

TABLE OF CONTENTS

1	INTERACTIVE SIMULATION.....	7
1.1	HISTORY.....	7
1.2	VEHICLE SIMULATORS	8
1.2.1	<i>Flight simulators</i>	<i>8</i>
1.2.2	<i>Space vehicles simulators.....</i>	<i>8</i>
1.2.3	<i>Rail engine simulators.....</i>	<i>8</i>
1.2.4	<i>Captain bridges (ships) simulators.....</i>	<i>9</i>
1.2.5	<i>Driving simulators</i>	<i>9</i>
1.2.6	<i>Special devices simulation.....</i>	<i>10</i>
1.3	OPERATOR'S WORKPLACE SIMULATORS	10
1.4	CAR DRIVING SIMULATORS	11
1.4.1	<i>Non-interactive simulation</i>	<i>12</i>
1.4.2	<i>PC "game" simulators</i>	<i>12</i>
1.4.3	<i>Virtual simulators.....</i>	<i>12</i>
1.4.4	<i>Light cockpit simulators</i>	<i>13</i>
1.4.5	<i>Full body simulators</i>	<i>13</i>
1.4.6	<i>Motion platform based simulators</i>	<i>13</i>
2	DRIVING SIMULATORS DESIGN	16
2.1	SYSTEM ARCHITECTURE	17
2.1.1	<i>Modular architecture</i>	<i>19</i>
2.2	MATHEMATICAL – PHYSICS SIMULATION ENGINE.....	20
2.3	VISUALIZATION SYSTEM	22
2.3.1	<i>3D projection.....</i>	<i>22</i>
2.4	AUDIO SYSTEM	24
2.4.1	<i>Simulation of the engine sounds.....</i>	<i>24</i>
2.5	HAPTICS, MOTION CUEING	25
2.5.1	<i>Steering wheel</i>	<i>25</i>
3	ENHANCED IMMERSIVE FEATURES.....	26
3.1	SHADOW-LIGHT PROJECTION SYSTEM (DYICOLIS)	26
3.2	SHADOW-LIGHT SCENARIOS	27
3.2.1	<i>Day vs. night light conditions.....</i>	<i>27</i>
3.2.2	<i>Daylight and dropped shadows</i>	<i>27</i>
3.2.3	<i>Night and tunnel driving</i>	<i>28</i>
3.3	DYICOLIS DESIGN	29

3.3.1	<i>Static Elements</i>	29
3.3.2	<i>Dynamic Elements</i>	29
3.3.3	<i>Casting maps</i>	30
3.3.4	<i>System design and software implementation</i>	31
4	LABORATORIES AND SIMULATOR SYSTEMS AT FTS CTU	32
4.1	NON-INTERACTIVE SIMULATION FOR RAIL ENGINE-DRIVERS.....	33
4.2	PC SIMULATOR FAVORIT	33
4.3	LIGHT SIMULATOR SUPERB.....	33
4.4	FULL SIMULATOR SUPERB	34
4.5	FULL SIMULATOR OCTAVIA II.....	35
4.6	3D LIGHT SIMULATOR OCTAVIA II.....	35
4.7	FULLY VIRTUAL SIMULATOR.....	35
5	CONCLUSION	36
6	LIST OF REFERENCES	38