

Supplementary Materials S1. All permutations of code changes corresponding to multi-valued logic trees 1, 2, 3

Lp	x ₁	x ₂	x ₃	x ₄	x ₅	Lp	x ₁	x ₂	x ₃	x ₅	x ₄	Lp	x ₁	x ₂	x ₄	x ₃	x ₅
1						2						3					

4, 5, 6

Lp	x ₁	x ₂	x ₅	x ₃	x ₄	Lp	x ₁	x ₂	x ₄	x ₅	x ₃	Lp	x ₁	x ₂	x ₅	x ₄	x ₃
4						5						6					

7, 8, 9

Lp	x ₁	x ₃	x ₄	x ₅	x ₂	Lp	x ₁	x ₃	x ₄	x ₂	x ₅	Lp	x ₁	x ₃	x ₅	x ₄	x ₂
7						8						9					

10, 11, 12

Lp	x ₁	x ₃	x ₂	x ₄	x ₅	Lp	x ₁	x ₃	x ₅	x ₂	x ₄	Lp	x ₁	x ₃	x ₂	x ₅	x ₄
10						11						12					

13, 14, 15

Lp	x ₁	x ₄	x ₅	x ₂	x ₃	Lp	x ₁	x ₄	x ₅	x ₃	x ₂	Lp	x ₁	x ₄	x ₂	x ₅	x ₃
13						14						15	0	0	0	0	0

16, 17, 18

Lp	x ₁	x ₄	x ₃	x ₅	x ₂	Lp	x ₁	x ₄	x ₂	x ₃	x ₅	Lp	x ₁	x ₄	x ₃	x ₂	x ₅
16						17						18					

19, 20, 21

Lp	x ₁	x ₅	x ₂	x ₃	x ₄	Lp	x ₁	x ₅	x ₂	x ₄	x ₃	Lp	x ₁	x ₅	x ₃	x ₂	x ₄
19						20						21					

22, 23, 24

Lp	x ₁	x ₅	x ₄	x ₂	x ₃	Lp	x ₁	x ₅	x ₃	x ₄	x ₂	Lp	x ₁	x ₅	x ₄	x ₃	x ₂
22						23						24					

25, 26, 27

Lp	x ₂	x ₃	x ₄	x ₅	x ₁	Lp	x ₂	x ₃	x ₄	x ₁	x ₅	Lp	x ₂	x ₃	x ₅	x ₄	x ₁
25						26						27					

28, 29, 30

Lp	x ₂	x ₃	x ₁	x ₄	x ₅	Lp	x ₂	x ₃	x ₅	x ₁	x ₄	Lp	x ₂	x ₃	x ₁	x ₅	x ₄
28						29						30					

31, 32, 33

Lp	x ₂	x ₄	x ₅	x ₁	x ₃	Lp	x ₂	x ₄	x ₅	x ₃	x ₁	Lp	x ₂	x ₄	x ₁	x ₅	x ₃
31						32						33					

34, 35, 36

Lp	x ₂	x ₄	x ₃	x ₅	x ₁	Lp	x ₂	x ₄	x ₁	x ₃	x ₅	Lp	x ₂	x ₄	x ₃	x ₁	x ₅
34						35						36					

37, 38, 39

Lp	x ₂	x ₅	x ₁	x ₃	x ₄	Lp	x ₂	x ₅	x ₁	x ₄	x ₃	Lp	x ₂	x ₅	x ₃	x ₁	x ₄
37						38						39					

40, 41, 42

Lp	x ₂	x ₅	x ₄	x ₁	x ₃	Lp	x ₂	x ₅	x ₃	x ₄	x ₁	Lp	x ₂	x ₅	x ₄	x ₃	x ₁
40						41						42					

43, 44, 45

Lp	x ₂	x ₁	x ₃	x ₄	x ₅	Lp	x ₂	x ₁	x ₃	x ₅	x ₄	Lp	x ₂	x ₁	x ₄	x ₃	x ₅
43						44						45					

46, 47, 48

Lp	x ₂	x ₁	x ₅	x ₃	x ₄	Lp	x ₂	x ₁	x ₄	x ₅	x ₃	Lp	x ₂	x ₁	x ₅	x ₄	x ₃
46						47						48					

49, 50, 51

Lp	x ₃	x ₄	x ₅	x ₁	x ₂	Lp	x ₃	x ₄	x ₅	x ₂	x ₁	Lp	x ₃	x ₄	x ₁	x ₅	x ₂
49						50						51					

52, 53, 54

Lp	x ₃	x ₄	x ₂	x ₅	x ₁	Lp	x ₃	x ₄	x ₁	x ₂	x ₅	Lp	x ₃	x ₄	x ₂	x ₁	x ₅
52						53						54					

55, 56, 57

Lp	x ₃	x ₅	x ₁	x ₂	x ₄	Lp	x ₃	x ₅	x ₁	x ₄	x ₂	Lp	x ₃	x ₅	x ₂	x ₁	x ₄
55						56						57					

58, 59, 60

Lp	x ₃	x ₅	x ₄	x ₁	x ₂	Lp	x ₃	x ₅	x ₂	x ₄	x ₁	Lp	x ₃	x ₅	x ₄	x ₂	x ₁
58						59						60					

61, 62, 63

Lp	x ₃	x ₁	x ₂	x ₄	x ₅	Lp	x ₃	x ₁	x ₂	x ₅	x ₄	Lp	x ₃	x ₁	x ₄	x ₂	x ₅
61						62						63					

64, 65, 66

Lp	x ₃	x ₁	x ₅	x ₂	x ₄	Lp	x ₃	x ₁	x ₄	x ₅	x ₂	Lp	x ₃	x ₁	x ₅	x ₄	x ₂
64						65						66					

67, 68, 69

Lp	x ₃	x ₂	x ₄	x ₅	x ₁	Lp	x ₃	x ₂	x ₄	x ₁	x ₅	Lp	x ₃	x ₂	x ₅	x ₄	x ₁
67						68						69					

70, 71, 72

Lp	x ₃	x ₂	x ₁	x ₄	x ₅	Lp	x ₃	x ₂	x ₅	x ₁	x ₄	Lp	x ₃	x ₂	x ₁	x ₅	x ₄
70						71						72					

73, 74, 75

Lp	x ₄	x ₅	x ₁	x ₂	x ₃	Lp	x ₄	x ₅	x ₁	x ₃	x ₂	Lp	x ₄	x ₅	x ₂	x ₁	x ₃
73						74						75					

76, 77, 78

Lp	x ₄	x ₅	x ₃	x ₁	x ₂	Lp	x ₄	x ₅	x ₂	x ₃	x ₁	Lp	x ₄	x ₅	x ₃	x ₂	x ₁
76						77						78					

79, 80, 81

Lp	x ₄	x ₁	x ₂	x ₃	x ₅	Lp	x ₄	x ₁	x ₂	x ₅	x ₃	Lp	x ₄	x ₁	x ₃	x ₂	x ₅
79						80						81					

Nr tab. 82, 83, 84

Lp	x ₄	x ₁	x ₅	x ₂	x ₃	Lp	x ₄	x ₁	x ₃	x ₅	x ₂	Lp	x ₄	x ₁	x ₅	x ₃	x ₂
82						83						84					

Nr tab. 85, 86, 87

Lp	x ₄	x ₂	x ₃	x ₅	x ₁	Lp	x ₄	x ₂	x ₃	x ₁	x ₅	Lp	x ₄	x ₂	x ₅	x ₃	x ₁
85						86						87					

Nr tab. 88, 89, 90

Lp	x ₄	x ₂	x ₁	x ₃	x ₅	Lp	x ₄	x ₂	x ₅	x ₁	x ₃	Lp	x ₄	x ₂	x ₁	x ₅	x ₃
88						89						90					

Nr tab. 91, 92, 93

Lp	x ₄	x ₃	x ₅	x ₁	x ₂	Lp	x ₄	x ₃	x ₅	x ₂	x ₁	Lp	x ₄	x ₃	x ₁	x ₅	x ₂
91						92						93					

Nr tab. 94, 95, 96

Lp	x ₄	x ₃	x ₂	x ₅	x ₁	Lp	x ₄	x ₃	x ₁	x ₂	x ₅	Lp	x ₄	x ₃	x ₂	x ₁	x ₅
94						95						96					

Nr tab. 97, 98, 99

Lp	x ₅	x ₁	x ₂	x ₃	x ₄	Lp	x ₅	x ₁	x ₂	x ₄	x ₃	Lp	x ₅	x ₁	x ₃	x ₂	x ₄
97						98						99					

Nr tab. 100, 101, 102

Lp	x ₅	x ₁	x ₄	x ₂	x ₃	Lp	x ₅	x ₁	x ₃	x ₄	x ₂	Lp	x ₅	x ₁	x ₄	x ₃	x ₂
100						101						102					

Nr tab. 103, 104, 105

Lp	x ₅	x ₂	x ₃	x ₄	x ₁	Lp	x ₅	x ₂	x ₃	x ₁	x ₄	Lp	x ₅	x ₂	x ₄	x ₃	x ₁
103						104						105					

Nr tab. 106, 107, 108

Lp	x ₅	x ₂	x ₁	x ₃	x ₄	Lp	x ₅	x ₂	x ₄	x ₁	x ₃	Lp	x ₅	x ₂	x ₁	x ₄	x ₃
106						107						108					

Nr tab. 109, 110, 111

Lp	x ₅	x ₃	x ₄	x ₁	x ₂	Lp	x ₅	x ₃	x ₄	x ₂	x ₁	Lp	x ₅	x ₃	x ₁	x ₄	x ₂
109						110						111					

Nr tab. 112, 113, 114

Lp	x ₅	x ₃	x ₂	x ₄	x ₁	Lp	x ₅	x ₃	x ₁	x ₂	x ₄	Lp	x ₅	x ₃	x ₂	x ₁	x ₄
112						113						114					

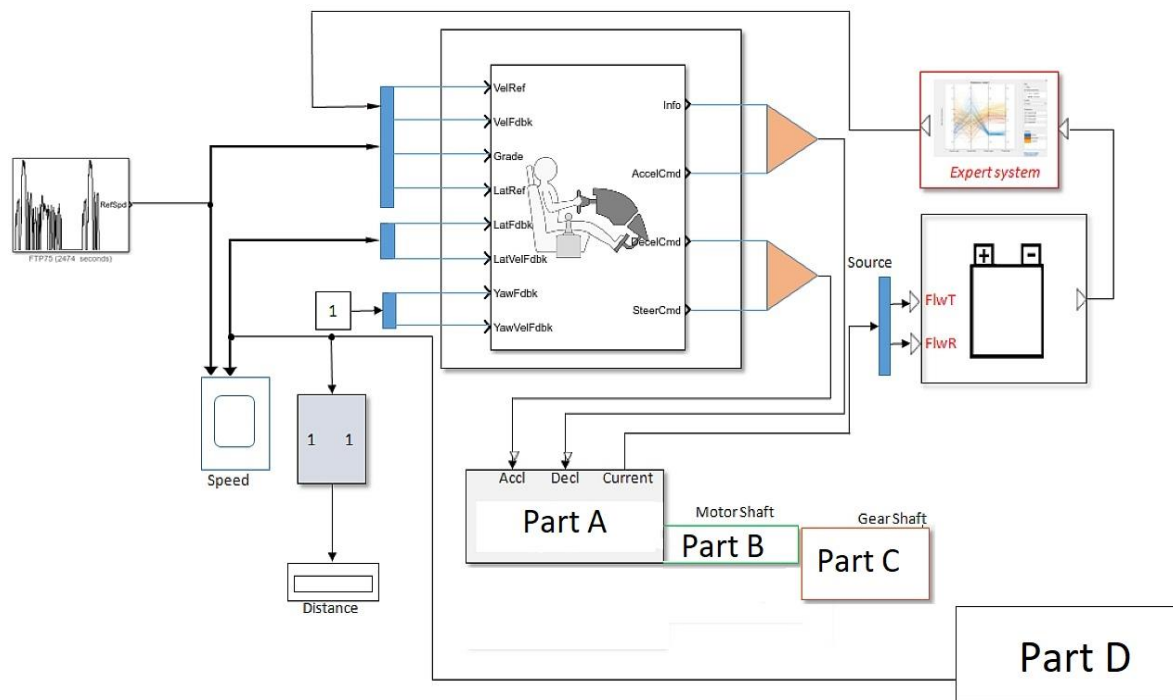
Nr tab. 115, 116, 117

Lp	x ₅	x ₄	x ₁	x ₂	x ₃	Lp	x ₅	x ₄	x ₁	x ₃	x ₂	Lp	x ₅	x ₄	x ₂	x ₁	x ₃
115						116						117					

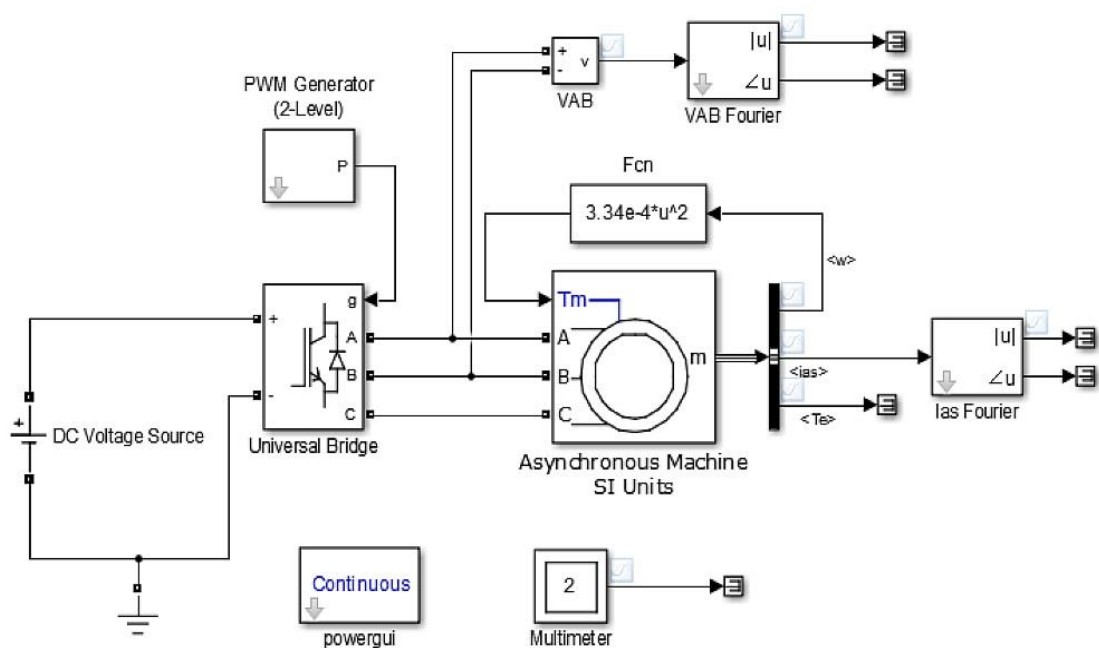
Nr tab. 118, 119, 120

Lp	x ₅	x ₄	x ₃	x ₁	x ₂	Lp	x ₅	x ₄	x ₂	x ₃	x ₁	Lp	x ₅	x ₄	x ₃	x ₂	x ₁
118						119						120					

Supplementary Materials S2. EV model in Matlab including expert system - with detailed presentation of selected elements



Proposed EV model in Matlab including expert system



PART A. Energy control block for batteries

