

Collaborative Digital Design

When the Architect meets the Software Engineer

Luís Santos António Menezes Leitão

`luis.sds82@gmail.com`

`antonio.menezes.leitao@ist.utl.pt`

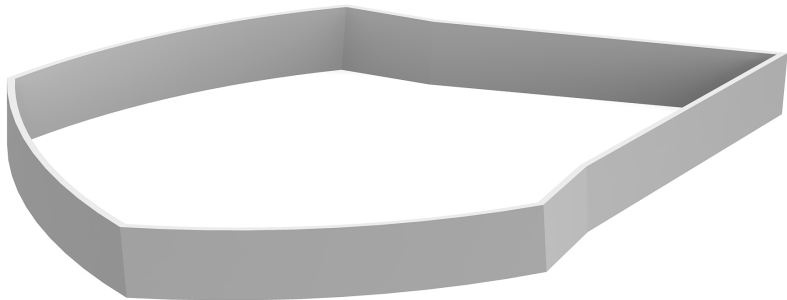
eCAADe 2012-Digital Physicality/Physical Digitality

Teaching



Teaching

Teaching



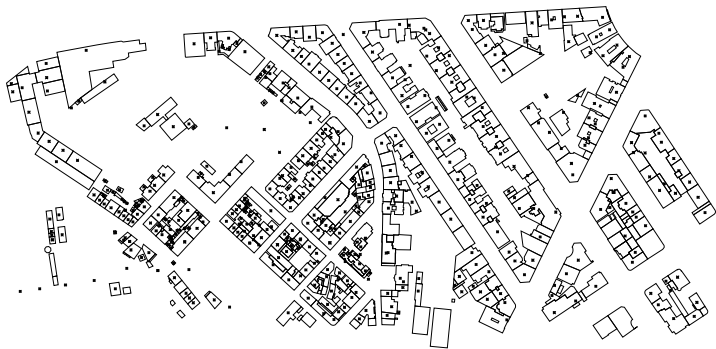
Teaching

Teaching

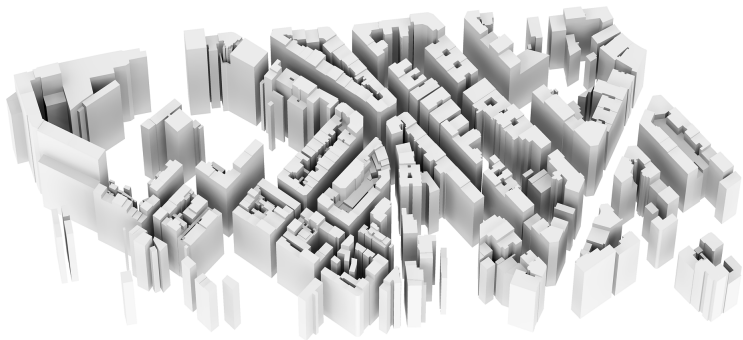
Teaching

Teaching

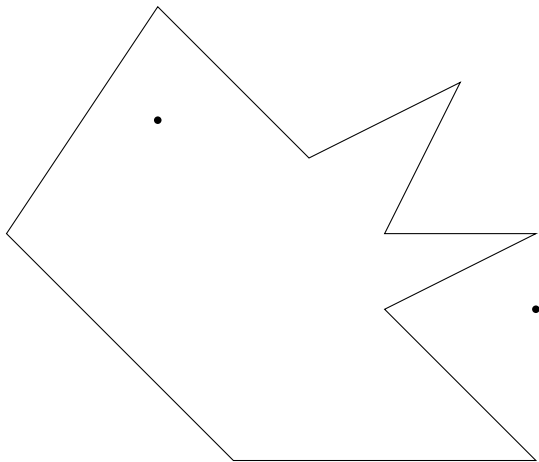
Algorithms



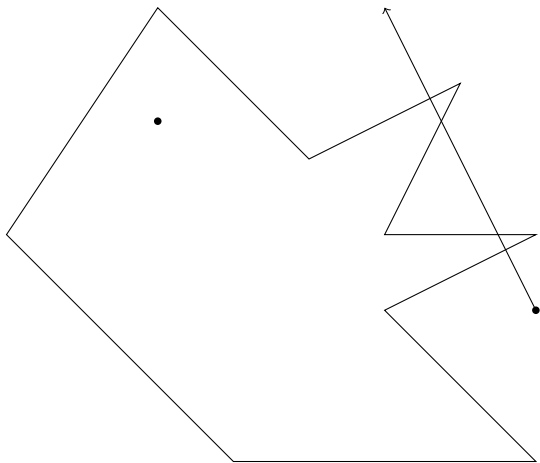
Algorithms



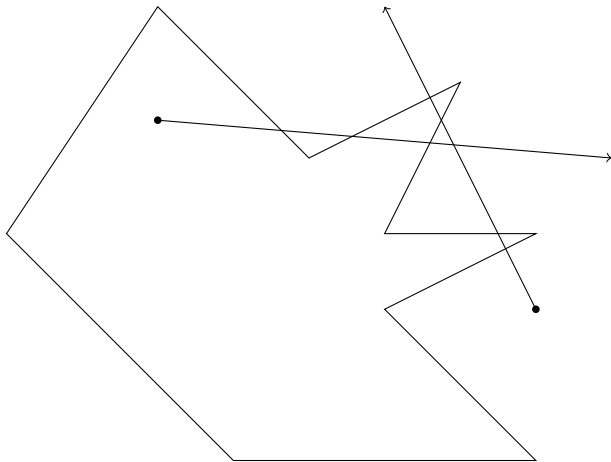
Algorithms



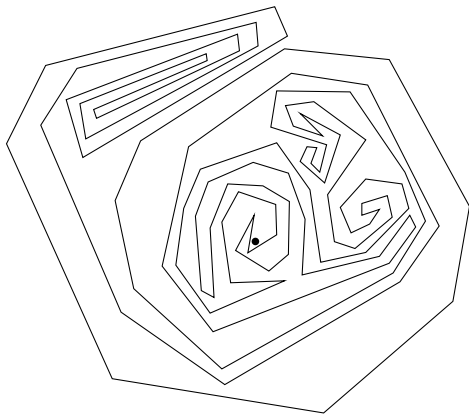
Algorithms



Algorithms



Algorithms



Algorithms



Translation



Google is your friend

Google is your friend

Search for ``Delaunay" + ``*your preferred language*"

Google is your friend

Search for ``Delaunay" + ``*your preferred language*"

Java



373000

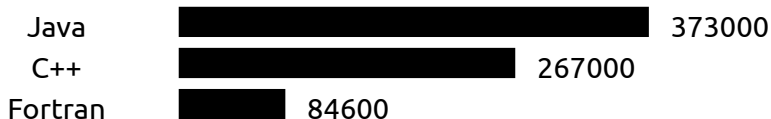
Google is your friend

Search for ``Delaunay" + ``*your preferred language*"

Java		373000
C++		267000

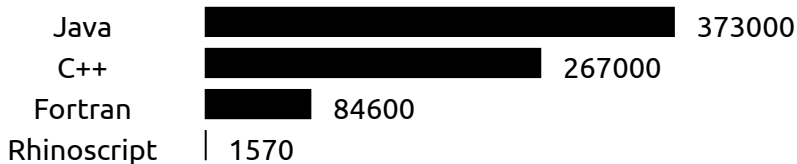
Google is your friend

Search for ``Delaunay" + ``*your preferred language*''



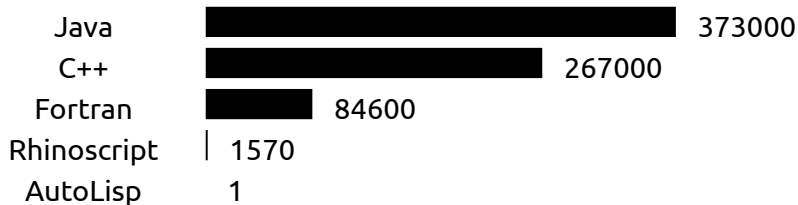
Google is your friend

Search for ``Delaunay" + ``*your preferred language*"



Google is your friend

Search for ``Delaunay" + ``*your preferred language*"



Translation

Delaunay in C++ (tiny fragment)

```
class triangleHasVertex {
public:
    triangleHasVertex(const vertex SuperTriangle[3]) :
        m_pSuperTriangle(SuperTriangle) {}

    bool operator()(const triangle& tri) const {
        for (int i = 0; i < 3; i++) {
            const vertex * p = tri.GetVertex(i);
            if (p >= m_pSuperTriangle && p < (m_pSuperTriangle + 3))
                return true;
        }
        return false;
    }
protected:
    const vertex * m_pSuperTriangle;
};
```


Integration

AutoLisp + AutoCAD

The image displays the AutoCAD interface with the Visual LISP editor open. The left pane shows the following AutoLisp code:

```
(defun toroidal-knot (p a b r0 r1 r2 m n)
  (parametric
    (lambda (u v)
      (+cil p
        (+ r0
          (* r1 (cos (* b u)))
          (* r2 (cos v)))
        (* a u)
        (+ (* r1 (sin (* b u)))
          (* r2 (sin v))))))
    0 2*pi m
    0 2*pi n))

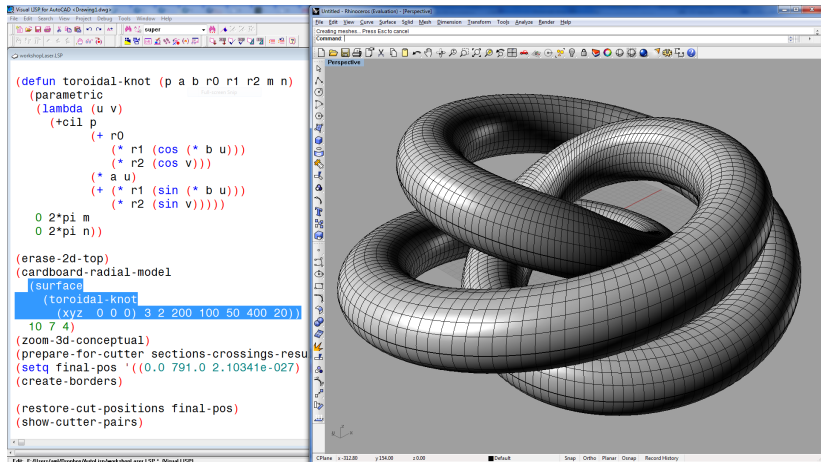
(erase-2d-top)
(cardboard-radial-model
  (surface
    (toroidal-knot
      (xyz 0 0 0) 3 2 200 100 50 400 20))
  10 7 4)
(zoom-3d-conceptual)
(prepare-for-cutter sections-crossings-resu
(setq final-pos '((0.0 791.0 2.10341e-027)
(create-borders)

(restore-cut-positions final-pos)
(show-cutter-pairs)
```

The right pane shows a 3D rendering of a toroidal knot, a complex mathematical structure consisting of two intertwined loops. The knot is rendered in a light gray color with a visible mesh grid. The background is dark blue with a grid pattern. The interface includes a top menu bar, a toolbar, and a command line at the bottom.

Integration

AutoLisp + Rhinoceros



The image shows two overlapping software windows. The left window is 'Visual LISP for AutoCAD - Drawing1.dwg', displaying a list of LISP commands. The right window is 'Rhino - Rhinoceros (Evaluation) - [Perspective]', showing a 3D wireframe model of a toroidal knot.

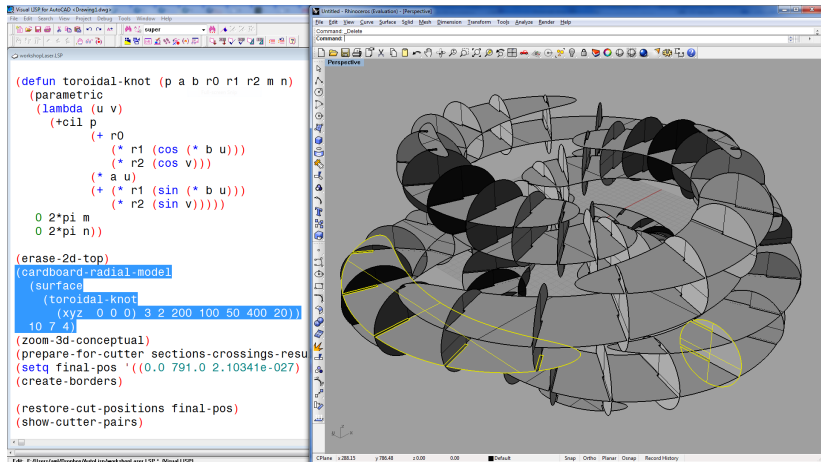
```
(defun toroidal-knot (p a b r0 r1 r2 m n)
  (parametric
    (lambda (u v)
      (+cil p
        (+ r0
          (* r1 (cos (* b u)))
          (* r2 (cos v)))
        (* a u)
        (+ (* r1 (sin (* b u)))
          (* r2 (sin v))))))
    0 2*pi m
    0 2*pi n))

(erase-2d-top)
(cardboard-radial-model
  (surface
    (toroidal-knot
      (xyz 0 0 0) 3 2 200 100 50 400 20))
  10 7 4)
(zoom-3d-conceptual)
(prepare-for-cutter-sections-crossings-resu
  (setq final-pos '((0.0 791.0 2.10341e-027)
    (create-borders)

    (restore-cut-positions final-pos)
    (show-cutter-pairs)
```

The 3D model in the Rhino window is a complex, knotted structure composed of a grid of lines, representing a toroidal knot. It features multiple loops and crossings, rendered in a perspective view.

AutoLisp + Rhinoceros



The image displays two software windows side-by-side. The left window is 'Visual LISP for AutoCAD - Drawing1.dwg', showing a Visual LISP script. The right window is 'Rhino5 - Rhinoceros Evaluation - [Perspective]', showing a 3D model of a toroidal knot.

```
(defun toroidal-knot (p a b r0 r1 r2 m n)
  (parametric
    (lambda (u v)
      (+cil p
        (+ r0
          (* r1 (cos (* b u)))
          (* r2 (cos v)))
          (* a u)
          (* r1 (sin (* b u)))
          (* r2 (sin v))))))
  0 2*pi m
  0 2*pi n))

(erase-2d-top)
(cardboard-radial-model
  (surface
    (toroidal-knot
      (xyz 0 0 0) 3 2 200 100 50 400 20)
    10 7 4))

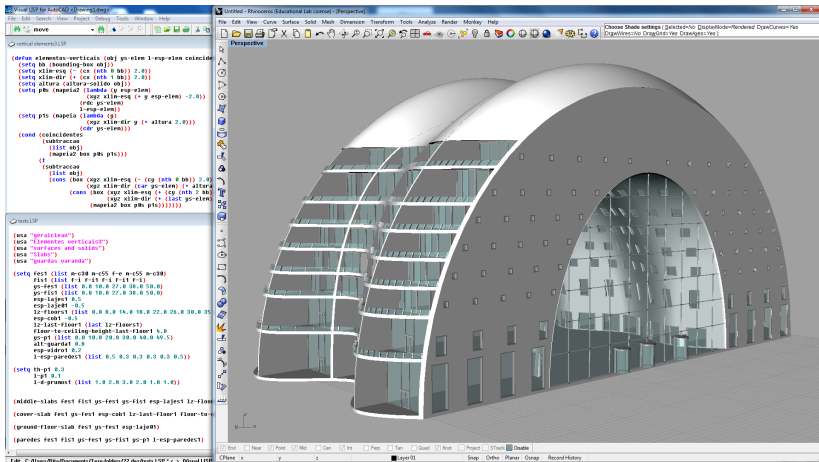
(zoom-3d-conceptual)
(prepare-for-cutter-sections-crossings-resu
  (setq final-pos '((0.0 791.0 2.10341e-027)
    (create-borders)

  (restore-cut-positions final-pos)
  (show-cutter-pairs))
```

The 3D model in the Rhino window is a complex, multi-layered toroidal knot structure. It features several concentric rings and intersecting surfaces, rendered in a wireframe style with some shaded areas. The model is centered in the Rhino viewport, which also shows various toolbars and a command line.

Integration

AutoLisp + Rhinoceros



Conclusion

In the long history of humankind those who learned to collaborate and improvise most effectively have prevailed

Charles Darwin

Conclusion

*In the long history of humankind those who
learned to collaborate and improvise most
effectively have prevailed*

Charles Darwin

Thank You

Conclusion

In the long history of humankind those who learned to collaborate and improvise most effectively have prevailed

Charles Darwin

Thank You

Questions?