

APPENDIX K

SKILL Codes

The complete SKILL code of the LATool.

```
menu=hiCreateMenuItem( ?name 'menu
                        ?itemText "DCELL matrix layout Automation"
                        ?callback "DCELLmenu()"
                        )
hiAddMenuItem(icfbToolsMenu menu)
procedure(DCELLmenu()
libName = "deneme"
desName = "DCELLmatrix"
Row = 1
Column = 1
Araust = 0
extkont = nil
STP = list( ('libName "Design Library Name" "string")
            list('desName "Design Name" "string")
              list('Row "Template Book Size" "integer")
                list('Column "Size of the Template Vector" "integer")
                  list('Araust "Power Grid Step" "integer")
                    list('extkont "Extracted View ?" "boolean"))
if( hiEditPropList( STP "DCELL matrix Layout Automation" nil ) then
    Lib=ddCreateLib(libName)
    techBindTechFile(Lib "TECH_CUQ")
    designLib = ddGetObj( libName )
paramkontrol(Row Column Araust libName desName extkont)
procedure(paramkontrol(Row Column Araust designLib desName extkont)
if((Row<1 || Row>100) then
    printf("The number of template vector range is between 1 to
    100\n")
    DCELLmenu()
else
    if((mod(Row 2)==0) then
        Row_sym=Row
        Row_lay=Row/2
    else
        Row_sym=(Row+1)
        Row_lay=(Row+1)/2 )
if((Column<1 || Column>100) then
    printf("The size of the template vector must be within 1 to
    100\n")
    DCELLmenu()
if((Column<10 || Araust==0 ) then
    Araust=150
    else
    if((Araust<5) then
        Araust=5 )
```

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DCELLlayout(designLib desName Row_lay Column Araust extkont)
DCELLsymbol(designLib desName Row_sym Column)
procedure(DCELLsymbol(DesignLibrary DesignName row column)
symbol      =dbOpenCellViewByType(DesignLibrary DesignName "symbol"
"schematicSymbol" "w")
instpin     =dbOpenCellView("basic" "sympin" "symbolNN" nil "r")
schCreateInstBox(symbol list( (0.0:-0.8125) (2.0:0.6875)))
schCreateSymbolShape(symbol "rectangle" "outline" list((0.25:-
0.5625) (1.75:0.4375)) 0.125)
schCreateSymbolShape(symbol "line" "outline" list((0.0:-0.3125)
(0.25:-0.3125)) 0)
schCreateSymbolShape(symbol "line" "outline" list((0.6875:-0.8125)
(0.6875:-0.5625)) 0)
schCreateSymbolShape(symbol "line" "outline" list((1.375:-0.8125)
(1.375:-0.5625)) 0)
schCreateSymbolShape(symbol "line" "outline" list((2.0:-0.1875)
(1.75:-0.1875)) 0)
schCreateSymbolShape(symbol "line" "outline" list((0.375:0.6875)
(0.375:0.4375)) 0)
schCreateSymbolShape(symbol "line" "outline" list((0.5:0.6875)
(0.5:0.4375)) 0)
schCreateSymbolShape(symbol "line" "outline" list((0.8125:0.6875)
(0.8125:0.4375)) 0)
schCreateSymbolShape(symbol "line" "outline" list((0.9375:0.6875)
(0.9375:0.4375)) 0)
schCreateSymbolShape(symbol "line" "outline" list((1.0625:0.6875)
(1.0625:0.4375)) 0)
schCreateSymbolShape(symbol "line" "outline" list((1.1875:0.6875)
(1.1875:0.4375)) 0)
rows=concat(row-1)
columns=concat(column-1)
rowa=strcat("Row_Akt<0:" rows ">")
vinp=strcat("Vinp<0:" columns ">")
vinn=strcat("Vinn<0:" columns ">")
out=strcat("OUT<0:" rows ">")
schCreateSymbolPin(symbol instpin rowa "input" (0.0:-0.3125) "R0")
schCreateSymbolPin(symbol instpin vinp "input" (0.6875:-0.8125)
"R0")
schCreateSymbolPin(symbol instpin vinn "input" (1.375:-0.8125) "R0")
schCreateSymbolPin(symbol instpin out "output" (2.0:-0.1875) "R0")
schCreateSymbolPin(symbol instpin "Vdd_DCELL" "inputOutput"
(0.375:0.6875) "R0")
schCreateSymbolPin(symbol instpin "Gnd_DCELL" "inputOutput"
(0.5:0.6875) "R0")
schCreateSymbolPin(symbol instpin "Vbias" "input" (0.8125:0.6875)
"R0")
schCreateSymbolPin(symbol instpin "Ik" "input" (0.9375:0.6875) "R0")
schCreateSymbolPin(symbol instpin "Ib" "input" (1.0625:0.6875) "R0")
schCreateSymbolPin(symbol instpin "Itail" "input" (1.1875:0.6875)
"R0")
schCreateSymbolLabel(symbol (0.3125:-0.3125) "pin name" rowa
"centerLeft" "R0" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (0.6:-0.4875) "pin name" vinp
"centerCenter" "R0" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (1.3:-0.4875) "pin name" vinn
"centerCenter" "R0" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (1.6875:-0.1875) "pin name" out
"centerRight" "R0" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (0.375:0.375) "pin name" "Vdd_DCELL"
"centerRight" "R90" "stick" 0.0625 "normalLabel")

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schCreateSymbolLabel(symbol (0.5:0.375) "pin name" "Gnd_DCELL"
"centerRight" "R90" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (0.8125:0.375) "pin name" "Vbias"
"centerRight" "R90" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (0.9375:0.375) "pin name" "Ik"
"centerRight" "R90" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (1.0625:0.375) "pin name" "Ib"
"centerRight" "R90" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (1.1875:0.375) "pin name" "Itail"
"centerRight" "R90" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (1.375:0.5) "instance label"
"[@instanceName]" "centerLeft" "R0" "stick" 0.0625 "normalLabel")
schCreateSymbolLabel(symbol (1:0) "logical label" DesignName
"centerCenter" "R0" "stick" 0.0625 "normalLabel")
dbSave(symbol)
dbClose(symbol)
dbClose(instpin)
)
procedure (DCELLlayout(DesignLibrary DesignName row column Araust
extkont)
instDcell =dbOpenCellView("TEZ" "VQ_ROW_WTA_pc" "layout" nil "r")
layout =dbOpenCellViewByType(DesignLibrary DesignName "layout"
"maskLayout" "w")
leMoveCellViewOrigin( layout (0:0))
metallno = 34
metal2no = 36
xSol = 10.2
xAra = 9.3
yAlt = 10
yUst = 10
xDcell = 15.8
yDcell = 26.8
xRWTA = 57.5
yRA1 = 11.6
yRA2 = 13.8
xCoorRASol = 0
xCoorRASag = 1
yO1 = 0.4
yO2 = 25.5
xVbias = 6.9
xVinp = 0.7
xVinn = 14.2
xIk = 0.8
xIb = 3.1
xGnd = 12.4
xItail = 49.5
xVdd = 51.8
xCoordinate = 0
yCoordinate = 0
aras = 0
ara = nil
usts = 0
ust = nil
alt = nil
sol = nil
sags = 0
sag = nil
satir = row
sutun = column
Arasira = Araust
name_vdd = "Vdd_DCELL"

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name_Vbias      =      "Vbias"
name_Ik         =      "Ik"
name_Ib         =      "Ib"
name_gnd        =      "Gnd_DCELL"
name_Itail      =      "Itail"
net_vdd         =      dbMakeNet(layout name_vdd nil)
net_Vbias       =      dbMakeNet(layout name_Vbias nil)
net_Ik          =      dbMakeNet(layout name_Ik nil)
net_Ib          =      dbMakeNet(layout name_Ib nil)
net_gnd         =      dbMakeNet(layout name_gnd nil)
net_Itail       =      dbMakeNet(layout name_Itail nil)
dbCreateTerm(net_vdd name_vdd "inputOutput")
dbCreateTerm(net_Vbias name_Vbias "input")
dbCreateTerm(net_Ik name_Ik "input")
dbCreateTerm(net_Ib name_Ib "input")
dbCreateTerm(net_gnd name_gnd "inputOutput")
dbCreateTerm(net_Itail name_Itail "input")
for(a 1 satir
  for(b 1 sutun
    if( (mod(b Arasira)==0 && b<sutun) then
      ara = t
      aras =1
    else
      aras =0
      ara = nil )
    if( (a==1) then
      alt = t
    else
      alt = nil )
    if( (a==satir) then
      ust = t
      usts =1
    else
      usts =0
      ust = nil )
    if( (b==1) then
      sol = t
    else
      sol = nil )
    if( (b==sutun) then
      sag = t
      sags =1
    else
      sags =0
      sag = nil )
dbCreateParamInst( layout instDcell nil (xCoordinate : yCoordinate)
"R0" 1 list( list( "ust" "boolean" ust)
             list( "alt" "boolean" alt)
             list( "sag" "boolean" sag)
             list( "sol" "boolean" sol)
             list( "ara" "boolean" ara)      )      )
  if(sol then
    indexRA1 =concat(2*(a-1))
    indexRA2 =concat(2*(a-1)+1)
    netnameRA1 =strcat("Row_Akt<" indexRA1 ">" )
    netnameRA2 =strcat("Row_Akt<" indexRA2 ">" )
    newnet1 =dbMakeNet(layout netnameRA1 nil)
    newnet2 =dbMakeNet(layout netnameRA2 nil)
    dbCreateTerm(newnet1 netnameRA1 "input")
    dbCreateTerm(newnet2 netnameRA2 "input")

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yCoorRA1=yCoordinate+yRA1+yAlt
yCoorRA2=yCoordinate+yRA2+yAlt
pinshapel=dbCreateRect(layout list( metallno "pin")
                        list((xCoorRASol:yCoorRA1)
                              (xCoorRASag:yCoorRA1+1.4)))
pinshape2=dbCreateRect(layout list( metallno "pin")
                        list((xCoorRASol:yCoorRA2)
                              (xCoorRASag:yCoorRA2+1.4)))
newpin1=dbCreatePin(newnet1 pinshapel netnameRA1)
newpin2=dbCreatePin(newnet2 pinshape2 netnameRA2)
dbSetq(newpin1 list("left") accessDir)
dbSetq(newpin2 list("left") accessDir)
)
if(sag then
indexO1          =concat(2*(a-1))
indexO2          =concat(2*(a-1)+1)
netnameO1        =strcat("OUT<" indexO1 ">" )
netnameO2        =strcat("OUT<" indexO2 ">" )
newnet1 =dbMakeNet(layout netnameO1 nil)
newnet2 =dbMakeNet(layout netnameO2 nil)
dbCreateTerm(newnet1 netnameO1 "output")
dbCreateTerm(newnet2 netnameO2 "output")
yCoorO1=yCoordinate+yO1+yAlt
yCoorO2=yCoordinate+yO2+yAlt
xCoorOsag=xCoordinate+xDcell+xRWTA+xSol+xAra
xCoorOsol=xCoorOsag-1
pinshapel=dbCreateRect(layout list( metallno "pin")
                        list((xCoorOsol:yCoorO1)
                              (xCoorOsag:yCoorO1+0.9)))
pinshape2=dbCreateRect(layout list( metallno "pin")
                        list((xCoorOsol:yCoorO2)
                              (xCoorOsag:yCoorO2+0.9)))
newpin1=dbCreatePin(newnet1 pinshapel netnameO1)
newpin2=dbCreatePin(newnet2 pinshape2 netnameO2)
dbSetq(newpin1 list("right") accessDir)
dbSetq(newpin2 list("right") accessDir)
)
if(alt then
indexIN          =concat(b-1)
netnameINP       =strcat("Vinp<" indexIN ">" )
netnameINN       =strcat("Vinn<" indexIN ">" )
newnet1 =dbMakeNet(layout netnameINP nil)
newnet2 =dbMakeNet(layout netnameINN nil)
dbCreateTerm(newnet1 netnameINP "input")
dbCreateTerm(newnet2 netnameINN "input")
yCoorINalt=0
yCoorINust=1
xCoorINP=xCoordinate+xVinp+xSol
xCoorINN=xCoordinate+xVinn+xSol
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorINP:yCoorINalt)
                              (xCoorINP+0.9:yCoorINust)))
pinshape2=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorINN:yCoorINalt)
                              (xCoorINN+0.9:yCoorINust)))
newpin1=dbCreatePin(newnet1 pinshapel nil)
newpin2=dbCreatePin(newnet2 pinshape2 nil)
dbSetq(newpin1 list("bottom") accessDir)
dbSetq(newpin2 list("bottom") accessDir)
)
if(ust then
indexIN          =concat(b-1)
netnameINP       =strcat("Vinp<" indexIN ">" )

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netnameINN      =strcat("Vinn<" indexIN ">")
newnet1  =dbFindNetByName(layout netnameINP)
newnet2  =dbFindNetByName(layout netnameINN)
yCoorINust=yCoordinate+yDcell+yUst+yAlt
yCoorINalt=yCoorINust-1
xCoorINP=xCoordinate+xVinp+xSol
xCoorINN=xCoordinate+xVinn+xSol
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorINP:yCoorINalt)
                              (xCoorINP+0.9:yCoorINust)))
pinshape2=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorINN:yCoorINalt)
                              (xCoorINN+0.9:yCoorINust)))
newpin1=dbCreatePin(newnet1 pinshapel nil)
newpin2=dbCreatePin(newnet2 pinshape2 nil)
dbSetq(newpin1 list("top") accessDir)
dbSetq(newpin2 list("top") accessDir)
)
if( (ust && sol) then
yCoorust=yCoordinate+yDcell+yUst+yAlt
yCooralt=yCoorust-1
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((0:yCoorust)
                              (5.9:yCooralt)))
pinshape2=dbCreateRect(layout list( metal2no "pin")
                        list((xVbias:yCoorust)
                              (xVbias+2.9:yCooralt)))
newpin1=dbCreatePin(net_vdd pinshapel nil)
newpin2=dbCreatePin(net_Vbias pinshape2 nil)
dbSetq(newpin1 list("top") accessDir)
dbSetq(newpin2 list("top") accessDir)
)
if( (alt && sol) then
yCoorust=1
yCooralt=0
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((0:yCoorust)
                              (5.9:yCooralt)))
pinshape2=dbCreateRect(layout list( metal2no "pin")
                        list((xVbias:yCoorust)
                              (xVbias+2.9:yCooralt)))
newpin1=dbCreatePin(net_vdd pinshapel nil)
newpin2=dbCreatePin(net_Vbias pinshape2 nil)
dbSetq(newpin1 list("bottom") accessDir)
dbSetq(newpin2 list("bottom") accessDir)
)
if( (ust && ara) then
yCoorust=yCoordinate+yDcell+yUst+yAlt
yCooralt=yCoorust-1
xCoorara=xCoordinate+xDcell+0.1+xSol
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorara:yCoorust)
                              (xCoorara+9.1:yCooralt)))
newpin1=dbCreatePin(net_vdd pinshapel nil)
dbSetq(newpin1 list("top") accessDir)
)
if( (alt && ara) then
yCoorust=1
yCooralt=0
xCoorara=xCoordinate+xDcell+0.1+xSol
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorara:yCoorust)
                              (xCoorara+9.1:yCooralt)))
newpin1=dbCreatePin(net_vdd pinshapel nil)

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        dbSetq(newpin1 list("bottom") accessDir)
    )
    if( (ust && sag) then
        yCoorust=yCoordinate+yDcell+yUst+yAlt
        yCooralt=yCoorust-1
        xCoorara=xCoordinate+xDcell+0.1+xSol
        pinshapel=dbCreateRect(layout list( metal2no "pin")
                                list((xCoorara:yCoorust)
                                      (xCoorara+9.1:yCooralt)))
        newpin1=dbCreatePin(net_vdd pinshapel nil)
        dbSetq(newpin1 list("top") accessDir)
        yCoorust=yCoordinate+yDcell+yUst+yAlt
        yCooralt=yCoorust-1
        xCoorara=xCoordinate+xDcell+xAra+xIk+xSol
        pinshapel=dbCreateRect(layout list( metal2no "pin")
                                list((xCoorara:yCoorust)
                                      (xCoorara+1.2:yCooralt)))
        newpin1=dbCreatePin(net_Ik pinshapel nil)
        dbSetq(newpin1 list("top") accessDir)
        yCoorust=yCoordinate+yDcell+yUst+yAlt
        yCooralt=yCoorust-1
        xCoorara=xCoordinate+xDcell+xAra+xIb+xSol
        pinshapel=dbCreateRect(layout list( metal2no "pin")
                                list((xCoorara:yCoorust)
                                      (xCoorara+1.5:yCooralt)))
        newpin1=dbCreatePin(net_Ib pinshapel nil)
        dbSetq(newpin1 list("top") accessDir)
        yCoorust=yCoordinate+yDcell+yUst+yAlt
        yCooralt=yCoorust-1
        xCoorara=xCoordinate+xDcell+xAra+xGnd+xSol
        pinshapel=dbCreateRect(layout list( metal2no "pin")
                                list((xCoorara:yCoorust)
                                      (xCoorara+4.6:yCooralt)))
        newpin1=dbCreatePin(net_gnd pinshapel nil)
        dbSetq(newpin1 list("top") accessDir)
        yCoorust=yCoordinate+yDcell+yUst+yAlt
        yCooralt=yCoorust-1
        xCoorara=xCoordinate+xDcell+xAra+xItail+xSol
        pinshapel=dbCreateRect(layout list( metal2no "pin")
                                list((xCoorara:yCoorust)
                                      (xCoorara+1.5:yCooralt)))
        newpin1=dbCreatePin(net_Itail pinshapel nil)
        dbSetq(newpin1 list("top") accessDir)
        yCoorust=yCoordinate+yDcell+yUst+yAlt
        yCooralt=yCoorust-1
        xCoorara=xCoordinate+xDcell+xAra+xVdd+xSol
        pinshapel=dbCreateRect(layout list( metal2no "pin")
                                list((xCoorara:yCoorust)
                                      (xCoorara+5.7:yCooralt)))
        newpin1=dbCreatePin(net_vdd pinshapel nil)
        dbSetq(newpin1 list("top") accessDir)
    )
    if( (alt && sag) then
        yCoorust=1
        yCooralt=0
        xCoorara=xCoordinate+xDcell+0.1+xSol
        pinshapel=dbCreateRect(layout list( metal2no "pin")
                                list((xCoorara:yCoorust)
                                      (xCoorara+9.1:yCooralt)))
        newpin1=dbCreatePin(net_vdd pinshapel nil)
        dbSetq(newpin1 list("bottom") accessDir)
        xCoorara=xCoordinate+xDcell+xAra+xIk+xSol

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pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorara:yCoorust)
                              (xCoorara+1.2:yCooralt)))
newpin1=dbCreatePin(net_Ik pinshapel nil)
dbSetq(newpin1 list("bottom") accessDir)
xCoorara=xCoordinate+xDcell+xAra+xIb+xSol
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorara:yCoorust)
                              (xCoorara+1.5:yCooralt)))
newpin1=dbCreatePin(net_Ib pinshapel nil)
dbSetq(newpin1 list("bottom") accessDir)
xCoorara=xCoordinate+xDcell+xAra+xGnd+xSol
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorara:yCoorust)
                              (xCoorara+4.6:yCooralt)))
newpin1=dbCreatePin(net_gnd pinshapel nil)
dbSetq(newpin1 list("bottom") accessDir)
xCoorara=xCoordinate+xDcell+xAra+xItail+xSol
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorara:yCoorust)
                              (xCoorara+1.5:yCooralt)))
newpin1=dbCreatePin(net_Itail pinshapel nil)
dbSetq(newpin1 list("bottom") accessDir)
xCoorara=xCoordinate+xDcell+xAra+xVdd+xSol
pinshapel=dbCreateRect(layout list( metal2no "pin")
                        list((xCoorara:yCoorust)
                              (xCoorara+5.7:yCooralt)))
newpin1=dbCreatePin(net_vdd pinshapel nil)
dbSetq(newpin1 list("bottom") accessDir)
xCoordinate=xCoordinate+xDcell+(aras*xAra)
yCoordinate = yCoordinate+yDcell
xCoordinate = 0
dbSave(layout)
if( extkont then
    printf("Extraction Phase, This may take time\n")
    ivExtract( ?cell layout
              ?echo nil
              ?set "capall" )
dbClose(layout)
dbClose(instDcell)
ddsServOpen(DesignLibrary DesignName "layout" "edit")
deInstallApp(getCurrentWindow() "Abstract")
absHiAutoPrBoundary()
absHiSetCVProps()
absHiAbgen()
geSave()
leCloseWindow()

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