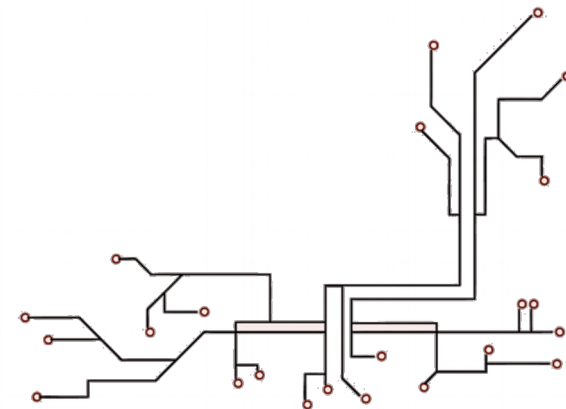
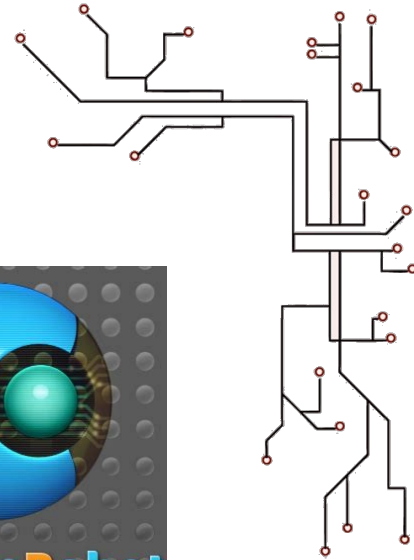
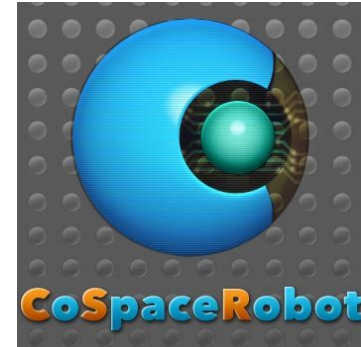


CoSpace – Coordinate System

- Compass
 - Driving Towards Heading
- PositionX & PositionY
 - Avoiding Limits in World_2
 - Driving Towards Position (X,Y)



CoSpace – Compass

0°



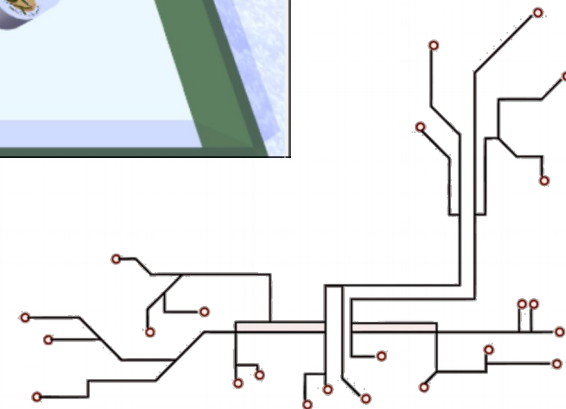
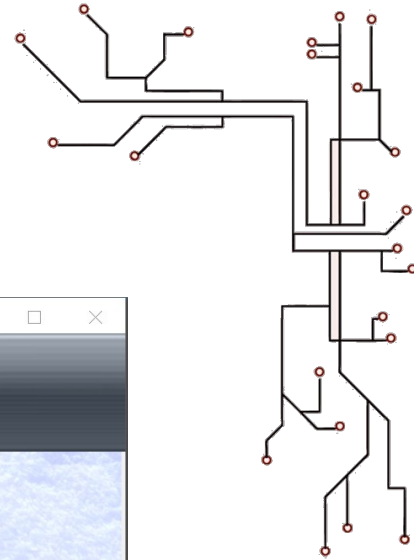
90°

270°

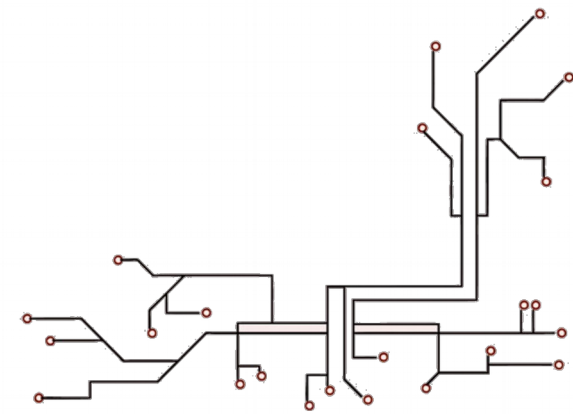
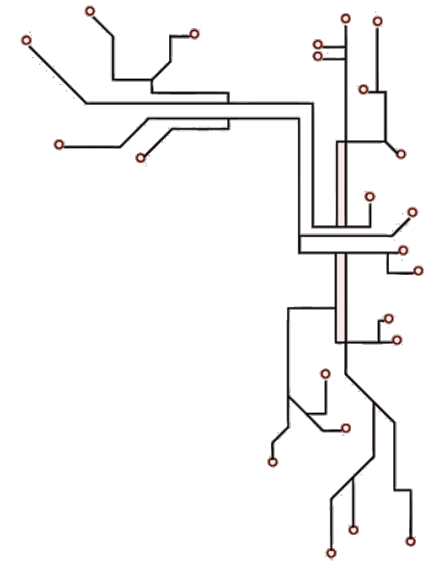
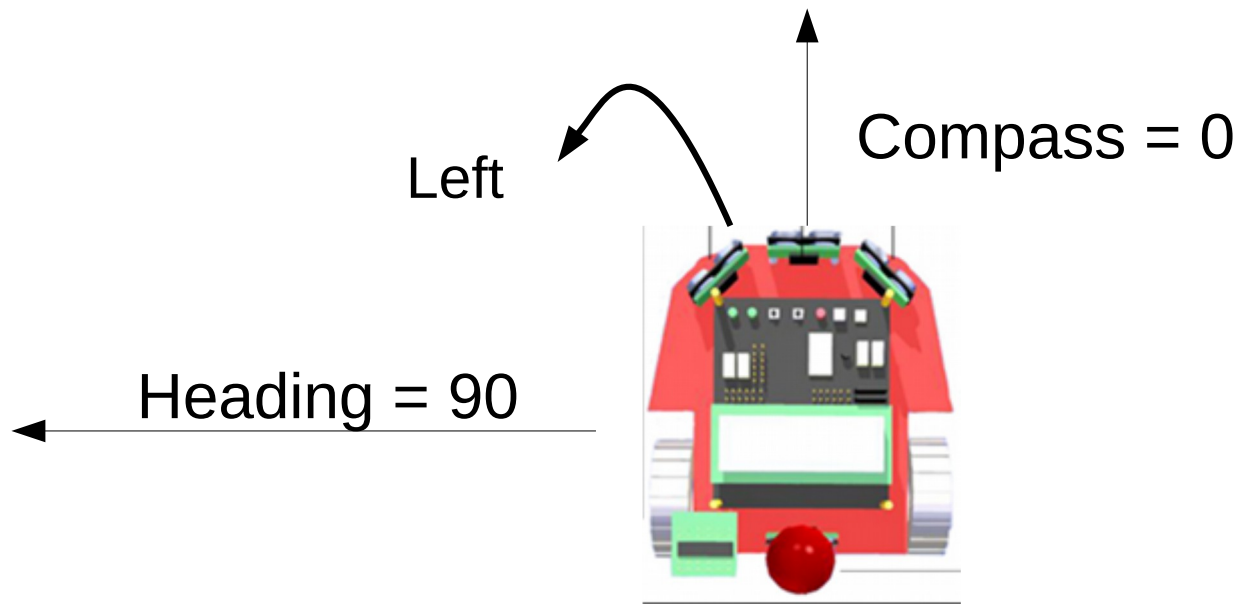
180°

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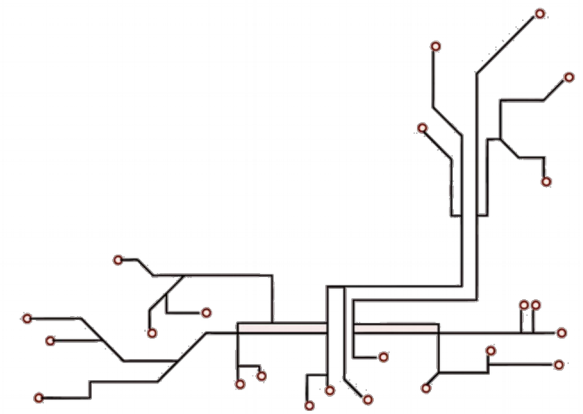
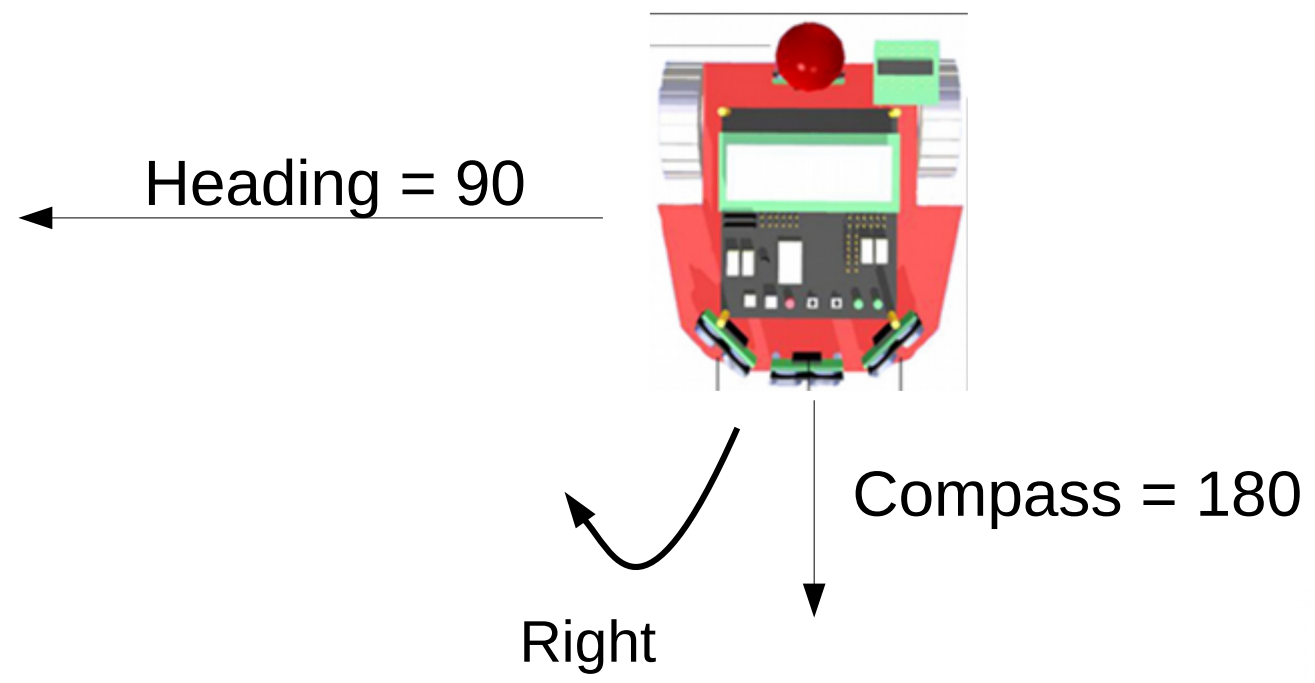
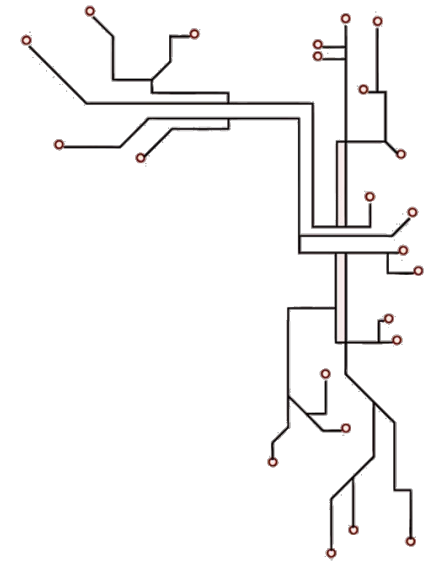
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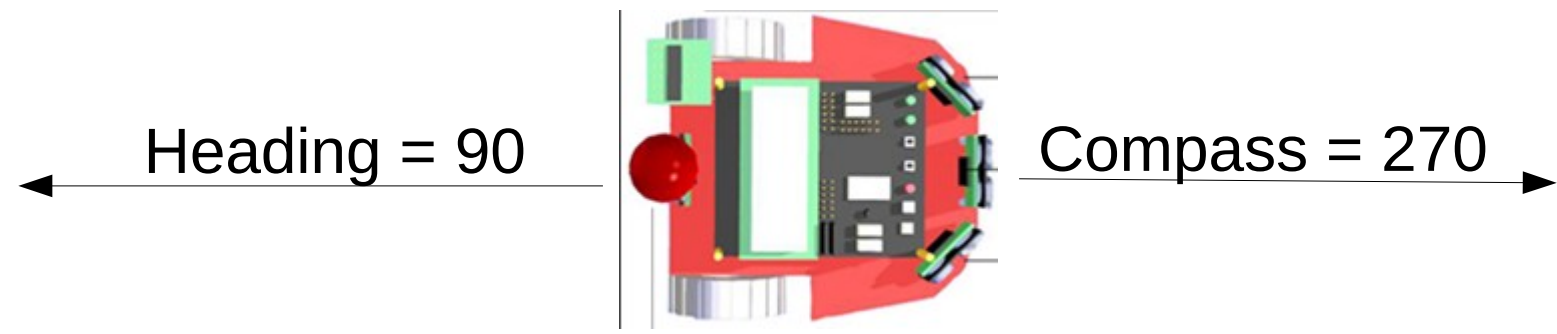
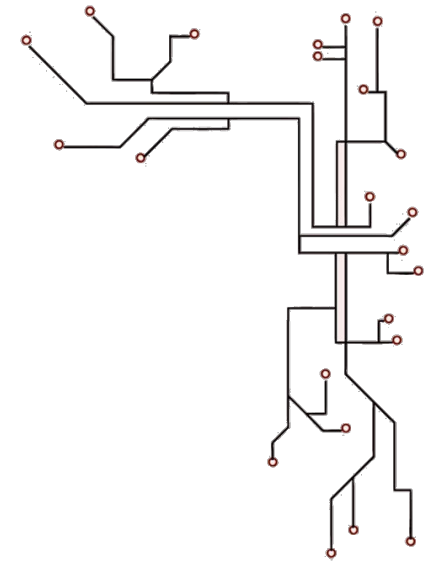
CoSpace – Drive To Heading



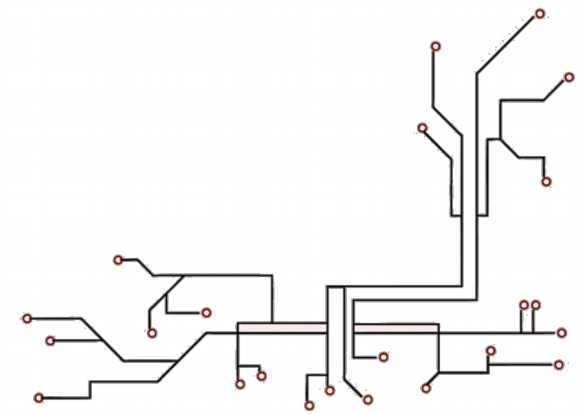
CoSpace – Drive To Heading



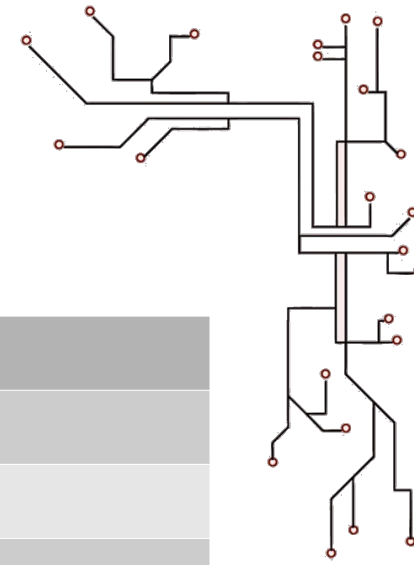
CoSpace – Drive To Heading



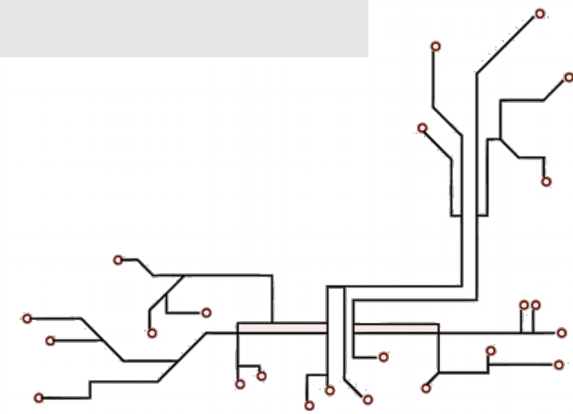
?



CoSpace – Drive To Heading



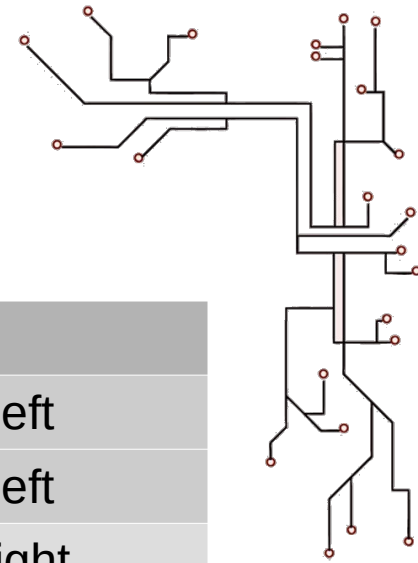
Compass	Target Heading	Error (Compass-Heading)	Turn
0	90	-90	
0	179	-179	
0	181	-181	
0	270	-270	
0	359	-359	
90	0	90	
179	0	179	
181	0	181	
270	0	270	
359	0	359	



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CoSpace – Drive To Heading

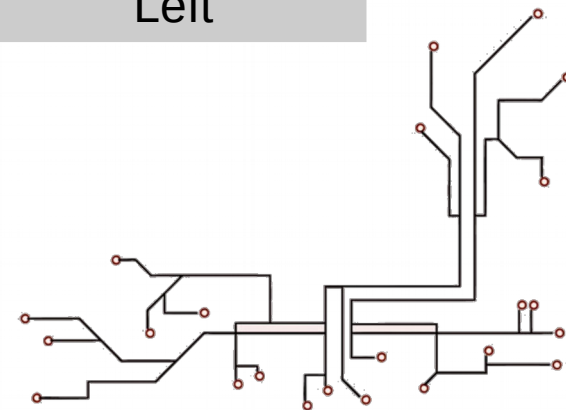


Compass	Target Heading	Error (Compass-Heading)	Turn
0	90	-90	Left
0	179	-179	Left
0	181	-181	Right
0	270	-270	Right
0	359	-359	Right
90	0	90	Right
179	0	179	Right
181	0	181	Left
270	0	270	Left
359	0	359	Left

What if the Error is close, like -5 to 5...?

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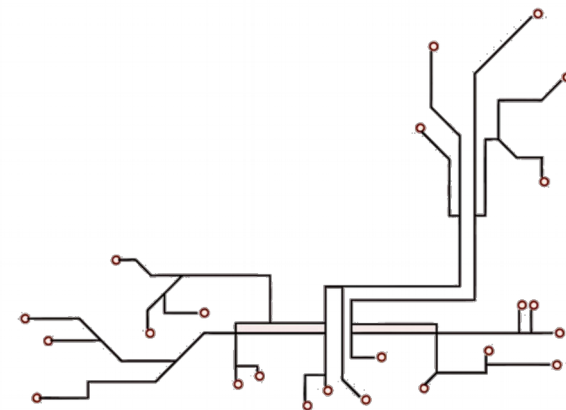
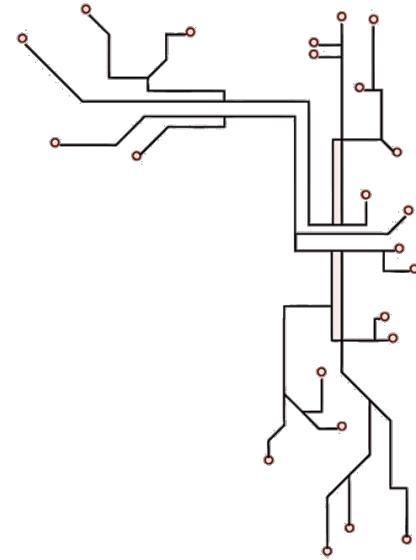
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CoSpace – Drive To Heading

General Algorithm

- Error = Compass – Heading
- Check Error
 - Less than -180 : Turn Right
 - Between -180 and -? : Turn Left
 - Between ? and 180 : Turn Right
 - More than 180 : Turn Left
 - Else : FWD



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CoSpace – Position X, Y

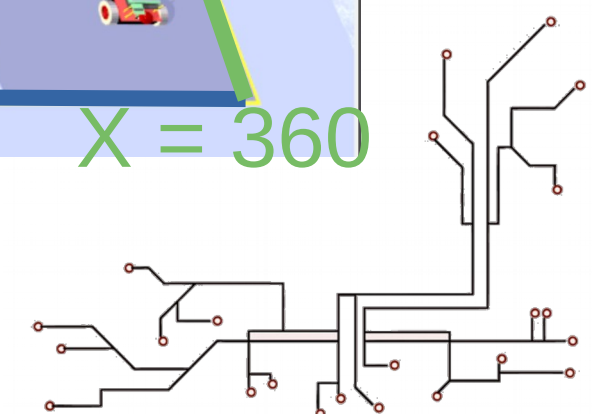
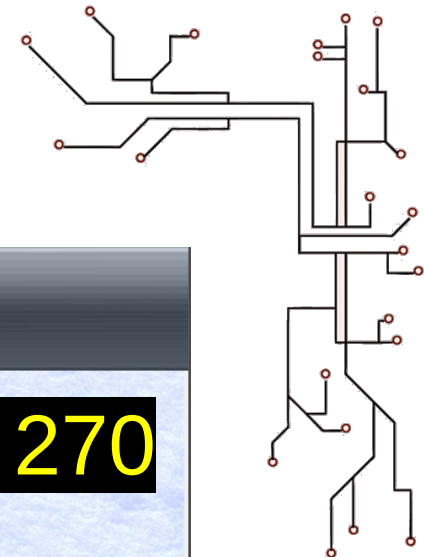


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CoSpace – Avoiding Limits



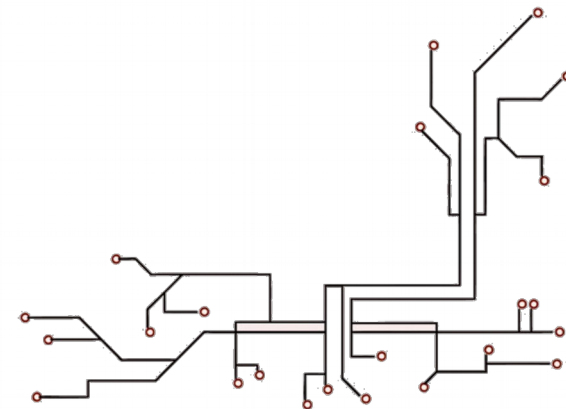
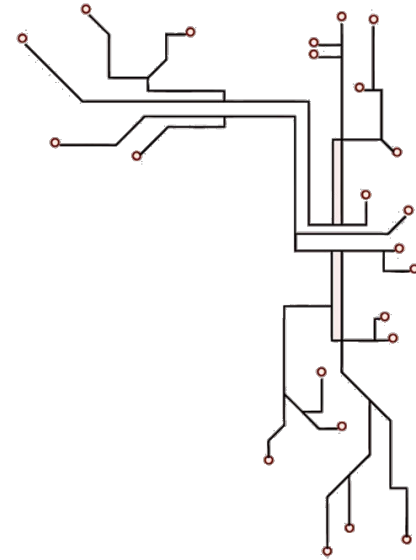
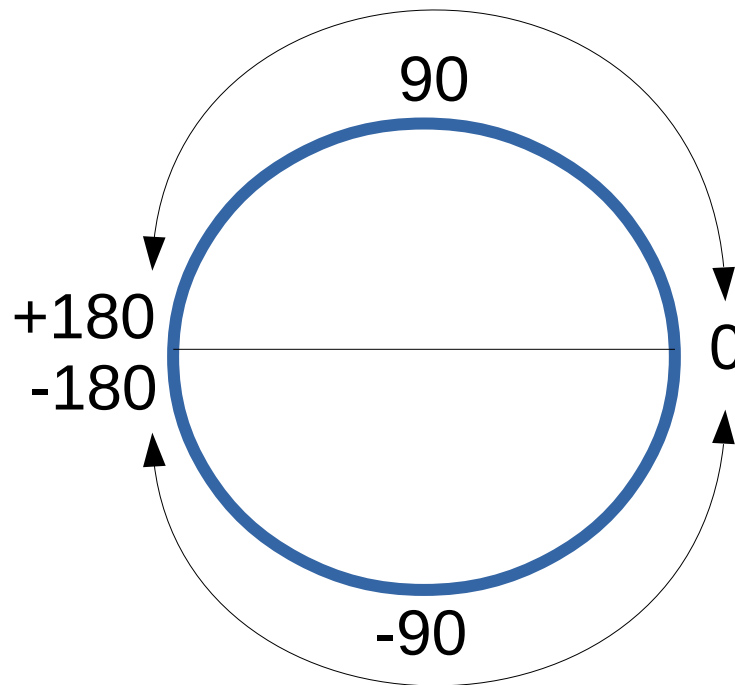
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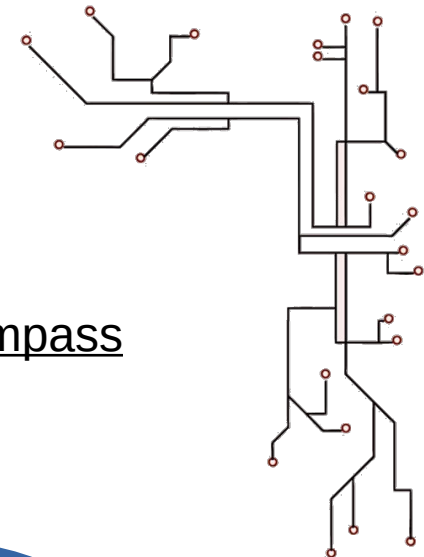
CoSpace – Drive To Position

General Algorithm

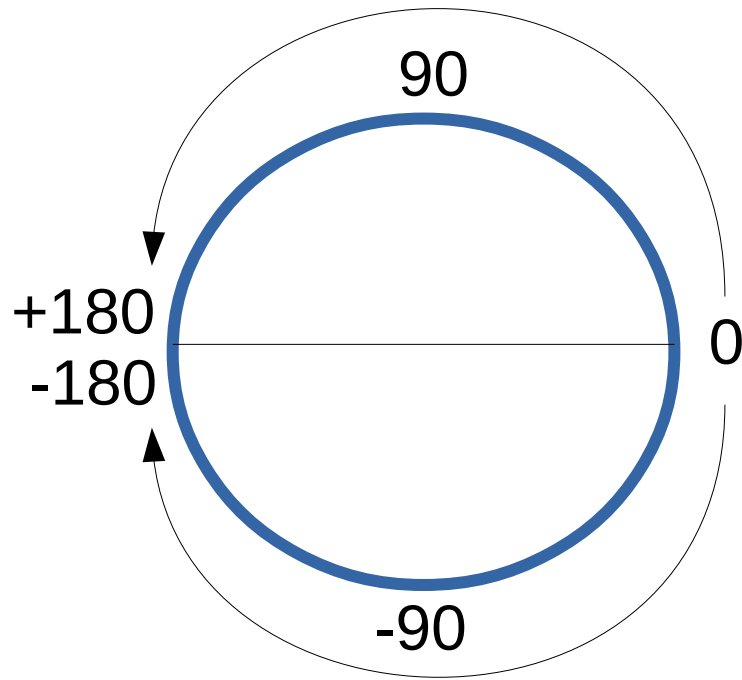
- $ErrX = HeadingX - PositionX$
- $ErrY = HeadingY - PositionY$
- $Angle = \text{atan2}(ErrY, ErrX) * 180 / \text{PI}$



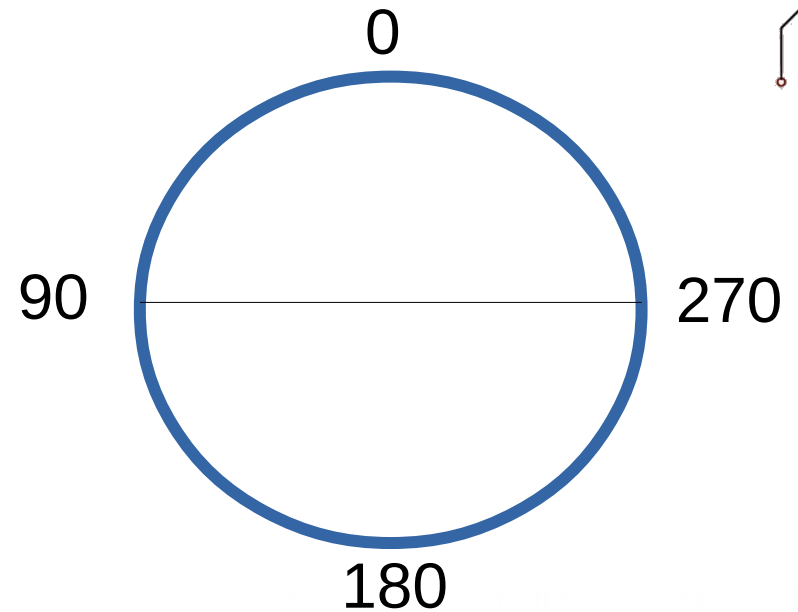
CoSpace – Drive To Position



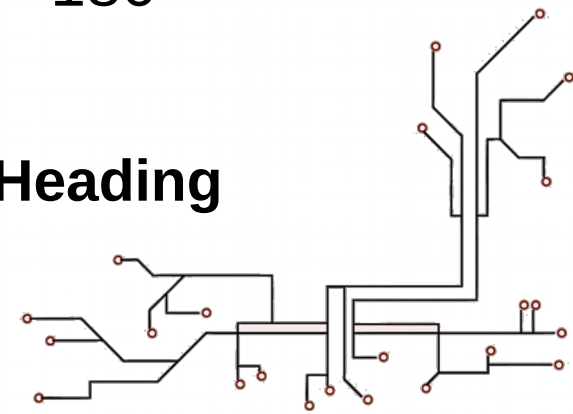
ArcTan Angles



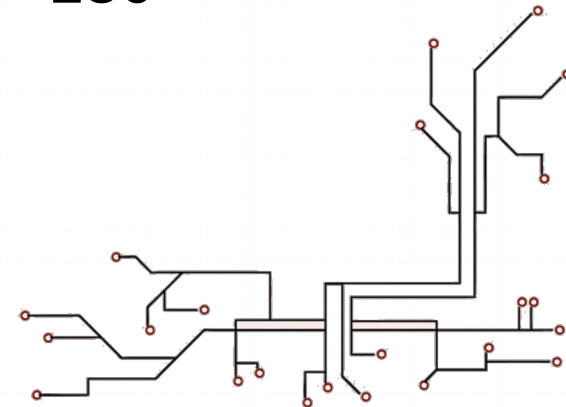
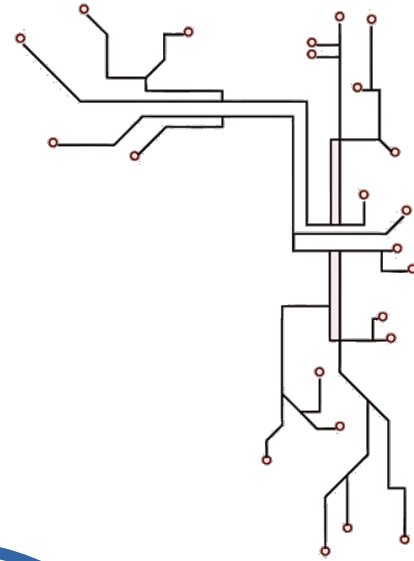
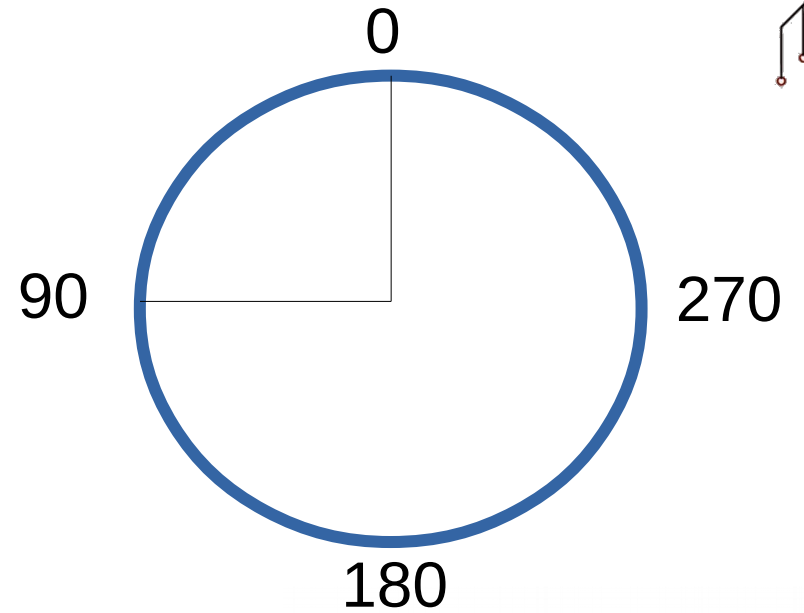
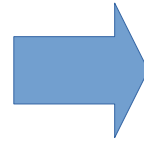
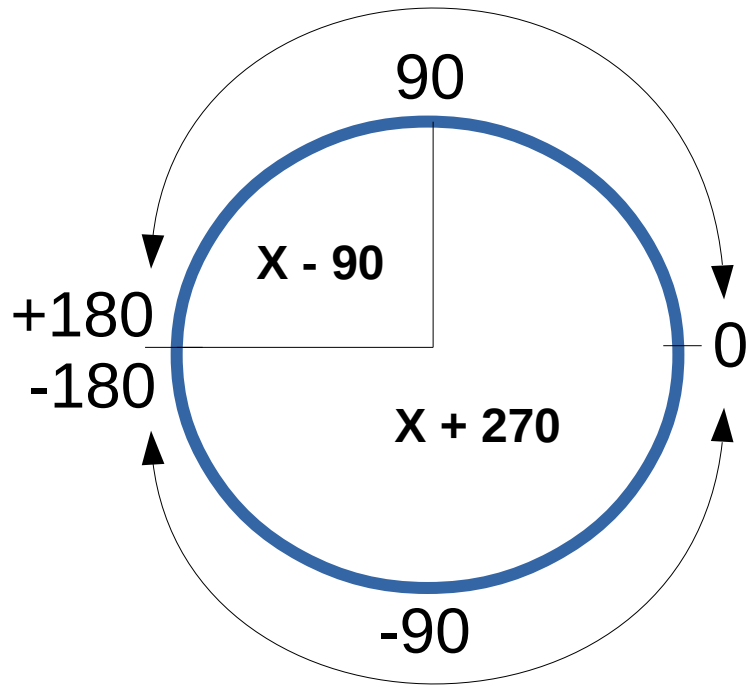
CoSpace Compass



**Convert Polar Coordinates
Then use same logic as Drive to Heading**



CoSpace – Drive To Position



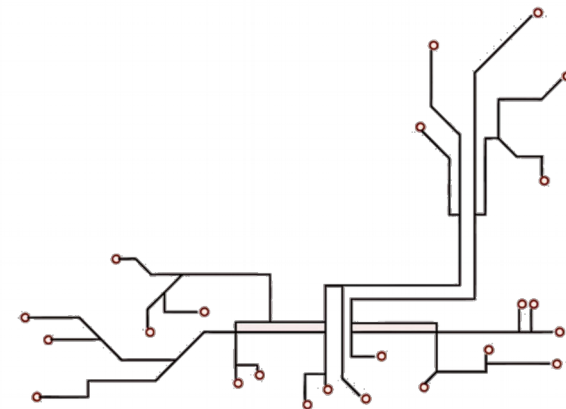
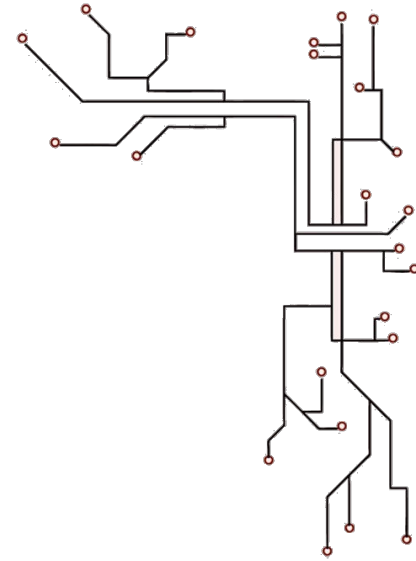
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CoSpace – Drive To Position

General Algorithm

- $Angle = \text{atan2}(Hy - Py, Hx - Px) * 180 / PI$
- *If (Angle >= 90 && Angle <= 180)*
 - *Heading = Angle – 90;*
- *Else*
 - *Heading = Angle + 270;*
- Error = Compass – Heading
- Check Error
 - Less than -180 : Turn Right
 - Between -180 and -? : Turn Left
 - Between ? and 180 : Turn Right
 - More than 180 : Turn Left
 - Else : FWD



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