Verify muralizer algorithm on the arduino

Inverse transformation (to check results)

In[142]:=
```
inversexform[refpoints_] := Function[{radii},
  Block[{ra = radii[[1]], rb = radii[[2]], xa = refpoints[[1, 1]],
    ya = refpoints[[1, 2]], xb = refpoints[[2, 1]], yb = refpoints[[2, 2]]},
   {(xa + xb)/2 + ((ra - rb) (ra + rb) (-xa + xb))/(2 ((-xa + xb)^2 + (-ya + yb)^2)) +
     ((-ya + yb) Sqrt[-((-(ra - rb)^2 + (-xa + xb)^2 + (-ya + yb)^2) (-(ra + rb)^2 + (-xa + xb)^2 + (-ya + yb)^2))])/
      (2 ((-xa + xb)^2 + (-ya + yb)^2)),
    (ya + yb)/2 + ((ra - rb) (ra + rb) (-ya + yb))/(2 ((-xa + xb)^2 + (-ya + yb)^2)) -
     ((-xa + xb) Sqrt[-((-(ra - rb)^2 + (-xa + xb)^2 + (-ya + yb)^2) (-(ra + rb)^2 + (-xa + xb)^2 + (-ya + yb)^2))])/
      (2 ((-xa + xb)^2 + (-ya + yb)^2))}
  ]
 ]
```

Mathematica output

In[141]:=
```
mathematicapath = {{124, 208}, {123, 207}, {123, 206}, {123, 205}, {122, 204}, {122, 203},
   {122, 202}, {121, 201}, {121, 200}, {121, 199}, {121, 198}, {120, 197}, {120, 196},
   {120, 195}, {120, 194}, {119, 193}, {119, 192}, {119, 191}, {119, 190}, {119, 189},
   {118, 188}, {118, 187}, {118, 186}, {118, 185}, {118, 184}, {118, 183}, {118, 182},
   {117, 181}, {117, 180}, {117, 179}, {117, 178}, {117, 177}, {117, 176}, {117, 175},
   {117, 174}, {117, 173}, {117, 172}, {117, 171}, {117, 170}, {117, 169}, {116, 168},
   {116, 167}, {116, 166}, {116, 165}, {117, 164}, {117, 163}, {117, 162}, {117, 161},
   {117, 160}, {117, 159}, {117, 158}, {117, 157}, {117, 156}, {117, 155}, {117, 154},
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   {140, 89}, {141, 88}, {141, 87}, {142, 86}, {142, 85}, {143, 84}, {143, 83}, {144, 82},
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   {160, 57}, {161, 56}, {161, 55}, {162, 54}, {163, 53}, {163, 52}, {164, 51}, {165, 50},
   {166, 49}, {166, 48}, {167, 47}, {168, 46}, {169, 45}, {169, 44}, {170, 43},
   {171, 42}, {171, 41}, {172, 40}, {173, 39}, {174, 38}, {174, 37}, {175, 36},
   {176, 35}, {177, 34}, {177, 33}, {178, 32}, {179, 31}, {180, 30}, {181, 29}};
```

arduino output

In[143]:=
```
SetDirectory["/data/arduino/arduino-0015"]
FileNames[]
```

Out[143]= /data/arduino/arduino-0015

Out[144]= {arduino, arduinolog, curve, examples, hardware, lib, .metadata, muralizer, reference, sketchbook, straightline}

In[147]:=
```
TableForm[arduinoraw = Import["arduinolog", "Table"]]
```

Out[147]//TableForm=

Stable	Library				
==					
Native	lib	Version	=	RXTX-2.1-7	
Java	lib	Version	=	RXTX-2.1-7	
Binary	sketch	size:	7952	bytes	(of
0.					
0.					
0.					
(124,208)					
(181,28)					
15 376.					
43 264.					
0.					
0.					
0.					
-0.01					
-y					
-x					
(123,207)					
-y					
(123,206)					
-y					

```
(123,205)
-y
-x
(122,204)
-y
(122,203)
-y
(122,202)
-y
-x
(121,201)
-y
(121,200)
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(121,199)
-y
(121,198)
-y
-x
(120,197)
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(120,196)
-y
(120,195)
-y
(120,194)
-y
-x
(119,193)
-y
(119,192)
-y
(119,191)
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(119,190)
-y
(119,189)
-y
-x
(118,188)
-y
(118,187)
-y
(118,186)
-y
```

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(118,185)
-y
(118,184)
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(118,183)
-y
(118,182)
-y
-x
(117,181)
-y
(117,180)
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(117,179)
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(117,178)
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(117,176)
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(117,175)
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(117,169)
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(116,168)
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(116,167)
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(116,166)
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(116,165)
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(116,164)
```

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-y
(116,163)
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(116,144)
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(118,142)
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(119,141)
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(142,86)
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(145,80)
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(149,73)
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-y
(151,70)
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+x
(152,69)
-y
+x
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(153,67)
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(154,66)
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(162,54)
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(163,53)
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(163,52)
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(164,51)
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(167,47)
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(168,46)
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(169,45)
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(169,44)
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(170,43)
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(171,42)
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(171,41)
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(172,40)
-y
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(173,39)
-y
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(174,38)
-y
(174,37)
-y
+x
(175,36)
-y
+x
(176,35)
-y
+x
```

```
(177,34)
-y
(177,33)
-y
+x
(178,32)
-y
+x
(179,31)
-y
+x
(180,30)
-y
+x
(181,29)
Pixels                                  drawn:       179
Experimental:                           JNI_OnLoad   called.
```

In[175]:=
```
arduinopath = ToExpression[StringReplace[#, {"(" → "{", ")" → "}"}]] & /@
  Select[First /@ Select[arduinoraw, Length[#] == 1 &],
   MatchQ[#, s_String /; StringMatchQ[s, "(*,*)*"]] &]
```

Out[175]=
```
{{124, 208}, {181, 28}, {123, 207}, {123, 206}, {123, 205}, {122, 204}, {122, 203}, {122, 202},
 {121, 201}, {121, 200}, {121, 199}, {121, 198}, {120, 197}, {120, 196}, {120, 195}, {120, 194},
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 {148, 76}, {148, 75}, {149, 74}, {149, 73}, {150, 72}, {151, 71}, {151, 70}, {152, 69},
 {153, 68}, {153, 67}, {154, 66}, {155, 65}, {155, 64}, {156, 63}, {157, 62}, {157, 61},
 {158, 60}, {159, 59}, {159, 58}, {160, 57}, {161, 56}, {161, 55}, {162, 54}, {163, 53},
 {163, 52}, {164, 51}, {165, 50}, {166, 49}, {166, 48}, {167, 47}, {168, 46}, {169, 45},
 {169, 44}, {170, 43}, {171, 42}, {171, 41}, {172, 40}, {173, 39}, {174, 38}, {174, 37},
 {175, 36}, {176, 35}, {177, 34}, {177, 33}, {178, 32}, {179, 31}, {180, 30}, {181, 29}}
```
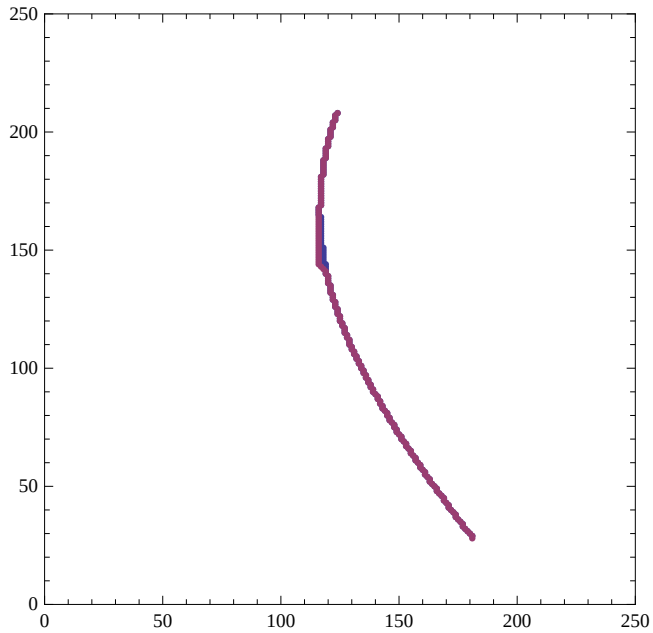

Comparison

In[185]:=
```
ListPlot[{mathematicapath, arduinopath},
 Frame → True, PlotRange → {#, #} &[{0, 250}], AspectRatio → 1]
```

Out[185]=



In[181]:=
```
inversexform[{{-100, 0}, {100, 0}}][{128, 81}]
```

Out[181]=
$$\left\{\frac{9823}{400}, -\frac{9\sqrt{1\,717\,391}}{400}\right\}$$

In[184]:=
```
ListPlot[inversexform[{{-100, 0}, {100, 0}}] /@ # & /@ {mathematicapath, arduinopath},
 Frame → True, PlotRange → {{-100, 100}, {-200, 0}}, AspectRatio → 1]
```

Out[184]=