



Realtime Telemetry Visualization Of Robots Playing Soccer

Customer

Robot Club Toulon (RCT)
Toulon University, France

Industry

Research, Robotics

Notes

This implementation has been done as part of SciChart's "Free Educational license" for academic and non-profit projects.



Humanoid Robot to compete in FIFA tournament

Since 1997 RoboCup brings fully autonomous robots from over 40 countries to play soccer against each other.

The ultimate goal of the competition is to improve the robotics and to build a team of fully autonomous humanoid robot soccer players.

Robot's goal is to win a soccer game, complying with the official rules of FIFA, against the winner of the most recent World Cup before the year of 2050.

Realtime Charting for Robots Strategy

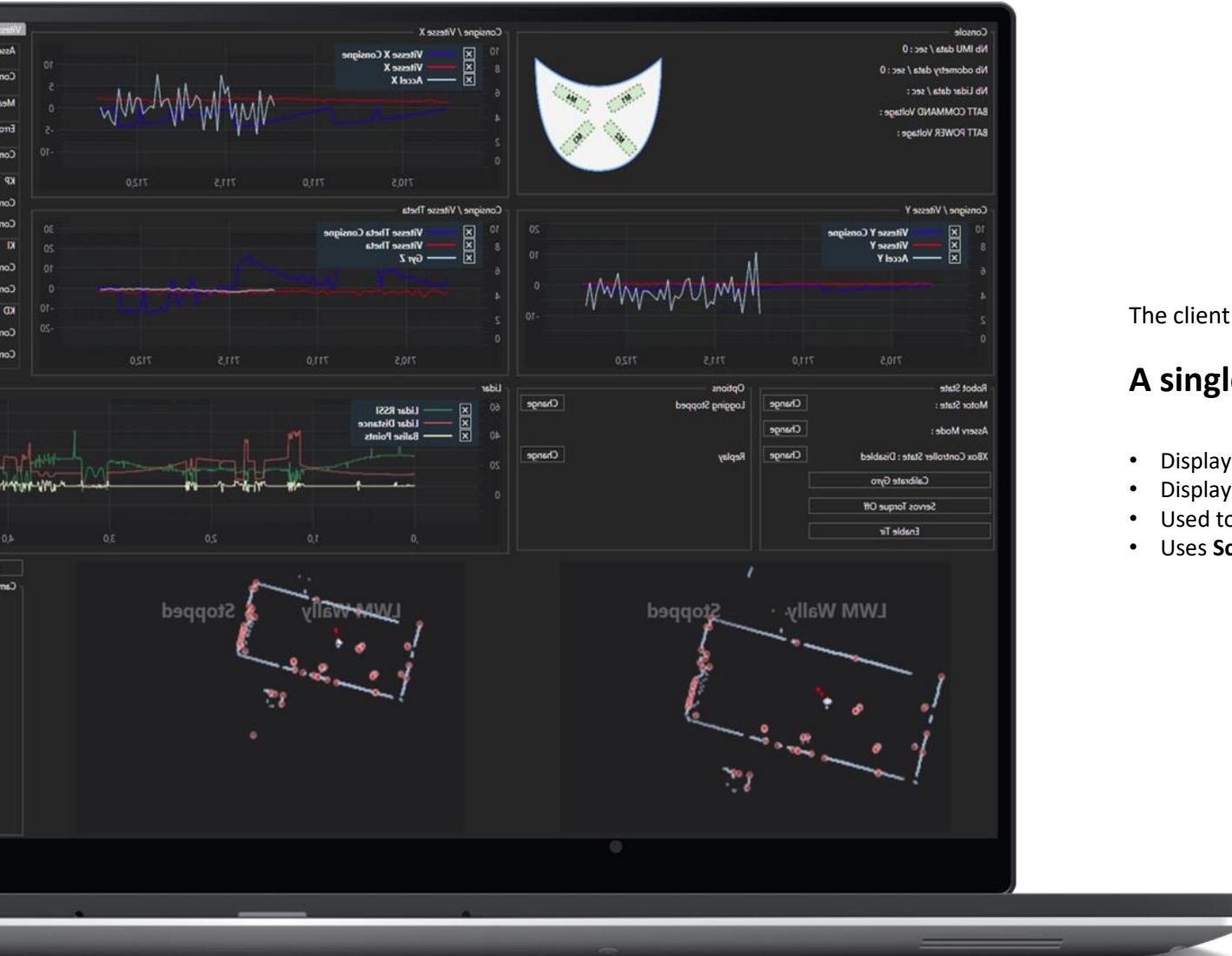
Robot Club Toulon, composed of students and researchers in robotics, electronics and embedded systems.

The team is participating in the Middle Size League, one of the most difficult ones due to the high speed and level of interaction in the game.

It needs advanced and reactive team strategies to adapt to opponents. Strategy is built on understanding the robots' environment in real time with robots moving fast up to 6 meters per second.

Fine tuning the robots and team strategy requires some powerful charting tools for displaying telemetry and strategy information for each robots and the whole team in real time, without impacting CPU performances. This is why we have chosen SciChart after an extensive comparison between charting solution in WPF.





The client used SciChart for two main interfaces.

A single robot telemetry visualization

- Displays standard information such as velocity, accelerometer and gyro outputs, lidar raw signal.
- Displays 2D lidar maps which provide information on opponents, points of interest and more.
- Used to improve Robots perception algorithms.
- Uses **Scichart's Line and Scatter Renderable Series**.



RoboCup

CASE STUDY

SciChart.WPF

The client used SciChart for two main interfaces.

Team strategy Visualization

- Displays perception of each robot in real time, as well as the team strategy.
Uses **SciChart CustomRenderableSeries API** to create Polygon list series and to display teammates and opponents, arrows pointing destination (in dashed lines) and available chosen waypoint (continuous line) in the different views. (see top 2 maps)
- Displays a list of obstacles for each player, as well as a heatmap depending on the player role, which itself depends on the team strategy.
Uses **SciChart Heatmap API** extensively for modelling areas of interest and forbidden zones used by the strategy generator and the collision avoidance algorithm.





CASE STUDY

SciChart.WPF

Robot Club Toulon was able to understand the robot's environment in real-time and the speed at which the robots moved using SciChart's WPF library.

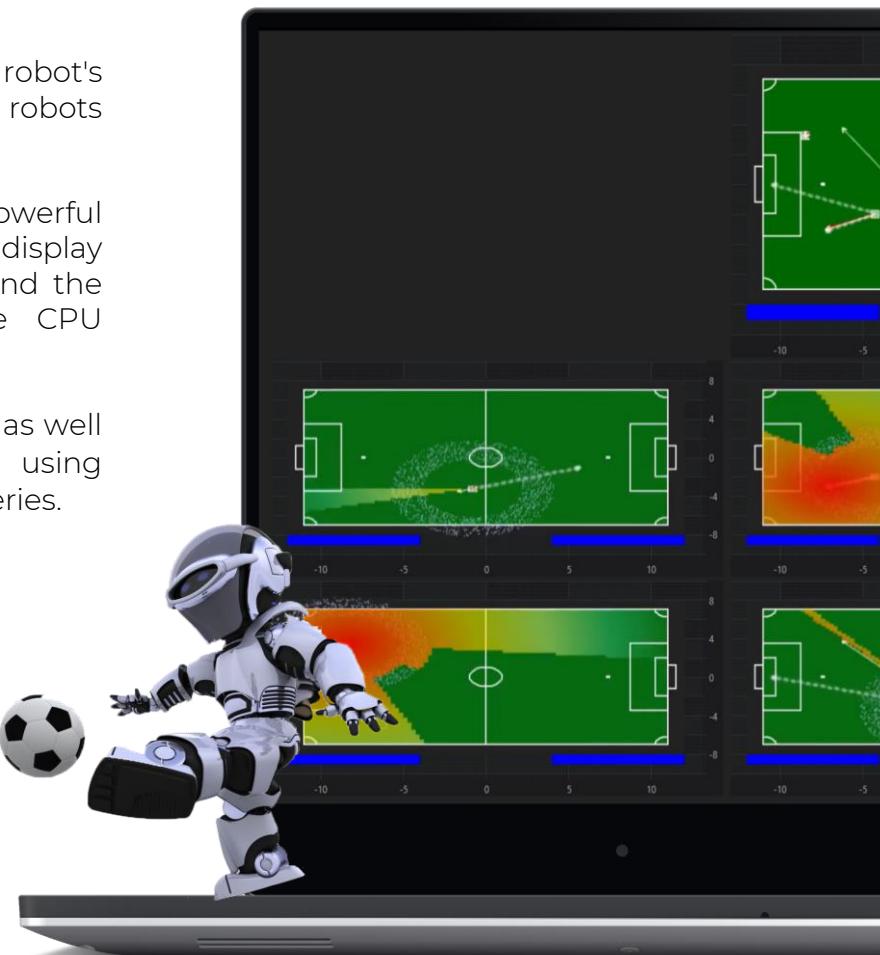
Furthermore, Robot Club Toulon used SciChart's powerful charting tools to fine-tune the robots and used it to display telemetry and strategic information for each robot and the whole team in real-time without impacting the CPU performances.

They utilized many of SciChart features out of the box, as well as took advantage SciChart's flexible API by using CustomRenderable series to create custom PolygonSeries.

“We are in love with SciChart and we strongly recommend it to other teams and companies!”

Valentin Gies

Team Leader - ROBOCUP - RCT
(Robot Club Toulon) - Université de Toulon,
researcher in Embedded Artificial Intelligence
and Robotics at Toulon University.



About SciChart

SciChart is a cross-platform WPF, iOS, Android and Xamarin Scientific & Financial Charting Library.

SciChart supports rendering of complex, interactive, real-time charts with many millions of data points for demanding scientific, medical and financial applications and embedded systems that require high performance, rich interaction and smooth updates.

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