

S3 Appendix

In this file, we present the sequences of all genetic elements used to engineer the RNA-based half-adder, as well as the sequences of the final constructs.

Regulatory RNAs

>5'UTR_RAJ11 (with start codon)

CCTCGCATAATTTCACTTCTTCAATCCTCCCGTTAAAGAGGAGAAAATTATGAATG

>RAJ11

GGGAGGGTTGATTGTGTGAGTCTGTACAGTTCAGCGGAAACGTTGATGCTGTGACAGATTTATGCGAGGC

>RAJ11min

GGGAGGGTTGATTGTGTGATTATGCGAGGC

>5'UTR_RAJ12 (with start codon)

ACCCAGTATCATTCTCTTCTTCCCTGCCACGCGGAAAGAGGAGAAAGGTGTAATG

>RAJ12

GGGCAGGAAGAAGGGTTCCTTTGAGCGAATCTAGCGGCACCTCGCTAGGATTTGCTCGAAGGGATTCTGGG

>5'UTR_RAJ21 (with start codon)

CCCTGCCTAGTATCTCTTCTTTGCTTCCCTCCAGTAAAGAGGAGATATTGGTTATG

>RAJ21

TGGAGGAGAGAGCGATCCTAGTTCTCACTCAAAGAAGGGTAGGACTAGGCAGGGC

>5'UTR_RR12 (with start codon)

CAATTCTACCATTACCTCTTGGATTTGGGTATTAAAGAGGAGAAAGGTACCATG

>RR12

ACCCAAATCCAGGAGGTGATTGGTAGTGGTGGTTAATGAAAATTAACCTACTACTACCATATATCTCTAGA

Promoters

>PLlac01

AATTGTGAGCGGATAACAATTGACATTGTGAGCGGATAACAAGATACTGAGCAC

>PLlac012

ATAAATGTGAGCGGATAACATTGACATTGTGAGCGGATAACAAGATACTGAGCAC

>PLtet01

TCCCTATCAGTGATAGAGATTGACATCCCTATCAGTGATAGAGATACTGAGCAC

>PLtet012

ACTCTATCATTGATAGAGTTTGACATCCCTATCAGTGATAGAGATACTGAGCAC

>J23119

TTGACAGCTAGCTCAGTCCTAGGTATAATGCTAGC

>PR(lambda)

TAACACCGTGCGTGTTGACTATTTTACCTCTGGCGGTGATAATGGTTGC

Terminators

>TtonB

CACCGAAATTCAGTAAGCAGAAAGTCAAAAGCCTCCGACCGGAGGCTTTTGACTATTACTCAACAGGTAAGGCGC
GAGGTTTTTC

>TtonB-deriv

ATTAGCAGAAAGTCAAAAGCCTCCGACCGGAGGCTTTTGACTAAAACCTCCCTTGGGGTTATCATTGGG

>T500

CAAAGCCCGCCGAAAGGCGGGCTTTTCTGT

>TrrnC

ATCCTTAGCGAAAGCTAAGGATTTTTTTTT

>TM13central-min

GGCTCCTTTTGGAGCCTTTTTTTTTT

>B1002

CGCAAAAACCCCGCTTCGGCGGGGTTTTTTCGC

Proteins

>sfGFP (without start and stop codons)

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cgtaaaggcgaagagctgttcaactggtgctgctccctattctgggtggaactggatggtgatgtcaacggtcataag
ttttccgtgctggtggcgagggtgaaggtgacgcaactaatggtaaactgacgctgaagttcatctgtactactggt
aaactgccggtaccttggccgactctggtaacgacgctgacttatggtgttcagtgctttgctcgttatccggac
catatgaagcagcatgacttcttcaagtccgccatgcccgaaggctatgtgcaggaacgcacgatttcctttaag
gatgacggcagctacaaaacgcgtgcccgaagtgaatttgaaggcgataccctggtaaaccgcattgagctgaaa
ggcattgactttaagaagacggcaatatcctgggccataagctggaatacaattttaacagccacaatgtttac
atcaccgccgataaacaaaaaatggcattaagcgaattttaaattcgccacaacgtggaggatggcagcgtg
cagctggtgatcactaccagcaaaacactccaatcggtgatggtcctggtctgctgccagacaatcactatctg
agcagcgaagcgttctgtctaaagatccgaacgagaaaacgcgatcatatggttctgctggagtccgtaaccgca
cggggcatacgcgatggtatggatgaactgtacaaa
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>mRFP1 (without start and stop codons)

```
gcttctccgaagacggttatcaaagagttcatgcggttccaaagtccgatggaagggtccggttaacggtcacgag
ttcgaaatcgaaggtgaaggtgaaggtcgctccgtacgaaggtaccagaccgctaaactgaaagttaccaaaggt
ggtccgctgcccgttcgcttgggacatcctgtccccgcagttccagtagcgttccaaagcttacgttaaacaccgg
gctgacatccccggactacctgaaactgtccttccccggaagggttccaaatgggaacgtgttatgaaactcgaagac
ggtggtggttaccggtaccaggactcctccctgcaagacggtgagttcatctacaaaggttaaactgctggt
accaacttcccgtccgacggtccggttatgcagaaaaaaaccatgggttgggaagcttccaccgaaacgtatgtac
ccggaagacggtgctctgaaaggtgaaatcaaaatgctgtctgaaactgaaagacggtggtcactacgacgctgaa
gttaaaaccacctacatggctaaaaaaaccggttcagctgcccgggtgcttacaaaaccgacatcaaactggacatc
acctcccacaacgaagactacaccatcgttgaacagtagcaacgtgctgaaggtcgctcactccaccggtgct
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>cI(lambda) (without start and stop codons)

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TCAACCAAGAAAAAGCCACTTACGCAGGAGCAACTGGAAGATGCTCGTTCGTTTGAAAGCCATCTACGAGAAAAAG
AAAAATGAACTTGGCTTATCCCAAGAGTCTGTAGCGGATAAAAATGGGTATGGGGCAGAGTGGAGTGGGCGCGCTT
TTTAACGGTATTAATGCTTTAAACGCATACAATGCAGCATTATTAGCAAAAAATCCTGAAAAGTAAGTGTGAAGAG
TTCAGTCTTCCATTGCTCGTGAAATCTACGAGATGTATGAGGCGGTTTCTATGCAACCGTCCTTACGTAGCGAG
TATGAATACCCGGTGTCTCCCACGTTCAAGCGGGCATGTTTAGTCCCGAACTTCGTACGTTTACAAAAGGGCGAC
GCGGAGCGTTGGGTGAGTACCACGAAAAAGGCATCTGACTCTGCTTTTTGGCTGGAGGTAGAAGGTAACCTCCATG
ACGGCACCCACTGGAAGTAAACCCTCATTCCCGGATGGGATGCTGATTTTGGTTGACCCCGAACAGGCTGTAGAA
CCAGGGGATTTTTGCATCGCCCGTCTTGAGGGCGATGAGTTTACCTTTAAGAAACTTATCCGTGACAGTGGACAA
GTTTTTTTTGCAACCGCTTAATCCGCAGTATCCCATGATTCCGTGCAATGAATCCTGTAGCGTGGTGGGGAAAAGTA
ATTGCGAGCCAGTGGCCCCGAAGAAACATTCGGT
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AND gate (with GFP)

rev(B1002) + NheI + rev(RAJ12) + rev(PLtetO1) + AvrII + NsiI + PLlacO12 +
5'UTR_RAJ12 + sfGFP + SpeI + PstI TtonB-deriv

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GCGAAAAAACCCGCCGAAGCGGGGTTTTTTGCGgctagcCCCAGAATCCCTTCGAGCAAATCCTAGCGAGGTGC  
CGCTAGATTGCTCAAAGGAACCCCTTCTTCCTGCCCCTGCTCAGTATCTCTATCACTGATAGGGATGTCAATCTC  
TATCACTGATAGGGAcctaggatgcatATAAATGTGAGCGGATAACATTGACATTGTGAGCGGATAACAAGATAC  
TGAGCACACCCAGTATCATTCTTCTTCTTCCTGCCCACGCGGAAAGAGGAGAAAGGTGTAATGACTAGCcgtaaag  
gcgaagagctgttactggtgctgctccctattctggtggaactggatggtgatgtcaacggtcataagttttccg  
tgcgtggcgaggggtgaaggtgacgcaactaatggtaaactgacgctgaagttcatctgtactactggtaaactgc  
cggtaaccttggccgactctggtaacgacgctgacttatggtgttcagtgctttgctcgttatccggaccatatga  
agcagcatgacttcttcaagtcgccaatgcccgaaggtatgtgcaggaacgcacgatttcccttaaggatgacg  
gcacgtacaaaacgcgtgcccgaagtgaatttgaaggcgataccctggtaaaccgcattgagctgaaaggcattg  
actttaagaagacggcaatatcctgggccataagctggaatacaattttaacagccacaatgtttacatcaccg  
ccgataaacaaaaaaaaatggcattaaagcgaattttaaaattcgccacaacgtggaggatggcagcgtgcagctgg  
ctgatcactaccagcaaaacactccaatcggtgatggtcctgttctgctgccagacaatcactatctgagcacgc  
aaagcgttctgtctaaagatccgaacgagaaacgcgatcatatgggttctgctggagttcgttaaccgcagcgggca  
tcacgcattggtatggatgaactgtacaaaTGATGATactagtAGCGGCCGctgcagGAGTCACTAAGGGTTAGTT  
AGTTAGATTAGCAGAAAGTCAAAGCCTCCGACCGGAGGCTTTTACTAAAACCTTCCTTGGGGTTATCATTGGG
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XOR gate (with RFP)

EcoRI + rev(TtonB) + rev(mRFP1) + SpeI + rev(5'UTR_RAJ11) + rev(PR(lambda))
+ PLlacO1 + RAJ11min + TrrnC + XbaI + PLtetO1 + RAJ11 + TM13central-min +
BglII + PstI + rev(B1002) + rev(RAJ21) + rev(PLtetO12) + XhoI + PLlacO12 +
5'UTR_RAJ21 + ApaI + cI(lambda) + T500 + BamHI

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gaattcGAAAACCTCGCGCCTTACCTGTTGAGTAATAGTCAAAAGCCTCCGGTCGGAGGCTTTTACTTTCTGCT
TACTGAATTTTCGGTGTAAgaccaccggtggagtgacgaccttcagcagcttcgtactgttcaacgatggtgtagtc
ttcgttggggaggtgatgtccagtttgatgtcggttttgtaagcaccggcagctgaaccggtttttagccta
gtaggtggttttaacttcagcgtcgtagtgaccaccgtctttcagtttcagacgcattttgatttcaccttcag
agcaccgtcttccgggtacatacgttcgggtggaagottoccaaaccatggttttttctgcataaccggaccgtc
ggacgggaagttggtaccacgcagtttaactttgtagatgaactcaccgtcttcgagggaggagtcctgggtaac
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gtcttcggaggaagcactagtCATTTCATAATTTCTCCTCTTTAACGGGAGGATTGAAGAAGTGAATTTATGCGAG
GGCAACCATTATCACCGCCAGAGGTAATAATAGTCAACACGCACGGTGTTAattcgcggcctgcatAATTGTGAGC
GGATAACAATTGACATTGTGAGCGGATAACAAGATACTGAGCACGGGAGGGTTGATTGTGTGATTATGCGAGGCA
TCCTTAGCGAAAGCTAAGGATTTTTTTTTtctagaTCCCTATCAGTGATAGAGATTGACATCCCTATCAGTGATAG
AGATACTGAGCACGGGAGGGTTGATTGTGTGAGTCTGTTCACAGTTTCAGCGGAAACGTTGATGCTGTGACAGATTT
ATGCGAGGCGGCTCCTTTTGGAGCCTTTTTTTTTtagatctctgcagGCGAAAAAACCCCGCCGAAGCGGGGTTTT
TTGCGGCCCTGCCTAGTCCTACCCTTCTTTGAGTGAGAACTAGGATCGCTCTCTCTCCA GTGCTCAGTATCTCT
ATCACTGATAGGGATGTCAAACCTCTATCAATGATAGAGTctcgagctgaccATAAATGTGAGCGGATAACATTGA
CATTGTGAGCGGATAACAAGATACTGAGCACCCCTGCCTAGTATCTCTTTCTTTGCTTCTCCAGTAAAGAGGAGA
TATTGGTTATGggggcccTCAACCAAGAAAAAGCCACTTACGCAGGAGCAACTGGAAGATGCTCGTCGTTTGAAG
CCATCTACGAGAAAAAGAAAAATGAACTTGGCTTATCCCAAGAGTCTGTAGCGGATAAAAAATGGGTATGGGGCAGA
GTGGAGTGGGCGCGCTTTTTAACGGTATTAATGCTTTAAACGCATACAATGCAGCATTATTAGCAAAAAATCCTGA
AAGTAAGTGTTGAAGAGTTCAGTCCTTCCATTGCTCGTGAAATCTACGAGATGTATGAGGCGGTTTCTATGCAAC
CGTCCTTACGTAGCGAGTATGAATACCCGGTGTCTCCACGTTCAAGCGGGCATGTTTAGTCCCGAACTTCGTA
CGTTTACAAAGGGCGACGCGGAGCGTTGGGTGAGTACCACGAAAAAGGCATCTGACTCTGCTTTTTGGCTGGAGG
TAGAAGGTAACCTCCATGACGGCACCCACTGGAAGTAAACCCTCATTCCCGGATGGGATGCTGATTTTGGTTGACC
CCGAACAGGCTGTAGAACCAGGGGATTTTTTGCATCGCCCGTCTTGGAGGCGATGAGTTTACCTTTAAGAACTTA
TCCGTGACAGTGGACAAGTTTTTTTTGCAACCGCTTAATCCGCAGTATCCCATGATTCCGTGCAATGAATCCTGTA
GCGTGGTGGGAAAGTAATTGCGAGCCAGTGGCCCCGAAGAAACATTCCGGTTAAACAAAAGCCCCGAAAGGCGGGC
TTTTCTGtgatcc
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Table listing our plasmids

Plasmid	Function	Genetics
pRAJ11	AND gate	GFPmut3b, RAJ11, pUC ori, ampR
pRHA12	AND gate	sfGFP, RAJ12, pSC101m ori, kanR
pRHA25	OR gate	mRFP1, RAJ11, pUC ori, ampR
pRHA37	OR gate	mRFP1, RAJ11, pUC ori, ampR
pRHA36	XOR gate (failed)	mRFP1, RAJ11, cI, RR12, pUC ori, ampR
pRHA40	XOR gate	mRFP1, RAJ11, cI, RAJ21, pUC ori, ampR



