999836676 | 99.6084436487 | 33.4301011030 |
| **36** | -0.0184860208 | 0.0135616346 | | -0.0249204729 | 7.9999450313 | 7.9999458531 | 7.9999525294 | 7.9999821623 | 99.6102340133 | 33.4357728248 |
| **37** | 0.0000790047 | -0.0059916281 | | -0.0243957924 | 7.9999503984 | 7.9999532231 | 7.9999488617 | 7.9999823508 | 99.6074761285 | 33.4310904665 |
| **38** | 0.0131323468 | 0.0120448478 | | -0.0201011815 | 7.9999432514 | 7.9999568614 | 7.9999485856 | 7.9999836530 | 99.6079372830 | 33.4176504630 |
| **39** | -0.0064189529 | -0.0303210036 | | 0.0271039225 | 7.9999530119 | 7.9999534216 | 7.9999498695 | 7.9999832037 | 99.6079011140 | 33.4280319890 |
| **40** | -0.0057385059 | -0.0103462206 | | -0.0211759480 | 7.9999527988 | 7.9999484881 | 7.9999496020 | 7.9999822786 | 99.6089500145 | 33.4335422979 |
| **41** | 0.0152553472 | -0.0115749657 | | 0.0143713568 | 7.9999553585 | 7.9999519855 | 7.9999472351 | 7.9999824543 | 99.6110930266 | 33.4370305479 |
| **42** | -0.0029560793 | 0.0192430660 | | -0.0741586265 | 7.9999537317 | 7.9999449287 | 7.9999463786 | 7.9999815633 | 99.6082085503 | 33.4161145933 |
| **43** | -0.0001181188 | -0.0005285780 | | -0.0613336220 | 7.9999514313 | 7.9999614330 | 7.9999412472 | 7.9999828779 | 99.6094563802 | 33.4274226835 |
| **44** | 0.0250633833 | 0.0105036142 | | 0.0032134791 | 7.9999502395 | 7.9999471164 | 7.9999435480 | 7.9999821262 | 99.6065266927 | 33.4349200169 |
| **45** | -0.0024234454 | 0.0169937205 | | -0.0532378832 | 7.9999561637 | 7.9999461873 | 7.9999438632 | 7.9999824510 | 99.6091218171 | 33.4186028774 |
| **46** | 0.0284028479 | 0.0149597974 | | -0.0305740103 | 7.9999458794 | 7.9999474249 | 7.9999557588 | 7.9999834898 | 99.6068070023 | 33.4096439980 |
| **47** | 0.0017742207 | 0.0211348538 | | -0.0111066282 | 7.9999435647 | 7.9999493814 | 7.9999473760 | 7.9999816923 | 99.6115270544 | 33.4420702345 |
| **48** | -0.0165239037 | 0.0257217285 | | 0.0009555381 | 7.9999582230 | 7.9999506409 | 7.9999426438 | 7.9999838727 | 99.6074037905 | 33.4338943781 |
| **49** | 0.0315840433 | -0.0134053006 | | 0.0252079644 | 7.9999413880 | 7.9999536541 | 7.9999541264 | 7.9999851631 | 99.6098994502 | 33.4200447432 |
| **50** | 0.0045215049 | -0.0293596632 | | 0.0369325163 | 7.9999532828 | 7.9999462459 | 7.9999473094 | 7.9999830638 | 99.6072681568 | 33.4337908355 |
| **Total** | 0.0520253604 | 0.2191349343 | | -0.4569846547 | 399.9975290878 | 399.9975381123 | 399.9975231328 | 399.9991819960 | 4980.4529170284 | 1671.3881109027 |
| **Average** | 0.0010405068 | 0.0043826706 | | -0.0091394386 | 7.9999505818 | 7.9999507622 | 7.9999504627 | 7.9999836399 | 99.6090583406 | 33.4277622181 |

# DECRYPTION METRICS

|  |  |  |  |
| --- | --- | --- | --- |
| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Flight Simulator X - Flying PMDG Jetstream 41 1440p** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0016440842 | | 27.8407594921 |
| **2** | 0.0013432584 | | 28.7184044072 |
| **3** | 0.0013345041 | | 28.7468007851 |
| **4** | 0.0013512725 | | 28.6925707581 |
| **5** | 0.0013557882 | | 28.6780815468 |
| **6** | 0.0013577043 | | 28.6719479704 |
| **7** | 0.0013472349 | | 28.7055668584 |
| **8** | 0.0013397225 | | 28.7298514601 |
| **9** | 0.0013451189 | | 28.7123933580 |
| **10** | 0.0013417092 | | 28.7234160308 |
| **11** | 0.0013338695 | | 28.7488665208 |
| **12** | 0.0013466942 | | 28.7073102142 |
| **13** | 0.0013724835 | | 28.6249286685 |
| **14** | 0.0013325304 | | 28.7532287349 |
| **15** | 0.0013311797 | | 28.7576329941 |
| **16** | 0.0013314672 | | 28.7566951185 |
| **17** | 0.0013385850 | | 28.7335404484 |
| **18** | 0.0013244977 | | 28.7794879041 |
| **19** | 0.0013101760 | | 28.8267036109 |
| **20** | 0.0013211817 | | 28.7903743868 |
| **21** | 0.0013336455 | | 28.7495959652 |
| **22** | 0.0013445551 | | 28.7142140619 |
| **23** | 0.0013223618 | | 28.7864971535 |
| **24** | 0.0013331501 | | 28.7512093556 |
| **25** | 0.0013856248 | | 28.5835436512 |
| **26** | 0.0013414939 | | 28.7241130800 |
| **27** | 0.0013256225 | | 28.7758013985 |
| **28** | 0.0013441206 | | 28.7156176041 |
| **29** | 0.0013269122 | | 28.7715782888 |
| **30** | 0.0013384457 | | 28.7339925130 |
| **31** | 0.0013330324 | | 28.7515931038 |
| **32** | 0.0013315304 | | 28.7564892554 |
| **33** | 0.0013392882 | | 28.7312595768 |
| **34** | 0.0013223981 | | 28.7863779376 |
| **35** | 0.0013116371 | | 28.8218629274 |
| **36** | 0.0013409764 | | 28.7257887851 |
| **37** | 0.0013858610 | | 28.5828031714 |
| **38** | 0.0013418024 | | 28.7231142416 |
| **39** | 0.0013394201 | | 28.7308319604 |
| **40** | 0.0013276185 | | 28.7692670415 |
| **41** | 0.0013257595 | | 28.7753524872 |
| **42** | 0.0013284797 | | 28.7664507478 |
| **43** | 0.0013110794 | | 28.8237100624 |
| **44** | 0.0013278754 | | 28.7684268629 |
| **45** | 0.0013400933 | | 28.7286496096 |
| **46** | 0.0013298585 | | 28.7619455633 |
| **47** | 0.0013345433 | | 28.7466734367 |
| **48** | 0.0013276948 | | 28.7690173684 |
| **49** | 0.0014030136 | | 28.5293813194 |
| **50** | 0.0013408559 | | 28.7261788522 |
| **Total** | 0.0672418121 | | 1435.7798986507 |
| **Average** | 0.0013448362 | | 28.7155979730 |

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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 July - 2 Racing Clips 1440p60** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0140271789 | | 18.5302966497 |
| **2** | 0.0139212778 | | 18.5632089945 |
| **3** | 0.0138423607 | | 18.5878983950 |
| **4** | 0.0139704771 | | 18.5478876248 |
| **5** | 0.0138754086 | | 18.5775421856 |
| **6** | 0.0138355784 | | 18.5900268031 |
| **7** | 0.0138772835 | | 18.5769553785 |
| **8** | 0.0139107244 | | 18.5665025202 |
| **9** | 0.0138117930 | | 18.5974993788 |
| **10** | 0.0138971351 | | 18.5707472136 |
| **11** | 0.0137998899 | | 18.6012437916 |
| **12** | 0.0137839552 | | 18.6062614734 |
| **13** | 0.0141341787 | | 18.4972942347 |
| **14** | 0.0138372574 | | 18.5894998093 |
| **15** | 0.0137487135 | | 18.6173793703 |
| **16** | 0.0137580202 | | 18.6144405801 |
| **17** | 0.0138233450 | | 18.5938685439 |
| **18** | 0.0137733863 | | 18.6095927062 |
| **19** | 0.0136995500 | | 18.6329369927 |
| **20** | 0.0136544769 | | 18.6472493321 |
| **21** | 0.0135596541 | | 18.6775138800 |
| **22** | 0.0137214855 | | 18.6259886966 |
| **23** | 0.0137886329 | | 18.6047879087 |
| **24** | 0.0137032953 | | 18.6317498321 |
| **25** | 0.0139492256 | | 18.5544990110 |
| **26** | 0.0136600131 | | 18.6454888400 |
| **27** | 0.0138910136 | | 18.5726606368 |
| **28** | 0.0138438318 | | 18.5874368566 |
| **29** | 0.0138071665 | | 18.5989543876 |
| **30** | 0.0137431485 | | 18.6191376179 |
| **31** | 0.0137642175 | | 18.6124847253 |
| **32** | 0.0138416135 | | 18.5881328031 |
| **33** | 0.0137176287 | | 18.6272095522 |
| **34** | 0.0137216151 | | 18.6259476637 |
| **35** | 0.0136782523 | | 18.6396938859 |
| **36** | 0.0136670686 | | 18.6432462633 |
| **37** | 0.0138813988 | | 18.5756676817 |
| **38** | 0.0136313860 | | 18.6545998438 |
| **39** | 0.0136734391 | | 18.6412223927 |
| **40** | 0.0136962471 | | 18.6339841654 |
| **41** | 0.0137300463 | | 18.6232799757 |
| **42** | 0.0136979921 | | 18.6334308911 |
| **43** | 0.0138110531 | | 18.5977320473 |
| **44** | 0.0137299560 | | 18.6233085517 |
| **45** | 0.0137459409 | | 18.6182552710 |
| **46** | 0.0137061593 | | 18.6308422352 |
| **47** | 0.0138258140 | | 18.5930929081 |
| **48** | 0.0137496666 | | 18.6170783175 |
| **49** | 0.0138765391 | | 18.5771883494 |
| **50** | 0.0137862657 | | 18.6055335420 |
| **Total** | 0.6895817575 | | 930.1984807112 |
| **Average** | 0.0137916352 | | 18.6039696142 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Forza Motorsport 6: Apex (Beta) - Heavy Rain Gameplay 1440p60** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0003454702 | | 34.6158935428 |
| **2** | 0.0002382933 | | 36.2288813150 |
| **3** | 0.0002323217 | | 36.3391020148 |
| **4** | 0.0002305103 | | 36.3730967093 |
| **5** | 0.0002276461 | | 36.4273986591 |
| **6** | 0.0002281457 | | 36.4178770660 |
| **7** | 0.0002274129 | | 36.4318491012 |
| **8** | 0.0002277366 | | 36.4256722858 |
| **9** | 0.0002271937 | | 36.4360380433 |
| **10** | 0.0002278493 | | 36.4235234209 |
| **11** | 0.0002269450 | | 36.4407937341 |
| **12** | 0.0002268306 | | 36.4429841242 |
| **13** | 0.0002073787 | | 36.8323594493 |
| **14** | 0.0002135248 | | 36.7055165862 |
| **15** | 0.0002145759 | | 36.6841911213 |
| **16** | 0.0002183358 | | 36.6087509702 |
| **17** | 0.0002195313 | | 36.5850353970 |
| **18** | 0.0002211754 | | 36.5526318276 |
| **19** | 0.0002191402 | | 36.5927802176 |
| **20** | 0.0002190715 | | 36.5941417742 |
| **21** | 0.0002180537 | | 36.6143648880 |
| **22** | 0.0002202431 | | 36.5709774839 |
| **23** | 0.0002187737 | | 36.6000483915 |
| **24** | 0.0002210458 | | 36.5551769696 |
| **25** | 0.0002088410 | | 36.8018417671 |
| **26** | 0.0002172978 | | 36.6294459121 |
| **27** | 0.0002154414 | | 36.6667082829 |
| **28** | 0.0002169902 | | 36.6355992648 |
| **29** | 0.0002165192 | | 36.6450368415 |
| **30** | 0.0002160283 | | 36.6548943835 |
| **31** | 0.0002150919 | | 36.6737595180 |
| **32** | 0.0002150251 | | 36.6751092096 |
| **33** | 0.0002146054 | | 36.6835928588 |
| **34** | 0.0002147453 | | 36.6807638933 |
| **35** | 0.0002143009 | | 36.6897590719 |
| **36** | 0.0002145731 | | 36.6842472989 |
| **37** | 0.0002082484 | | 36.8141832190 |
| **38** | 0.0002095478 | | 36.7871683590 |
| **39** | 0.0002105194 | | 36.7670789380 |
| **40** | 0.0002137206 | | 36.7015366707 |
| **41** | 0.0002127792 | | 36.7207075607 |
| **42** | 0.0002130461 | | 36.7152639135 |
| **43** | 0.0002113305 | | 36.7503787065 |
| **44** | 0.0002124357 | | 36.7277239640 |
| **45** | 0.0002108498 | | 36.7602686899 |
| **46** | 0.0002110686 | | 36.7557632820 |
| **47** | 0.0002103583 | | 36.7704033638 |
| **48** | 0.0002104647 | | 36.7682066061 |
| **49** | 0.0002032588 | | 36.9195061854 |
| **50** | 0.0002041387 | | 36.9007459751 |
| **Total** | 0.0109984314 | | 1829.4787788287 |
| **Average** | 0.0002199686 | | 36.5895755766 |

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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 Hard 2 - 1440p60** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0010732069 | | 29.6931654596 |
| **2** | 0.0007631705 | | 31.1737840245 |
| **3** | 0.0007491362 | | 31.2543922297 |
| **4** | 0.0007526464 | | 31.2340899528 |
| **5** | 0.0007369183 | | 31.3258065131 |
| **6** | 0.0007344596 | | 31.3403208979 |
| **7** | 0.0007301371 | | 31.3659557550 |
| **8** | 0.0007210766 | | 31.4201861615 |
| **9** | 0.0007299562 | | 31.3670321467 |
| **10** | 0.0007229713 | | 31.4087894115 |
| **11** | 0.0007209630 | | 31.4208699389 |
| **12** | 0.0007197704 | | 31.4280599269 |
| **13** | 0.0007181068 | | 31.4381094743 |
| **14** | 0.0007037954 | | 31.5255357436 |
| **15** | 0.0007136616 | | 31.4650768593 |
| **16** | 0.0007109403 | | 31.4816684186 |
| **17** | 0.0006929031 | | 31.5932751351 |
| **18** | 0.0006958261 | | 31.5749927157 |
| **19** | 0.0007018949 | | 31.5372792607 |
| **20** | 0.0006944439 | | 31.5836281821 |
| **21** | 0.0006996162 | | 31.5514012723 |
| **22** | 0.0007149412 | | 31.4572970521 |
| **23** | 0.0006925965 | | 31.5951971175 |
| **24** | 0.0006918663 | | 31.5997782043 |
| **25** | 0.0006874528 | | 31.6275713354 |
| **26** | 0.0006797099 | | 31.6767642974 |
| **27** | 0.0006881125 | | 31.6234057105 |
| **28** | 0.0006834562 | | 31.6528929070 |
| **29** | 0.0006857349 | | 31.6384374279 |
| **30** | 0.0006978282 | | 31.5625148375 |
| **31** | 0.0006836679 | | 31.6515480654 |
| **32** | 0.0006870409 | | 31.6301738368 |
| **33** | 0.0006780901 | | 31.6871260115 |
| **34** | 0.0006814334 | | 31.6657660081 |
| **35** | 0.0006767854 | | 31.6954902126 |
| **36** | 0.0006837455 | | 31.6510554642 |
| **37** | 0.0006591060 | | 31.8104474174 |
| **38** | 0.0006564359 | | 31.8280768054 |
| **39** | 0.0006529951 | | 31.8509008753 |
| **40** | 0.0006761783 | | 31.6993875504 |
| **41** | 0.0006785466 | | 31.6842030427 |
| **42** | 0.0006658990 | | 31.7659165735 |
| **43** | 0.0006734579 | | 31.7168956539 |
| **44** | 0.0006632105 | | 31.7834863571 |
| **45** | 0.0006521813 | | 31.8563168495 |
| **46** | 0.0006495039 | | 31.8741823064 |
| **47** | 0.0006483682 | | 31.8817832237 |
| **48** | 0.0006737421 | | 31.7150630992 |
| **49** | 0.0006584337 | | 31.8148796301 |
| **50** | 0.0006541682 | | 31.8431060149 |
| **Total** | 0.0350602890 | | 1577.7230833674 |
| **Average** | 0.0007012058 | | 31.5544616673 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Project Cars 2016 - 1440p60 Racing Merc HQ HD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0004456977 | | 33.5095956743 |
| **2** | 0.0002842059 | | 35.4636693402 |
| **3** | 0.0002710600 | | 35.6693451822 |
| **4** | 0.0002700566 | | 35.6854528276 |
| **5** | 0.0002695726 | | 35.6932428801 |
| **6** | 0.0002735332 | | 35.6298993438 |
| **7** | 0.0002638547 | | 35.7863517898 |
| **8** | 0.0002640538 | | 35.7830752929 |
| **9** | 0.0002586381 | | 35.8730755756 |
| **10** | 0.0002589811 | | 35.8673197516 |
| **11** | 0.0002726524 | | 35.6439065158 |
| **12** | 0.0002724505 | | 35.6471236223 |
| **13** | 0.0002641437 | | 35.7815980001 |
| **14** | 0.0002730048 | | 35.6382976760 |
| **15** | 0.0002683510 | | 35.7129684575 |
| **16** | 0.0002658784 | | 35.7531699368 |
| **17** | 0.0002683882 | | 35.7123661557 |
| **18** | 0.0002574577 | | 35.8929404596 |
| **19** | 0.0002540952 | | 35.9500355455 |
| **20** | 0.0002590442 | | 35.8662612158 |
| **21** | 0.0002615787 | | 35.8239767745 |
| **22** | 0.0002704829 | | 35.6786014306 |
| **23** | 0.0002696593 | | 35.6918456782 |
| **24** | 0.0002788879 | | 35.5457038000 |
| **25** | 0.0002595924 | | 35.8570799302 |
| **26** | 0.0002547549 | | 35.9387753689 |
| **27** | 0.0002631674 | | 35.7976795534 |
| **28** | 0.0002649855 | | 35.7677796269 |
| **29** | 0.0002629668 | | 35.8009900338 |
| **30** | 0.0002599525 | | 35.8510598850 |
| **31** | 0.0002589435 | | 35.8679495069 |
| **32** | 0.0002651012 | | 35.7658828270 |
| **33** | 0.0002715582 | | 35.6613707059 |
| **34** | 0.0002703664 | | 35.6804721870 |
| **35** | 0.0002741231 | | 35.6205437593 |
| **36** | 0.0002690530 | | 35.7016214252 |
| **37** | 0.0002594101 | | 35.8601319867 |
| **38** | 0.0002696496 | | 35.6920018911 |
| **39** | 0.0002621625 | | 35.8142937598 |
| **40** | 0.0002693032 | | 35.6975847183 |
| **41** | 0.0002604816 | | 35.8422299122 |
| **42** | 0.0002538215 | | 35.9547155133 |
| **43** | 0.0002633690 | | 35.7943539609 |
| **44** | 0.0002618399 | | 35.8196412266 |
| **45** | 0.0002588135 | | 35.8701299620 |
| **46** | 0.0002566636 | | 35.9063576769 |
| **47** | 0.0002558840 | | 35.9195694790 |
| **48** | 0.0002645545 | | 35.7748488620 |
| **49** | 0.0002665154 | | 35.7427762418 |
| **50** | 0.0002652449 | | 35.7635287985 |
| **Total** | 0.0134380067 | | 1786.0631917252 |
| **Average** | 0.0002687601 | | 35.7212638345 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Bears Panasonic G85 - 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0002849372 | | 35.4525090447 |
| **2** | 0.0002432870 | | 36.1388101341 |
| **3** | 0.0002171173 | | 36.6330560506 |
| **4** | 0.0002337061 | | 36.3132988633 |
| **5** | 0.0002175576 | | 36.6242577956 |
| **6** | 0.0002206528 | | 36.5629049984 |
| **7** | 0.0002086663 | | 36.8054767446 |
| **8** | 0.0002274651 | | 36.4308519259 |
| **9** | 0.0002564734 | | 35.9095771654 |
| **10** | 0.0002730793 | | 35.6371123812 |
| **11** | 0.0002578910 | | 35.8856387299 |
| **12** | 0.0002805887 | | 35.5192980150 |
| **13** | 0.0002767190 | | 35.5796097456 |
| **14** | 0.0002835816 | | 35.4732199117 |
| **15** | 0.0002555307 | | 35.9255685805 |
| **16** | 0.0002767484 | | 35.5791481634 |
| **17** | 0.0002997170 | | 35.2328863876 |
| **18** | 0.0003138078 | | 35.0333626387 |
| **19** | 0.0002843632 | | 35.4612662065 |
| **20** | 0.0002905780 | | 35.3673722017 |
| **21** | 0.0003106602 | | 35.0771440345 |
| **22** | 0.0003258297 | | 34.8700928619 |
| **23** | 0.0002788992 | | 35.5455274267 |
| **24** | 0.0002956532 | | 35.2921742976 |
| **25** | 0.0002782193 | | 35.5561276906 |
| **26** | 0.0002896861 | | 35.3807239312 |
| **27** | 0.0002871254 | | 35.4192843088 |
| **28** | 0.0003002538 | | 35.2251142672 |
| **29** | 0.0002892781 | | 35.3868441494 |
| **30** | 0.0003022235 | | 35.1967180777 |
| **31** | 0.0002861865 | | 35.4335091573 |
| **32** | 0.0003025642 | | 35.1918250376 |
| **33** | 0.0002789674 | | 35.5444655054 |
| **34** | 0.0002948758 | | 35.3036081326 |
| **35** | 0.0002809313 | | 35.5139989268 |
| **36** | 0.0002873178 | | 35.4163750025 |
| **37** | 0.0002617219 | | 35.8215994765 |
| **38** | 0.0002873205 | | 35.4163340151 |
| **39** | 0.0002712668 | | 35.6660335460 |
| **40** | 0.0002586372 | | 35.8730893989 |
| **41** | 0.0002192819 | | 36.5899711615 |
| **42** | 0.0002295965 | | 36.3903474107 |
| **43** | 0.0002159218 | | 36.6570341052 |
| **44** | 0.0002485754 | | 36.0454181240 |
| **45** | 0.0002948996 | | 35.3032578069 |
| **46** | 0.0002965937 | | 35.2783811129 |
| **47** | 0.0002949452 | | 35.3025860904 |
| **48** | 0.0002959877 | | 35.2872628265 |
| **49** | 0.0002934256 | | 35.3250197198 |
| **50** | 0.0003149138 | | 35.0180826085 |
| **Total** | 0.0136742269 | | 1782.8931758951 |
| **Average** | 0.0002734845 | | 35.6578635179 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Jackdaw Bird Panasonic G85 Clip High Quality - 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.006666609 | | 21.76095019 |
| **2** | 0.006481022 | | 21.88356488 |
| **3** | 0.006363379 | | 21.96312231 |
| **4** | 0.006314564 | | 21.99656626 |
| **5** | 0.006314446 | | 21.99664748 |
| **6** | 0.006133935 | | 22.12260857 |
| **7** | 0.006089163 | | 22.15442373 |
| **8** | 0.006039027 | | 22.19032996 |
| **9** | 0.006116493 | | 22.13497546 |
| **10** | 0.00605296 | | 22.18032202 |
| **11** | 0.006145903 | | 22.11414316 |
| **12** | 0.006089045 | | 22.15450847 |
| **13** | 0.006487557 | | 21.87918812 |
| **14** | 0.006330852 | | 21.98537813 |
| **15** | 0.006293296 | | 22.01121869 |
| **16** | 0.00611333 | | 22.1372214 |
| **17** | 0.006028237 | | 22.19809702 |
| **18** | 0.00545497 | | 22.63207633 |
| **19** | 0.005262391 | | 22.78816925 |
| **20** | 0.005249662 | | 22.79868687 |
| **21** | 0.00539415 | | 22.68076995 |
| **22** | 0.005531856 | | 22.57129157 |
| **23** | 0.005593686 | | 22.52301937 |
| **24** | 0.005470786 | | 22.6195025 |
| **25** | 0.005652491 | | 22.47760148 |
| **26** | 0.00569054 | | 22.44846547 |
| **27** | 0.006171232 | | 22.0962815 |
| **28** | 0.005946951 | | 22.2570565 |
| **29** | 0.006457822 | | 21.89913945 |
| **30** | 0.006401377 | | 21.93726576 |
| **31** | 0.005939707 | | 22.26235009 |
| **32** | 0.006078768 | | 22.16184432 |
| **33** | 0.005830929 | | 22.34262218 |
| **34** | 0.006700926 | | 21.73865164 |
| **35** | 0.007343586 | | 21.34091838 |
| **36** | 0.007568738 | | 21.20976518 |
| **37** | 0.00804152 | | 20.94661874 |
| **38** | 0.008128037 | | 20.9001431 |
| **39** | 0.007756332 | | 21.10343584 |
| **40** | 0.007596922 | | 21.19362311 |
| **41** | 0.008199558 | | 20.86209542 |
| **42** | 0.008345496 | | 20.78547844 |
| **43** | 0.008409357 | | 20.75237205 |
| **44** | 0.00890927 | | 20.50157884 |
| **45** | 0.010060422 | | 19.97383787 |
| **46** | 0.010828599 | | 19.65427712 |
| **47** | 0.011368226 | | 19.44307311 |
| **48** | 0.012379342 | | 19.07302424 |
| **49** | 0.013559538 | | 18.67755098 |
| **50** | 0.013434144 | | 18.7178999 |
| **Total** | 0.356817149 | | 1080.233752 |
| **Average** | 0.007136343 | | 21.60467505 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Drifting in Real World by Drift Mechaniks 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.1122962624 | | 9.4963469843 |
| **2** | 0.1154765629 | | 9.3750615130 |
| **3** | 0.1153576806 | | 9.3795348464 |
| **4** | 0.1153883750 | | 9.3783794282 |
| **5** | 0.1154415791 | | 9.3763774141 |
| **6** | 0.1150328122 | | 9.3917826302 |
| **7** | 0.1154880242 | | 9.3746304875 |
| **8** | 0.1149950102 | | 9.3932100398 |
| **9** | 0.1150528443 | | 9.3910264023 |
| **10** | 0.1150078739 | | 9.3927242504 |
| **11** | 0.1142754114 | | 9.4204720638 |
| **12** | 0.1140989263 | | 9.4271844257 |
| **13** | 0.1144833070 | | 9.4125783405 |
| **14** | 0.1134415126 | | 9.4522799121 |
| **15** | 0.1121415059 | | 9.5023361612 |
| **16** | 0.1124840144 | | 9.4890919272 |
| **17** | 0.1127025396 | | 9.4806629756 |
| **18** | 0.1114638501 | | 9.5286595997 |
| **19** | 0.1114213457 | | 9.5303160065 |
| **20** | 0.1114463916 | | 9.5293398869 |
| **21** | 0.1116621525 | | 9.5209400437 |
| **22** | 0.1113608473 | | 9.5326747332 |
| **23** | 0.1103147009 | | 9.5736660826 |
| **24** | 0.1104181532 | | 9.5695952090 |
| **25** | 0.1136217185 | | 9.4453864645 |
| **26** | 0.1103821743 | | 9.5710105558 |
| **27** | 0.1103362422 | | 9.5728181125 |
| **28** | 0.1103621337 | | 9.5717991180 |
| **29** | 0.1106060038 | | 9.5622129842 |
| **30** | 0.1102667077 | | 9.5755559225 |
| **31** | 0.1103943106 | | 9.5705330847 |
| **32** | 0.1102444995 | | 9.5764307004 |
| **33** | 0.1102713801 | | 9.5753718981 |
| **34** | 0.1104978926 | | 9.5664600476 |
| **35** | 0.1102297119 | | 9.5770132767 |
| **36** | 0.1103971809 | | 9.5704201650 |
| **37** | 0.1131731980 | | 9.4625641190 |
| **38** | 0.1097275121 | | 9.5968446777 |
| **39** | 0.1098048924 | | 9.5937830924 |
| **40** | 0.1097523855 | | 9.5958603144 |
| **41** | 0.1098670134 | | 9.5913268122 |
| **42** | 0.1098355307 | | 9.5925714736 |
| **43** | 0.1098138253 | | 9.5934297968 |
| **44** | 0.1097112533 | | 9.5974882377 |
| **45** | 0.1099293287 | | 9.5888642393 |
| **46** | 0.1097012306 | | 9.5978850075 |
| **47** | 0.1097404934 | | 9.5963309141 |
| **48** | 0.1098162350 | | 9.5933344999 |
| **49** | 0.1132750426 | | 9.4586576575 |
| **50** | 0.1098011019 | | 9.5939330167 |
| **Total** | 5.5928106816 | | 475.7067575525 |
| **Average** | 0.1118562136 | | 9.5141351510 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **ARTE Carnival Ultra -HD Demo Video 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.2529554468 | | 5.9695596473 |
| **2** | 0.2886264786 | | 5.3966382925 |
| **3** | 0.2844984013 | | 5.4592016971 |
| **4** | 0.3169184893 | | 4.9905242301 |
| **5** | 0.3068852438 | | 5.1302399359 |
| **6** | 0.3101921039 | | 5.0836926154 |
| **7** | 0.3235054183 | | 4.9011844112 |
| **8** | 0.2987843053 | | 5.2464221910 |
| **9** | 0.3224354367 | | 4.9155723389 |
| **10** | 0.3120163111 | | 5.0582270204 |
| **11** | 0.3083524447 | | 5.1095260403 |
| **12** | 0.3083133457 | | 5.1100767592 |
| **13** | 0.3197653929 | | 4.9516854017 |
| **14** | 0.3064105707 | | 5.1369625622 |
| **15** | 0.2958662263 | | 5.2890460760 |
| **16** | 0.2959221951 | | 5.2882246016 |
| **17** | 0.3307253318 | | 4.8053253911 |
| **18** | 0.3131659017 | | 5.0422553107 |
| **19** | 0.3252728779 | | 4.8775214785 |
| **20** | 0.3156959179 | | 5.0073103367 |
| **21** | 0.2918586392 | | 5.3482744675 |
| **22** | 0.3307808278 | | 4.8045967029 |
| **23** | 0.3165977831 | | 4.9949213053 |
| **24** | 0.3283199628 | | 4.8370271013 |
| **25** | 0.3196261476 | | 4.9535769968 |
| **26** | 0.2944501448 | | 5.3098822783 |
| **27** | 0.3276178845 | | 4.8463239835 |
| **28** | 0.3160047532 | | 5.0030638483 |
| **29** | 0.3281134954 | | 4.8397590655 |
| **30** | 0.3186940405 | | 4.9662605770 |
| **31** | 0.3143007560 | | 5.0265457434 |
| **32** | 0.3240310108 | | 4.8941342442 |
| **33** | 0.3127841797 | | 5.0475522116 |
| **34** | 0.3237460385 | | 4.8979553708 |
| **35** | 0.3166351216 | | 4.9944091423 |
| **36** | 0.3174279909 | | 4.9835477963 |
| **37** | 0.3236066778 | | 4.8998252503 |
| **38** | 0.3042021507 | | 5.1683771982 |
| **39** | 0.3137194559 | | 5.0345854687 |
| **40** | 0.2806861503 | | 5.5177901586 |
| **41** | 0.2995071557 | | 5.2359279720 |
| **42** | 0.3054809884 | | 5.1501581284 |
| **43** | 0.2833993926 | | 5.4760108489 |
| **44** | 0.2977872595 | | 5.2609388701 |
| **45** | 0.2866077606 | | 5.4271205418 |
| **46** | 0.2889619488 | | 5.3915934240 |
| **47** | 0.3045134025 | | 5.1639358811 |
| **48** | 0.2810995466 | | 5.5113985488 |
| **49** | 0.2949954001 | | 5.3018475597 |
| **50** | 0.2857896751 | | 5.4395346526 |
| **Total** | 15.3676535810 | | 256.4960716760 |
| **Average** | 0.3073530716 | | 5.1299214335 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Max Payne 3 - Part 1 of Part 1 in 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Mean Square Error** | | **Peak Signal-to-Noise Ratio** |
| **1** | 0.0613694503 | | 12.1204776708 |
| **2** | 0.0624180924 | | 12.0468950798 |
| **3** | 0.0624992294 | | 12.0412533718 |
| **4** | 0.0623706149 | | 12.0501997417 |
| **5** | 0.0623502941 | | 12.0516149397 |
| **6** | 0.0624877210 | | 12.0420531414 |
| **7** | 0.0626520877 | | 12.0306445260 |
| **8** | 0.0624171732 | | 12.0469590380 |
| **9** | 0.0624431223 | | 12.0451538925 |
| **10** | 0.0625510180 | | 12.0376561804 |
| **11** | 0.0625923489 | | 12.0347875051 |
| **12** | 0.0624352835 | | 12.0456991187 |
| **13** | 0.0628599713 | | 12.0162582188 |
| **14** | 0.0624480880 | | 12.0448085427 |
| **15** | 0.0625822267 | | 12.0354898859 |
| **16** | 0.0625162794 | | 12.0400687635 |
| **17** | 0.0625893339 | | 12.0349967017 |
| **18** | 0.0624168667 | | 12.0469803663 |
| **19** | 0.0625007750 | | 12.0411459754 |
| **20** | 0.0624721881 | | 12.0431328223 |
| **21** | 0.0623830102 | | 12.0493367318 |
| **22** | 0.0623553258 | | 12.0512644702 |
| **23** | 0.0625831535 | | 12.0354255711 |
| **24** | 0.0623990739 | | 12.0482185590 |
| **25** | 0.0628756026 | | 12.0151783947 |
| **26** | 0.0626694079 | | 12.0294440864 |
| **27** | 0.0625296247 | | 12.0391417813 |
| **28** | 0.0623953250 | | 12.0484794894 |
| **29** | 0.0624723286 | | 12.0431230560 |
| **30** | 0.0624368326 | | 12.0455913640 |
| **31** | 0.0625809423 | | 12.0355790182 |
| **32** | 0.0625562492 | | 12.0372929864 |
| **33** | 0.0624567553 | | 12.0442058158 |
| **34** | 0.0622890877 | | 12.0558802971 |
| **35** | 0.0624291798 | | 12.0461237057 |
| **36** | 0.0625242305 | | 12.0395164466 |
| **37** | 0.0629314523 | | 12.0113224601 |
| **38** | 0.0625374197 | | 12.0386004207 |
| **39** | 0.0625399552 | | 12.0384243407 |
| **40** | 0.0623242628 | | 12.0534284952 |
| **41** | 0.0623548289 | | 12.0512990826 |
| **42** | 0.0625130391 | | 12.0402938744 |
| **43** | 0.0625674346 | | 12.0365165199 |
| **44** | 0.0625145649 | | 12.0401878687 |
| **45** | 0.0625171109 | | 12.0400110056 |
| **46** | 0.0624821387 | | 12.0424411377 |
| **47** | 0.0618322635 | | 12.0878485487 |
| **48** | 0.0619277487 | | 12.0811470783 |
| **49** | 0.0628961656 | | 12.0137582975 |
| **50** | 0.0619189949 | | 12.0817610165 |
| **Total** | 3.1227656742 | | 602.2171174023 |
| **Average** | 0.0624553135 | | 12.0443423480 |

# 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** | | **Flight Simulator X - Flying PMDG Jetstream 41 1440p** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.0237729549 | | 25.5448207855 |
| **2** | 25.9503524303 | | 25.9069855213 |
| **3** | 25.8102021217 | | 25.4451091290 |
| **4** | 25.7946531773 | | 25.4513938427 |
| **5** | 25.7837905884 | | 25.4610691071 |
| **6** | 25.7841393948 | | 25.4176576138 |
| **7** | 25.8653056622 | | 25.4302778244 |
| **8** | 26.2959568501 | | 25.4118030071 |
| **9** | 25.9980773926 | | 25.7414209843 |
| **10** | 26.2760899067 | | 25.4353060722 |
| **11** | 26.3944413662 | | 25.6606538296 |
| **12** | 26.2165057659 | | 25.4212138653 |
| **13** | 26.5693366528 | | 25.4533584118 |
| **14** | 26.1635096073 | | 25.4438264370 |
| **15** | 26.1430504322 | | 25.4328711033 |
| **16** | 26.4597737789 | | 25.4237976074 |
| **17** | 26.5880146027 | | 25.4398353100 |
| **18** | 26.5806097984 | | 25.4434871674 |
| **19** | 26.5540726185 | | 26.1040878296 |
| **20** | 26.1693067551 | | 25.7263443470 |
| **21** | 26.4871697426 | | 25.4080810547 |
| **22** | 26.5316262245 | | 25.4240436554 |
| **23** | 26.4857833385 | | 25.7099957466 |
| **24** | 26.1473665237 | | 25.7512145042 |
| **25** | 26.0969293118 | | 25.7057247162 |
| **26** | 26.1342902184 | | 25.6923847198 |
| **27** | 26.1291103363 | | 25.7085235119 |
| **28** | 26.1566815376 | | 25.6969435215 |
| **29** | 26.1238348484 | | 25.6959302425 |
| **30** | 26.1576545238 | | 25.7318122387 |
| **31** | 26.2442064285 | | 25.7480041981 |
| **32** | 26.1270477772 | | 25.5031983852 |
| **33** | 26.1248781681 | | 25.4984793663 |
| **34** | 26.1099700928 | | 25.7778129578 |
| **35** | 26.1180615425 | | 25.4399523735 |
| **36** | 26.1471085548 | | 25.4462728500 |
| **37** | 26.3316724300 | | 25.7774674892 |
| **38** | 26.1253590584 | | 25.4716749191 |
| **39** | 26.1207232475 | | 25.7925481796 |
| **40** | 26.1775305271 | | 25.7350227833 |
| **41** | 26.3302326202 | | 25.7226684093 |
| **42** | 26.1471328735 | | 25.6939487457 |
| **43** | 26.1309604645 | | 25.7780508995 |
| **44** | 26.1280705929 | | 25.6969575882 |
| **45** | 26.1182663441 | | 25.6627240181 |
| **46** | 26.4164981842 | | 25.6731514931 |
| **47** | 26.4424884319 | | 25.7572064400 |
| **48** | 26.1473011971 | | 25.6922357082 |
| **49** | 26.1214840412 | | 25.4473440647 |
| **50** | 27.1948618889 | | 25.4486119747 |
| **Total** | 1310.6752629280 | | 1280.0833065510 |
| **Average** | 26.2135052586 | | 25.6016661310 |

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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 July - 2 Racing Clips 1440p60** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.0263357162 | | 25.9869332314 |
| **2** | 26.0887234211 | | 25.6347966194 |
| **3** | 25.9303610325 | | 25.6236424446 |
| **4** | 26.0020744801 | | 25.8246207237 |
| **5** | 25.9563250542 | | 25.8177309036 |
| **6** | 25.9805462360 | | 25.8029770851 |
| **7** | 26.0663845539 | | 25.8089921474 |
| **8** | 26.4502308369 | | 25.7861380577 |
| **9** | 26.5058190823 | | 25.8364706039 |
| **10** | 26.4930903912 | | 25.7806048393 |
| **11** | 26.4829266071 | | 25.6088762283 |
| **12** | 26.3693635464 | | 25.5810508728 |
| **13** | 27.1495184898 | | 25.5987513065 |
| **14** | 26.3646268845 | | 25.6384365559 |
| **15** | 26.3613221645 | | 25.8559563160 |
| **16** | 26.6244547367 | | 25.7171530724 |
| **17** | 26.3109920025 | | 25.5569348335 |
| **18** | 29.2069528103 | | 25.5594239235 |
| **19** | 26.3956606388 | | 25.6597692966 |
| **20** | 26.3363242149 | | 25.7678306103 |
| **21** | 26.3004221916 | | 25.5972886086 |
| **22** | 26.4753923416 | | 25.5199244022 |
| **23** | 26.6527607441 | | 25.8856852055 |
| **24** | 26.6211228371 | | 25.5631463528 |
| **25** | 26.6928548813 | | 25.5724306107 |
| **26** | 26.6972551346 | | 25.5872011185 |
| **27** | 26.2459516525 | | 25.8121128082 |
| **28** | 26.5140829086 | | 25.8118233681 |
| **29** | 26.6282827854 | | 25.8215374947 |
| **30** | 26.3852019310 | | 25.7963123322 |
| **31** | 26.3350529671 | | 25.8103225231 |
| **32** | 26.4105119705 | | 25.8371295929 |
| **33** | 26.3773472309 | | 25.7715027332 |
| **34** | 26.3926405907 | | 25.8118233681 |
| **35** | 26.4188127518 | | 25.8426408768 |
| **36** | 26.5471293926 | | 25.5633318424 |
| **37** | 26.3942131996 | | 25.5929098129 |
| **38** | 26.3738861084 | | 25.5743317604 |
| **39** | 26.3237340450 | | 25.5911540985 |
| **40** | 26.3864254951 | | 25.5683147907 |
| **41** | 26.3024659157 | | 25.5729746819 |
| **42** | 26.3764288425 | | 25.5599582195 |
| **43** | 26.5314502716 | | 25.5745847225 |
| **44** | 26.3508813381 | | 25.5618646145 |
| **45** | 27.3316836357 | | 25.5963401794 |
| **46** | 26.7464325428 | | 25.5902464390 |
| **47** | 26.3457424641 | | 25.5827407837 |
| **48** | 26.3201687336 | | 25.5842349529 |
| **49** | 26.3189651966 | | 25.5785510540 |
| **50** | 26.5934853554 | | 25.8615584373 |
| **Total** | 1323.4928183556 | | 1284.4410674572 |
| **Average** | 26.4698563671 | | 25.6888213491 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Forza Motorsport 6: Apex (Beta) - Heavy Rain Gameplay 1440p60** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.3984279633 | | 25.7582528591 |
| **2** | 26.1333000660 | | 25.9934384823 |
| **3** | 26.0467827320 | | 25.8998777866 |
| **4** | 26.1107430458 | | 25.9187812805 |
| **5** | 26.0144824982 | | 25.9230914116 |
| **6** | 26.0360088348 | | 25.9469585419 |
| **7** | 26.0961780548 | | 25.6883919239 |
| **8** | 26.5043156147 | | 25.9130682945 |
| **9** | 26.3937859535 | | 25.6753675938 |
| **10** | 26.5172441006 | | 25.6805303097 |
| **11** | 26.5181672573 | | 25.6893196106 |
| **12** | 26.4039056301 | | 25.6584877968 |
| **13** | 26.4799463749 | | 25.6474707127 |
| **14** | 26.3710026741 | | 25.6754300594 |
| **15** | 26.3785307407 | | 25.6474614143 |
| **16** | 26.5833775997 | | 25.6428465843 |
| **17** | 26.4217388630 | | 25.6397888660 |
| **18** | 26.3550956249 | | 25.6567518711 |
| **19** | 26.6056058407 | | 25.6547181606 |
| **20** | 26.3331320286 | | 25.6499240398 |
| **21** | 26.3895874023 | | 25.6525597572 |
| **22** | 26.6857612133 | | 25.6552379131 |
| **23** | 26.3523230553 | | 25.6314184666 |
| **24** | 26.3695383072 | | 25.6547648907 |
| **25** | 26.3557679653 | | 25.6399219036 |
| **26** | 26.7071223259 | | 25.8532550335 |
| **27** | 26.4368708134 | | 25.8932452202 |
| **28** | 26.4206542969 | | 25.8475024700 |
| **29** | 26.4215776920 | | 25.8936128616 |
| **30** | 26.6756243706 | | 25.9141738415 |
| **31** | 26.7072758675 | | 25.8105707169 |
| **32** | 26.5380222797 | | 25.8442847729 |
| **33** | 26.4611670971 | | 25.8387196064 |
| **34** | 26.4311029911 | | 25.8772456646 |
| **35** | 26.6329369545 | | 25.8947920799 |
| **36** | 26.3674561977 | | 25.8382663727 |
| **37** | 26.4637403488 | | 25.8561565876 |
| **38** | 26.3713223934 | | 25.8763420582 |
| **39** | 26.3310871124 | | 25.8458266258 |
| **40** | 26.3644886017 | | 25.8656637669 |
| **41** | 26.7408924103 | | 25.7396595478 |
| **42** | 26.5798382759 | | 25.6485049725 |
| **43** | 26.3772511482 | | 25.6765358448 |
| **44** | 26.6243166924 | | 25.9488186836 |
| **45** | 26.3596172333 | | 25.9019978046 |
| **46** | 26.4252166748 | | 25.9524540901 |
| **47** | 26.5956530571 | | 25.9112062454 |
| **48** | 26.3914098740 | | 25.8779187202 |
| **49** | 26.3278491497 | | 25.8718113899 |
| **50** | 26.6301343441 | | 25.8696105480 |
| **Total** | 1321.2373776436 | | 1289.5420360565 |
| **Average** | 26.4247475529 | | 25.7908407211 |

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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 Hard 2 - 1440p60** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.1321055889 | | 26.0578396320 |
| **2** | 26.2774655819 | | 26.0505647659 |
| **3** | 26.0259032249 | | 26.1309218407 |
| **4** | 26.0346608162 | | 26.1371092796 |
| **5** | 26.0500514507 | | 26.0866134167 |
| **6** | 26.0098159313 | | 25.7879827023 |
| **7** | 26.1714122295 | | 26.0264711380 |
| **8** | 26.5704946518 | | 25.7901425362 |
| **9** | 26.3145959377 | | 25.7692015171 |
| **10** | 26.5679814816 | | 25.7316608429 |
| **11** | 26.5890963078 | | 26.0205717087 |
| **12** | 26.6999080181 | | 26.4458370209 |
| **13** | 26.5605611801 | | 25.7601206303 |
| **14** | 26.4583139420 | | 25.7199742794 |
| **15** | 26.4527754784 | | 25.7972674370 |
| **16** | 26.5311710835 | | 25.7867345810 |
| **17** | 26.8399620056 | | 26.0977292061 |
| **18** | 26.4185316563 | | 26.1116354465 |
| **19** | 26.4331240654 | | 25.7458286285 |
| **20** | 26.4675085545 | | 25.8070449829 |
| **21** | 26.4509603977 | | 25.7902185917 |
| **22** | 26.4515364170 | | 26.1750321388 |
| **23** | 26.4439058304 | | 25.8281877041 |
| **24** | 26.4762244225 | | 25.7319576740 |
| **25** | 26.4738204479 | | 25.7393825054 |
| **26** | 26.4473471642 | | 25.7748429775 |
| **27** | 26.4205627441 | | 25.7068347931 |
| **28** | 26.5015461445 | | 25.7756695747 |
| **29** | 26.4340672493 | | 25.8937408924 |
| **30** | 26.4445095062 | | 25.8230137825 |
| **31** | 26.4436328411 | | 25.7227571011 |
| **32** | 26.4273154736 | | 25.7019054890 |
| **33** | 26.4678211212 | | 25.7096464634 |
| **34** | 26.4325783253 | | 25.7671830654 |
| **35** | 26.4566707611 | | 25.7815434933 |
| **36** | 26.4733891487 | | 25.7408325672 |
| **37** | 26.4586255550 | | 25.7110385895 |
| **38** | 26.4507322311 | | 25.7822823524 |
| **39** | 26.4055550098 | | 25.7657706738 |
| **40** | 26.5057001114 | | 25.7760858536 |
| **41** | 26.4502072334 | | 25.7668704987 |
| **42** | 26.4714379311 | | 25.7249970436 |
| **43** | 26.4466097355 | | 25.6904470921 |
| **44** | 26.4429135323 | | 25.7588140965 |
| **45** | 26.4378199577 | | 25.7717318535 |
| **46** | 26.4593148232 | | 26.0626966953 |
| **47** | 26.4172787666 | | 25.8477950096 |
| **48** | 26.4750537872 | | 26.0623121262 |
| **49** | 26.6110343933 | | 25.9546630383 |
| **50** | 26.4346303940 | | 25.7456004620 |
| **Total** | 1321.3182406425 | | 1292.9451057911 |
| **Average** | 26.4263648129 | | 25.8589021158 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Project Cars 2016 - 1440p60 Racing Merc HQ HD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 27.0898764133 | | 25.8204524517 |
| **2** | 26.0519819260 | | 26.1683585644 |
| **3** | 26.3738160133 | | 26.0197868347 |
| **4** | 26.1608772278 | | 25.7715561390 |
| **5** | 26.0451033115 | | 25.7222101688 |
| **6** | 26.3511953354 | | 25.7580533028 |
| **7** | 26.2655827999 | | 25.7359299660 |
| **8** | 26.5833895206 | | 25.7415819168 |
| **9** | 26.3427348137 | | 25.7131760120 |
| **10** | 26.9493284225 | | 25.9600002766 |
| **11** | 26.5831859112 | | 25.7311933041 |
| **12** | 26.5012245178 | | 25.7108540535 |
| **13** | 26.6626400948 | | 25.7185184956 |
| **14** | 26.4760663509 | | 25.9504258633 |
| **15** | 26.4404730797 | | 25.9438803196 |
| **16** | 26.4667875767 | | 26.0142021179 |
| **17** | 26.6569783688 | | 25.8088288307 |
| **18** | 26.4816896915 | | 25.7322282791 |
| **19** | 26.4245014191 | | 25.7089674473 |
| **20** | 26.4323811531 | | 25.9260475636 |
| **21** | 26.4203016758 | | 25.8512327671 |
| **22** | 26.4640159607 | | 25.6773805618 |
| **23** | 26.4252016544 | | 25.7177834511 |
| **24** | 26.4724760056 | | 25.8232491016 |
| **25** | 26.4691302776 | | 26.0189254284 |
| **26** | 26.4835054874 | | 25.9614155293 |
| **27** | 26.4519777298 | | 26.1592943668 |
| **28** | 26.7315406799 | | 25.8937857151 |
| **29** | 26.7291288376 | | 25.7660167217 |
| **30** | 26.4773736000 | | 25.8943536282 |
| **31** | 26.5866496563 | | 25.9186208248 |
| **32** | 26.4925029278 | | 25.7734303474 |
| **33** | 26.4699831009 | | 25.7995517254 |
| **34** | 26.4898464680 | | 25.8198397160 |
| **35** | 26.4515147209 | | 25.8100943565 |
| **36** | 26.4422247410 | | 26.2545976639 |
| **37** | 26.7571611404 | | 25.7925879955 |
| **38** | 26.4496319294 | | 25.7984724045 |
| **39** | 26.4698824883 | | 25.8110263348 |
| **40** | 26.7331581116 | | 25.6418218613 |
| **41** | 26.8645291328 | | 25.9603958130 |
| **42** | 26.7731316090 | | 25.6548409462 |
| **43** | 26.4383172989 | | 25.6798148155 |
| **44** | 26.4615604877 | | 25.7155969143 |
| **45** | 26.4530978203 | | 25.6788313389 |
| **46** | 26.4569404125 | | 25.6751074791 |
| **47** | 26.4343938828 | | 25.8071367741 |
| **48** | 26.4722452164 | | 25.6784360409 |
| **49** | 26.4493768215 | | 25.6651070118 |
| **50** | 26.4658381939 | | 25.6961786747 |
| **Total** | 1325.0764520168 | | 1291.0511782169 |
| **Average** | 26.5015290403 | | 25.8210235643 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Bears Panasonic G85 - 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.5540046692 | | 25.7254941463 |
| **2** | 26.5140476227 | | 25.8399267197 |
| **3** | 26.1928944588 | | 25.6746115685 |
| **4** | 27.0294282436 | | 25.6754791737 |
| **5** | 26.4528446198 | | 25.6732912064 |
| **6** | 26.1885647774 | | 25.7022888660 |
| **7** | 26.3462996483 | | 25.6767499447 |
| **8** | 26.7107596397 | | 25.6969254017 |
| **9** | 26.4910559654 | | 25.7063403130 |
| **10** | 26.8143830299 | | 25.6958348751 |
| **11** | 26.7985639572 | | 25.7090167999 |
| **12** | 27.1112589836 | | 25.9435403347 |
| **13** | 27.3084230423 | | 25.9338998795 |
| **14** | 27.8536927700 | | 25.9654793739 |
| **15** | 26.9448060989 | | 25.9351077080 |
| **16** | 26.8227221966 | | 25.7149026394 |
| **17** | 26.7839436531 | | 25.7449712753 |
| **18** | 26.8125331402 | | 25.7181730270 |
| **19** | 26.7313394547 | | 25.6788585186 |
| **20** | 26.7218210697 | | 25.6773278713 |
| **21** | 26.7909533978 | | 25.6942875385 |
| **22** | 26.8295433521 | | 25.7061283588 |
| **23** | 26.6855623722 | | 25.6666588783 |
| **24** | 26.7036268711 | | 25.6958081722 |
| **25** | 26.8146636486 | | 25.7602119446 |
| **26** | 26.8072590828 | | 25.6686625481 |
| **27** | 26.7320268154 | | 25.7042117119 |
| **28** | 26.7862126827 | | 25.6901266575 |
| **29** | 26.8179471493 | | 25.7029480934 |
| **30** | 26.8987352848 | | 25.6944065094 |
| **31** | 26.7365736961 | | 25.6794021130 |
| **32** | 26.7508070469 | | 25.6779010296 |
| **33** | 26.8114240170 | | 25.6797821522 |
| **34** | 26.7989654541 | | 25.6754295826 |
| **35** | 26.8431851864 | | 25.7659235001 |
| **36** | 27.0341541767 | | 25.9610419273 |
| **37** | 27.0720257759 | | 25.6684155464 |
| **38** | 27.1048393250 | | 25.6799368858 |
| **39** | 26.9584753513 | | 25.6754508018 |
| **40** | 26.6343877316 | | 25.6672120094 |
| **41** | 26.8859431744 | | 25.6738152504 |
| **42** | 26.8981237411 | | 25.6786150932 |
| **43** | 27.0535347462 | | 25.6735970974 |
| **44** | 26.7251949310 | | 25.6743798256 |
| **45** | 27.1458570957 | | 25.6836755276 |
| **46** | 26.8287420273 | | 25.6930768490 |
| **47** | 26.7017292976 | | 25.6899154186 |
| **48** | 26.7026627064 | | 25.7031319141 |
| **49** | 26.8228521347 | | 25.6513109207 |
| **50** | 26.8190021515 | | 25.6676111221 |
| **Total** | 1340.3783974648 | | 1285.9912946224 |
| **Average** | 26.8075679493 | | 25.7198258924 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Jackdaw Bird Panasonic G85 Clip High Quality - 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.24628806 | | 25.78559566 |
| **2** | 26.05900788 | | 25.86909342 |
| **3** | 26.05696535 | | 25.7126255 |
| **4** | 26.10611343 | | 25.93351531 |
| **5** | 26.1030767 | | 25.96241498 |
| **6** | 26.08514524 | | 25.98759961 |
| **7** | 26.3242445 | | 26.20359826 |
| **8** | 26.61359715 | | 25.70470738 |
| **9** | 26.60702181 | | 25.7434504 |
| **10** | 26.81204033 | | 25.76354837 |
| **11** | 26.65166545 | | 25.79215264 |
| **12** | 26.60905218 | | 25.67428565 |
| **13** | 26.85144997 | | 25.70424008 |
| **14** | 26.65102959 | | 25.73022914 |
| **15** | 26.55201244 | | 25.73396802 |
| **16** | 26.69484067 | | 25.79553032 |
| **17** | 26.65944338 | | 25.97455144 |
| **18** | 26.67037201 | | 25.9212997 |
| **19** | 26.55503559 | | 25.91178584 |
| **20** | 26.59554267 | | 25.94683599 |
| **21** | 26.69315219 | | 25.74836135 |
| **22** | 26.68744016 | | 25.73450589 |
| **23** | 26.77451062 | | 25.75727797 |
| **24** | 26.56452274 | | 25.88025713 |
| **25** | 26.80884027 | | 25.81918263 |
| **26** | 26.65322328 | | 25.72818589 |
| **27** | 26.49669528 | | 25.76020551 |
| **28** | 26.51907396 | | 25.7465148 |
| **29** | 26.63456273 | | 25.73901725 |
| **30** | 26.7942667 | | 25.79120994 |
| **31** | 26.55049992 | | 25.76959324 |
| **32** | 26.55707216 | | 25.6970675 |
| **33** | 26.9669261 | | 25.71336746 |
| **34** | 26.62600517 | | 25.71639943 |
| **35** | 26.64552951 | | 25.70777965 |
| **36** | 26.53878546 | | 25.72774458 |
| **37** | 26.67047834 | | 25.78063321 |
| **38** | 27.19946361 | | 25.74614406 |
| **39** | 26.52232385 | | 25.72952509 |
| **40** | 26.55831933 | | 25.74998403 |
| **41** | 27.60538554 | | 25.76330781 |
| **42** | 26.64847493 | | 25.76858497 |
| **43** | 26.55131197 | | 25.84504128 |
| **44** | 26.91982985 | | 25.9495039 |
| **45** | 26.63605785 | | 25.92848778 |
| **46** | 26.63461328 | | 25.71840239 |
| **47** | 26.53170061 | | 25.73077297 |
| **48** | 26.59742165 | | 25.77225995 |
| **49** | 26.656322 | | 25.75510502 |
| **50** | 26.79853034 | | 25.72691822 |
| **Total** | 1330.545284 | | 1289.852369 |
| **Average** | 26.61090568 | | 25.79704737 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Drifting in Real World by Drift Mechaniks 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.3671588898 | | 26.0467910767 |
| **2** | 25.9824998379 | | 25.8403005600 |
| **3** | 25.9906067848 | | 25.6908504963 |
| **4** | 26.3311505318 | | 25.6729195118 |
| **5** | 26.2837011814 | | 25.6856422424 |
| **6** | 26.3343837261 | | 25.7625145912 |
| **7** | 26.1118967533 | | 25.9619264603 |
| **8** | 26.4988830090 | | 25.8945631981 |
| **9** | 26.4551928043 | | 25.8946576118 |
| **10** | 26.4682722092 | | 25.9007863998 |
| **11** | 26.4580314159 | | 25.9101488590 |
| **12** | 26.4087245464 | | 25.9226145744 |
| **13** | 26.5011923313 | | 25.9625482559 |
| **14** | 26.4097247124 | | 25.8938193321 |
| **15** | 26.3547542095 | | 25.8951764107 |
| **16** | 26.3828473091 | | 25.8761942387 |
| **17** | 26.3701133728 | | 25.9248399734 |
| **18** | 26.3594982624 | | 25.9041268826 |
| **19** | 26.6658313274 | | 25.9273519516 |
| **20** | 26.6248841286 | | 25.8943569660 |
| **21** | 26.7166848183 | | 25.9043989182 |
| **22** | 26.7056536674 | | 25.8928983212 |
| **23** | 26.4091486931 | | 25.8963184357 |
| **24** | 26.3661887646 | | 25.8968193531 |
| **25** | 26.3407633305 | | 25.8751461506 |
| **26** | 26.3812892437 | | 25.9059102535 |
| **27** | 26.3946478367 | | 25.8835487366 |
| **28** | 26.3610253334 | | 25.9385797977 |
| **29** | 26.3172628880 | | 25.9348154068 |
| **30** | 26.3426675797 | | 25.8837261200 |
| **31** | 26.3345994949 | | 25.9358773232 |
| **32** | 26.3328664303 | | 25.8036880493 |
| **33** | 26.3368487358 | | 25.7865684032 |
| **34** | 26.3478341103 | | 25.8093659878 |
| **35** | 26.3346807957 | | 25.8201985359 |
| **36** | 26.3234415054 | | 25.7803061008 |
| **37** | 26.3434844017 | | 25.8137831688 |
| **38** | 26.3182175159 | | 25.8066058159 |
| **39** | 26.3360748291 | | 25.7875301838 |
| **40** | 26.3315560818 | | 25.7960450649 |
| **41** | 26.4568636417 | | 25.8199214935 |
| **42** | 26.6022672653 | | 25.8362021446 |
| **43** | 26.3570938110 | | 25.7995932102 |
| **44** | 26.7160568237 | | 26.0539608002 |
| **45** | 26.3545212746 | | 25.6838252544 |
| **46** | 26.3299961090 | | 25.6991462708 |
| **47** | 26.3086359501 | | 25.6796538830 |
| **48** | 26.3443708420 | | 25.6772925854 |
| **49** | 26.3193345070 | | 25.9283401966 |
| **50** | 26.3663890362 | | 25.9080035686 |
| **Total** | 1319.1898126602 | | 1292.7001991272 |
| **Average** | 26.3837962532 | | 25.8540039825 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **ARTE Carnival Ultra -HD Demo Video 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.4620494843 | | 25.7985422611 |
| **2** | 26.4163219929 | | 25.9765391350 |
| **3** | 26.3394947052 | | 25.7205829620 |
| **4** | 26.4033355713 | | 25.7707035542 |
| **5** | 26.4087481499 | | 25.7544643879 |
| **6** | 26.3779199123 | | 25.8441448212 |
| **7** | 26.4701123238 | | 25.7576367855 |
| **8** | 26.5656301975 | | 25.9895067215 |
| **9** | 26.3366346359 | | 25.9857447147 |
| **10** | 26.5963277817 | | 26.0259616375 |
| **11** | 26.8520760536 | | 25.9867272377 |
| **12** | 26.5244939327 | | 26.0131337643 |
| **13** | 26.5481891632 | | 25.9659674168 |
| **14** | 26.4614777565 | | 26.0004510880 |
| **15** | 26.4360110760 | | 25.9991908073 |
| **16** | 26.4257729053 | | 26.0171709061 |
| **17** | 26.8017110825 | | 26.0051510334 |
| **18** | 26.4090912342 | | 26.0413346291 |
| **19** | 26.7235441208 | | 26.0147871971 |
| **20** | 26.6683940887 | | 25.9417760372 |
| **21** | 26.5732839108 | | 25.9221603870 |
| **22** | 26.8107326031 | | 25.9765341282 |
| **23** | 26.7699031830 | | 26.0218410492 |
| **24** | 26.4748520851 | | 26.0559864044 |
| **25** | 26.7161078453 | | 26.0328767300 |
| **26** | 26.7050538063 | | 26.0072903633 |
| **27** | 26.7076373100 | | 25.9545376301 |
| **28** | 26.7235648632 | | 26.0936162472 |
| **29** | 26.6939404011 | | 25.9979469776 |
| **30** | 26.4101727009 | | 26.0249733925 |
| **31** | 26.7879450321 | | 26.0387239456 |
| **32** | 26.7576897144 | | 25.9827358723 |
| **33** | 26.4271523952 | | 25.9907338619 |
| **34** | 26.4319739342 | | 26.0284941196 |
| **35** | 26.4608693123 | | 25.6914994717 |
| **36** | 26.7132735252 | | 25.7493150234 |
| **37** | 26.7425646782 | | 25.8876993656 |
| **38** | 26.7234466076 | | 25.7194468975 |
| **39** | 26.7077512741 | | 25.7146308422 |
| **40** | 26.7137207985 | | 25.7096364498 |
| **41** | 26.7033426762 | | 25.7620830536 |
| **42** | 26.6829249859 | | 25.7375864983 |
| **43** | 26.6669392586 | | 25.7712519169 |
| **44** | 26.6877648830 | | 25.7186241150 |
| **45** | 26.6980335712 | | 25.7289001942 |
| **46** | 26.6877844334 | | 25.7613987923 |
| **47** | 26.6802706718 | | 25.7638289928 |
| **48** | 26.6587054729 | | 25.7251002789 |
| **49** | 26.6303923130 | | 25.7500371933 |
| **50** | 26.3895585537 | | 25.7097568512 |
| **Total** | 1329.7646889687 | | 1294.6387641430 |
| **Average** | 26.5952937794 | | 25.8927752829 |

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| **Encryption Algorithm** | | **3D Chaotic Map-Cosine Transformation Based Approach to Video Encryption and Decryption (Dua et al., 2022)** | |
| **Video Stream** | | **Max Payne 3 - Part 1 of Part 1 in 4K UHD** | |
| **Resolution** | | **1440p** | |
| **Frame Number** | **Encryption (In seconds)** | | **Decryption (In seconds)** |
| **1** | 26.3533520699 | | 25.7943291664 |
| **2** | 26.2308421135 | | 25.7916257381 |
| **3** | 26.2484455109 | | 25.7715647221 |
| **4** | 26.2624094486 | | 25.7392728329 |
| **5** | 26.2964332104 | | 25.7709729671 |
| **6** | 26.1542122364 | | 25.7353866100 |
| **7** | 26.2144844532 | | 25.7435042858 |
| **8** | 26.6394097805 | | 25.7212870121 |
| **9** | 26.2367618084 | | 25.7769293785 |
| **10** | 26.5019850731 | | 25.7349231243 |
| **11** | 26.6778194904 | | 25.7380428314 |
| **12** | 26.3758199215 | | 25.7703747749 |
| **13** | 26.4239819050 | | 25.7907469273 |
| **14** | 26.3221886158 | | 25.7397241592 |
| **15** | 26.3518590927 | | 25.9346182346 |
| **16** | 29.6529793739 | | 26.0073394775 |
| **17** | 36.6701173782 | | 25.9607455730 |
| **18** | 33.8126432896 | | 25.9579236507 |
| **19** | 26.3617689610 | | 25.7597391605 |
| **20** | 26.6259443760 | | 25.7083313465 |
| **21** | 26.5985867977 | | 25.7319321632 |
| **22** | 26.3487093449 | | 25.7272994518 |
| **23** | 26.6490871906 | | 25.7434527874 |
| **24** | 26.3709735870 | | 25.7548494339 |
| **25** | 26.3368511200 | | 25.7469162941 |
| **26** | 26.3622775078 | | 25.7316493988 |
| **27** | 26.3175716400 | | 25.7457540035 |
| **28** | 26.3601260185 | | 25.7237861156 |
| **29** | 26.3333902359 | | 25.7440915108 |
| **30** | 26.4761018753 | | 25.7336363792 |
| **31** | 26.3189997673 | | 25.7397329807 |
| **32** | 26.3550548553 | | 25.7677268982 |
| **33** | 26.3197746277 | | 25.7388737202 |
| **34** | 26.3686394691 | | 25.7433912754 |
| **35** | 26.3146593571 | | 25.7393417358 |
| **36** | 26.3372168541 | | 25.7579362392 |
| **37** | 26.3357307911 | | 25.7551803589 |
| **38** | 26.3615546227 | | 25.7297842503 |
| **39** | 26.3706586361 | | 25.7725131512 |
| **40** | 26.3758823872 | | 25.7414624691 |
| **41** | 26.2886819839 | | 25.7772243023 |
| **42** | 26.3699047565 | | 25.7507557869 |
| **43** | 26.4037261009 | | 25.7505121231 |
| **44** | 26.3572189808 | | 25.7391641140 |
| **45** | 26.3712000847 | | 25.7525875568 |
| **46** | 26.3261165619 | | 25.8107726574 |
| **47** | 26.3355517387 | | 25.7753806114 |
| **48** | 26.3092434406 | | 25.7737357616 |
| **49** | 26.6440429688 | | 25.7676036358 |
| **50** | 26.3143329620 | | 25.7402911186 |
| **Total** | 1339.7453243732 | | 1288.4547202587 |
| **Average** | 26.7949064875 | | 25.7690944052 |