VIRTUAL REALITY SYSTEM OF TRAINING SIMULATOR FOR TANKS

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ABSTRACT

THIS IS TO DEVELOP A VIRTUAL REALITY SYSTEM OF TRAINING SIMULATOR FOR TANKS.SINCE A TUR -BO-CHARGED DIESEL ENGINE IS ALWAYS USED IN MILITARY VEHICLES DUE TO ITS ADVANTAGES OF PO -WERFUL AND EFFICIENT ENERGY USAGE, A MATHEMATIC MODEL FOR TURBO-CHARGED DIESEL ENGINES IS FIRST CONSTRUCTED. THEN, A 2-D DYNAMIC EQUATION OF TANKS IS FORMULATED. FOR VIRTUAL REALITY SYSTEM, BORLAND C++ BUILDER IS USED FOR PROGRAMMING THE TURBO-CHARG -ED DIESEL ENGINE AND EQUATIONS OF MOTION OF TANKS. THE CORRESPONDING OUTPUT DATA SUCH AS DISPLACEMENT, VELOCITY AND ORIENTATION WILL BE USED TO DRIVE OUR CONSTRUCTED VIRTUAL SCEN -ES. THE VIMTEK EON STUDIO IS USED AS THE VIRTUAL REALITY SIMULATION SOFTWARE. TRUESPACE、 VRML AND PRO/E ARE USED TO DEVELOP MODELS. THE WHOLE SYSTEM IS CONNECTED TO A "FIXED-BASE OPERATION PLATFORM" THROUGH TCP/IP INTERFACE PROVIDED BY BORLAND C++ BUILDER. FINALLY, IT IS SHOWN THAT THE VIRTUAL REALITY SYSTEM CAN OFFER THE DESIRED TRAINING OF TANK.

Keywords : VIRTUAL REALITY, TURBO-CHARGED DIESEL ENGINE, TANK, SIMULATOR

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REFERENCES

[1] 盧昭輝，汽車引擎的渦輪增壓，機械工業，1984.

[2] 余德宗，渦輪增壓是柴油引擎之理論分析與損壞研究，亞東技術學院學報，1987.

[3] 蔡欣正，內燃機的理論與實際，聯經出版事業公司，1987.

[4] 李冠宗、呂有豐，內燃機，高立圖書有限公司，1999 [5] 周重石、簡錫新，"渦輪增壓柴油引擎的動態分析"，第十七屆力學會議，1993，PP. 483-490.

[6] 丁建仁，"履帶車輛三維運動模擬與動態分析"私立大葉大學機械工程研究所碩士論文，民國九十 年六月 [7] 張旭明，"戰甲車動力系統匹配與性能評估之計算模式"，國防大學中正理工學院兵器系統工程研 究所碩士論文，民國八十九年六月 [8] 林克衛，"虛擬實境於船舶操控模擬系統之應用"，國立成功大學造船暨船舶機械工程研究所碩士 論文，民國九十年六月 [9] 朱聰暉，"起重機虛擬實境模擬系統之整合研究"，國立成功大學機械工程研究所碩士論文，民國 八十七年六月 [10] 瑋特虛擬實境，HTTP://WWW.VIMTEK.COM.TW

[11] 羅俊煌，"應用汽車駕駛模擬系統從事易肇事地點之交通工程改善方案評估研究-以中山高速公路 高雄終端為例"，國立成功大學交

通管理科學研究所碩士論文，民國八十九年七月 [12] 艾派克科技，HTTP://WWW.APEC.COM.TW/ [13] 愛爾得資訊，HTTP://WWW.I-ART.COM.TW/ [14] 汪明德、趙毓芹、祝嘉光，坦克行駛援例，北京國防出版社，1983 [15] 陽光曦，"虛擬實境技術應用國軍戰車模擬器之研究"，國防管理學院資源管理研究所碩士論文，民國八十六年六月 [16] 練紹安，"分散式即時動態視覺模擬操控訓練系統之研發"，國立交通大學電機與控制工程研究 所碩士論文，民國八十八年六月 [17] 黃毅偉，"車輛動態特性分析及虛擬實境技術應用於汽車駕駛模擬器之研製"，國立彰化師範大 學工業教育學系碩士班碩士論文，民國八十九年六月 [18] 黃嘉輝，揭開互助社群軟體NAPSTER的秘密-INTERNET與TCP/IP進階程式設計WITH C++ BUILDER， 文魁資訊股份有限公司，2001 [19] 李蔚澤，精通WINDOWS2000 TCP/IP，碁峰資訊股份有限公司，2001 [20] ADLER, U., AUTOMOTIVE HANDBOOK, BOSCH, 2ND EDITION, 1986.
[21] BAAZAARI, Z., TWO STAGE TUTBOCHARGING OF DIESEL UNDER STEADY AND TRANSIENT CONDITION, PH.D. THESIS, IMPERIAL COLLEGE, 1979.
[22] WATSON, N., SUPERCHARGING AND TURBOCHARGING, PRINCIPLES AND PERFORMANCE IN DIESEL ENG INEERING, JOHN WILEY & SONS, 1984.
[23] WATSON, N. AND JANOTA, M.S., TURBOCHARGING - THE INTERNAL COMBUSTION ENGINE,MACMILLAN ,1982.
[24] JIANG, Q. AND VAN GERPEN, J.H., PREDICTION DIESEL ENGINE PARTICULATE EMISSION DURING TRANSIENT CYCLES, SAE 920466.
[25] HEYWOOD, J.B.,INTERNAL COMBUSTION ENGINE FUNDAMENTALS, MCGRAW-HILL BOOK COMPANY,1988.
[26] MARK, J. AND PUAL, N., A DYNAMIC SIMULATION OF THE DETROIT DIESEL ELECTRONIC CONTROL SYSTEM IN HEAVY DUTY TRUCK POWERTRAINS, SAE 861959.
[27] DIESEL FUEL INJECTED PUMPS - TYPE PE AND PF, BOSCH TECHNICAL INSTRUCTION 1981.
[28] BORMAN, G.L.,MATHEMATICAL SIMULATION OF INTERNAL COMBUSTION ENGINE PROCESSES AND PERF -ORMANCE INCLUDING COMPARISON WITH EXPERIMENT, PH.D. THESIS, UNIVERSITY OF WISCONSIN, 1964.
[29] KOWALEWICZ, A., COMBUSTION SYSTEM OF HIGH-SPEED PISTON I.C. ENGINES, ELSEVIER SCIENCE PUBLISHER, 1984.
[30] JENSON, J.P., KRISTENSEN, A.F., SORENSON, S.O., HOUBAK, N. AND HENDRICKS, E.TRANSIENT SIMULATION OF SMALL TURBOCHARGED DIESEL ENGINE,SEMINAR OF ENGINE TRANSIENT PERFORMANC -E,I.MECH.E., 1990.
[31] MCKIERNAN,M.,LALK,T.R.,STOUT, B.A.AND SEARCY,S.W.,ESTIMATING DIESEL ENGINE PERFORMANC -E BY INDIRECT METHODS,SAE 871606,1987.
[32] MAGNUS,P.AND LARS,N.,"GEAR SHIFTING BY ENGINE CONTROL",IEEE TRANSACTIONS ON CONTROL S -YSTEM TECHNOLOGY, VOL. 8, NO.3, 2000.
[33] TURIN, C.R. AND GEERING, H.P., "ON-LINE IDENTIFICATION OF AIR/FUEL RATIO DYNAMICS IN A SEQUENTIALLY INJECTED SI ENGINE'. SAE PAPER NO.930857, 1993.
[34] WONG, J.Y., THEORY OF GROUND VEHICLE, SECOND EDITION, 1993.
[35] STEEDS, W., "TRACKED VEHICLES", AUTOMOBILE ENGINEER, 1950.
[36] DONALD, T.G., PRINCIPLES OF DYNAMICS, SECOND EDITION, 1988.
[37] ZVI, S., WILLIAM, S. AND MINH, H., "TRAJECTORY PLANNING OF TRACKED VEHICLES",IEEE INT -ERNATIONAL CONFERENCE ON ROBOTICS AND AUTOMATION, 1993, PP. 796-801.
[38] ANH, T.L., DAVID, C.R. AND HUNG, F.D.,"ESTIMATION OF TRACK-SOIL INTERACTIONS FOR AUTO -NOMOUS TRACKED VEHICLES",IEEE INTERNATIONAL CONFERENCE ON ROBOTICS AND AUTOMATION,19 97, PP. 1388-1393.
[39] AHMADI,M.,POLOTSKI,V.AND HURTEAU,R.,"PATH TRACKING CONTROL OF TRACKED VEHICLE", IEEE INTERNATIONAL CONFERENCE ON ROBOTICS AND AUTOMATION, 2000, PP. 2938-2943.
[40] EON STUDIO USER GUIDE [41] EON SDK USER GUIDE [42] INOUS, S., HIRANO, M., KIJIMA, K. AND TAKASHINA, J., "A PRATICAL CALCULATION METHOD OF SHIP MANEUVER MOTION", INTERNATIONAL SHIPBUILDING PROGRESS, 1981.
[43] KUHI, J., EVANS, D.,PAPELIS, Y.,ROMANO, R. AND WATSON,G.,"THE IOWA DRIVING SIMULATOR: AN IMMERSIVE RESEARCH ENVIRONMENT", IEEE COMPUTER, 1995.
[44] CREMER,J.,KEARNEY,J.AND PAPELIS,Y.,"DRIVING SIMULATION:CHALLENGES FOR VR TECHNOLOGY", IEEE COMPUTER GRAPHICS AND APPLICATIONS, 1996.
[45] KIM,JUNG-HA.,LEE,WOON-SUNG.,PARK,H-KYEONG.,PARK,KYUNG-KYUN.,CHO,JUN-HEE.,"A DESIGN AN -D CHARACTERISTIC ANALYSIS OF THE MOTION BASE FOR VEHICLE DRIVING SIMULATOR",PROCEEDI -NGS OF IEEE ROBOT AND HUMAN COMMUNICATION, 1997.
[46] MOURANT, R.R., QIU, N. AND CHIU, S.A., "A DISTRIBUTED VIRTUAL DRIVING SIMULATOR",IEEE VIRTUAL REALITY ANNUAL INTERNATIONAL SYMPOSIUM, 1997.
[47] ZYDA,M.J.,MCGHEE, R.B.,ROSS, R.S., SMITH, D.B. AND STREYLE, D.G., "FLIGHT SIMULATORS FOR UNDER $100,000", IEEE COMPUTER GRAPHICS AND APPLICATIONS, 1988, PP. 19-27.

[48] PLATT,P.A.,DAHN, D.A.AND AMBURN,P.,"LOW-COST APPROACHES TO VIRTUAL FLIGHT SIMULATION" ,PROCEEDINGS OF THE IEEE AEROSPACE AND ELECTRONICS CONFERENCE, 1991.
[49] CHAN,S.H.,TRANSIENT PERFORMANCE OF TURBOCHARGED VEHICLE DIESEL ENGINES,PH.D. THESIS, UNIVERSITY OF LONDON, 1991.
[50] BARRY,W.BOEHM,"A SPIRAL MODEL OF SOFTWARE DEVELOPMENT AND ENHANCEMENT",IEEE COMPUTER, 1988, VOL. 21, PP.61-72.