



Maplesoft and HiggsTools Freiburg, Germany, April 2015

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Outline

- Maplesoft products and applications
- News since April 2014
- Teams
- Projects for Interns
- About Waterloo
- Logistics

Maplesoft products

- **Maple:** Symbolic/numeric computation system (computer algebra system) covering a wide range of application, research and education areas
- **MapleSim:** Physical modeling tool, built on top of Maple, enabling significant performance gains resulting from symbolic analysis and transformation of the model equations
- **MapleTA / Möbius:** On-line testing and assessment system
- **MapleNet:** Web application for displaying and interacting with Maple worksheets



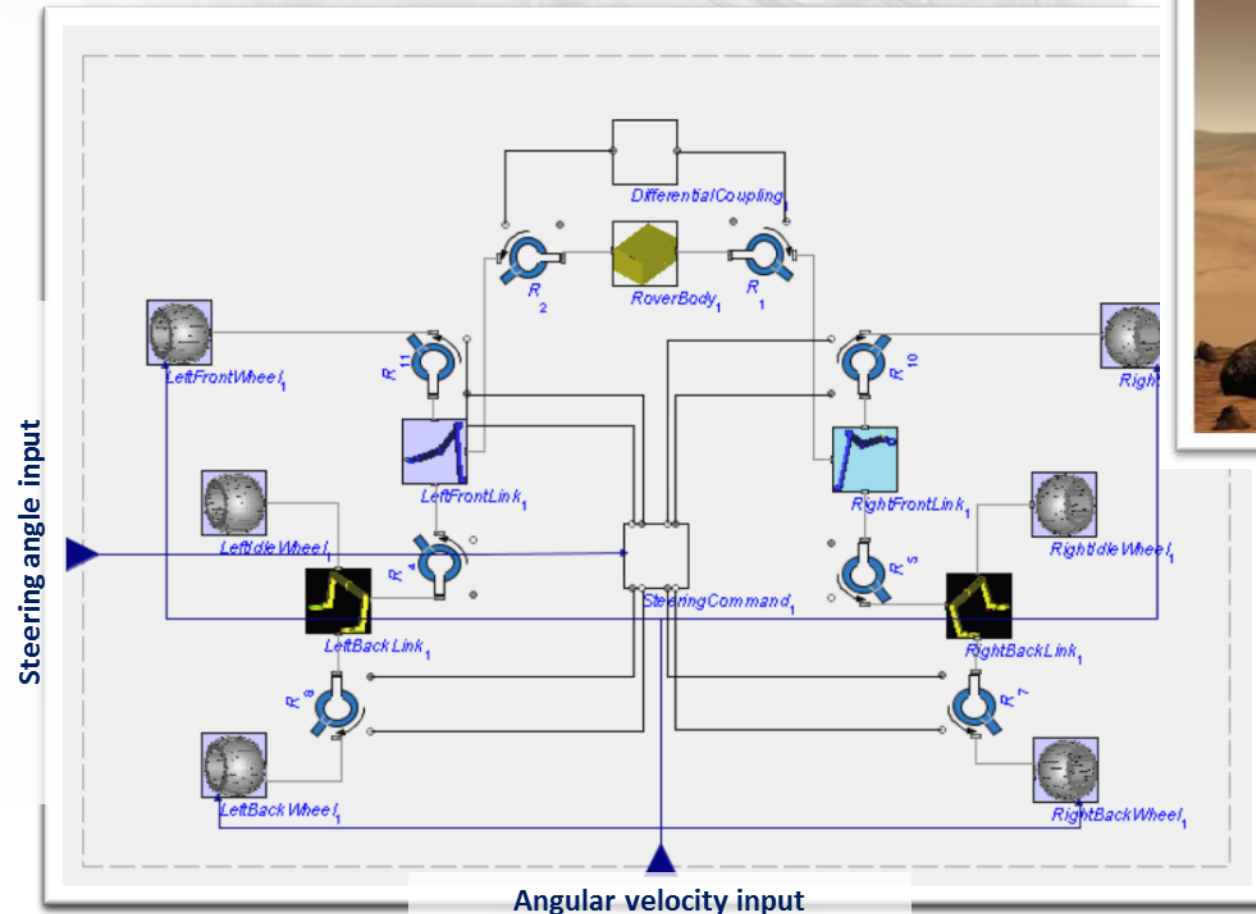
Some applications

- Canadarm and Dextre



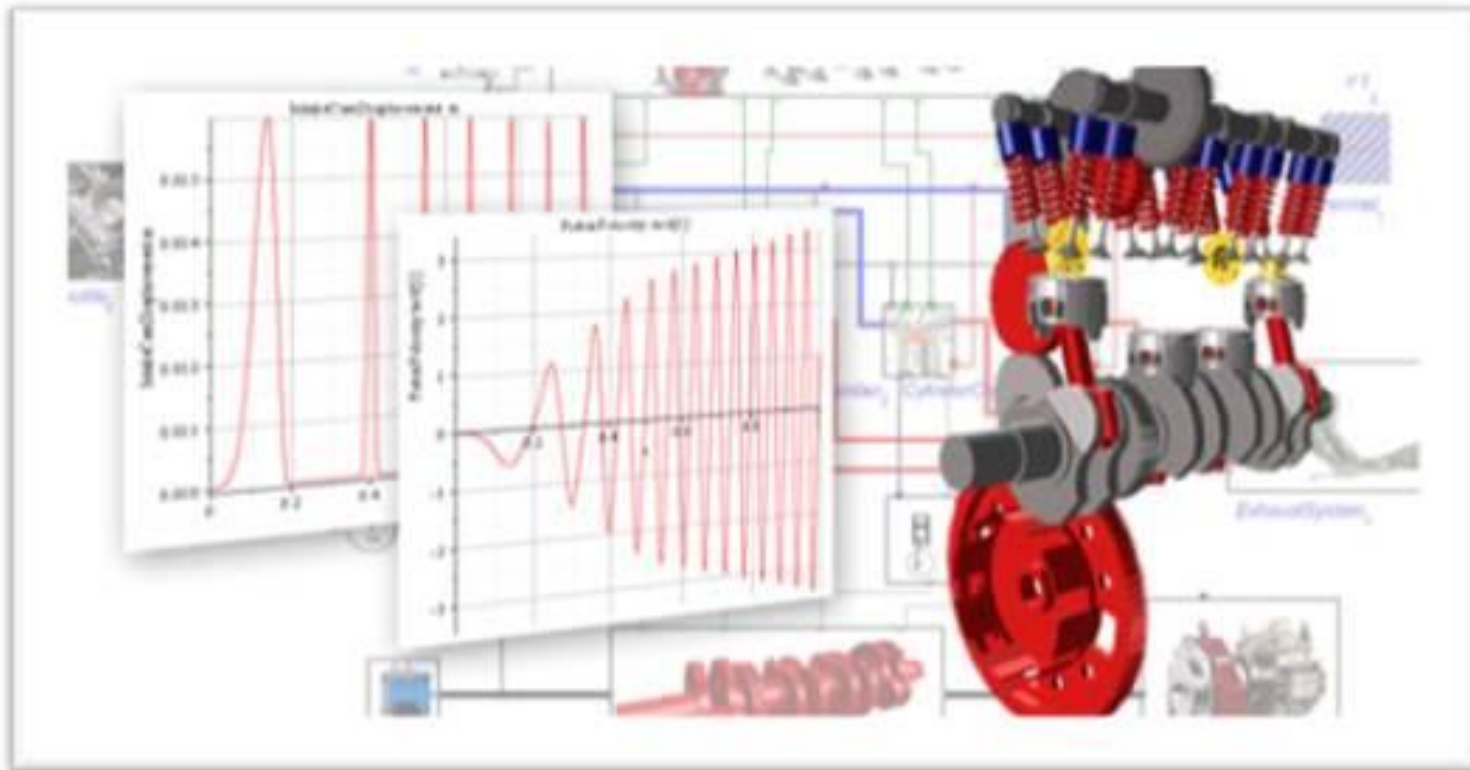
Some applications

- ET rovers



Some applications

- Automotive engines



Some applications

- SkySails



Some applications

- Sports



Some applications

- Robotics



Maplesoft news

Since April 2014:

- LHCPPhenoNet intern student Sep-Dec 2014
- Invited presentation at High Level Modeling for Control Systems Development of American Control Conference 2014
- Release of Maple 2015 and MapleSim 7

Mathematical development team

Solid team of developers – most with doctorates in mathematics, computer science, engineering – active in current research

- Symbolic and numeric computation
- Summation and integration
- Limit and series computation
- Polynomial arithmetic and factorization
- Special functions
- Optimization
- Statistics
- Fast numeric algorithms
- Connectivity
- Educational tools (Tutors, MathApps, ...)
- ...

Research group

- Research oriented application development and algorithm prototyping for dynamical modeling and simulation as well as control design and analysis, using symbolic/numeric tools.
 - Model simplification and model order reduction
 - System identification
 - Robust and parametric control design
 - Model predictive control
 - ...
- Clients include major automotive companies such as Toyota
- Several patent applications pending

University collaborations

- Leading edge research in optimization, differential geometry, polynomial system solving, differential and recurrence equations, other areas all incorporated in Maple through collaborations with a variety of universities around the world
- Long history of working with university co-operative education programs to seek out top quality students to work as part of our development team
- Have had graduate students from across Canada and some strong undergraduate students from around the world join us for 2-6 month internships

Projects for interns

- Interns would be (mostly) free to work on whatever interests them. We would prefer the intern to be the driver.
- Benefit for Maplesoft is the development of a “Maple emissary”.
- Benefit for the intern is the opportunity to work with some very bright and motivated people who develop some of the supporting technology used in particle physics.
Possibly future employment opportunity at Maplesoft.
- Intern’s work could easily end up in a subsequent release of Maple or MapleSim.

Projects for interns

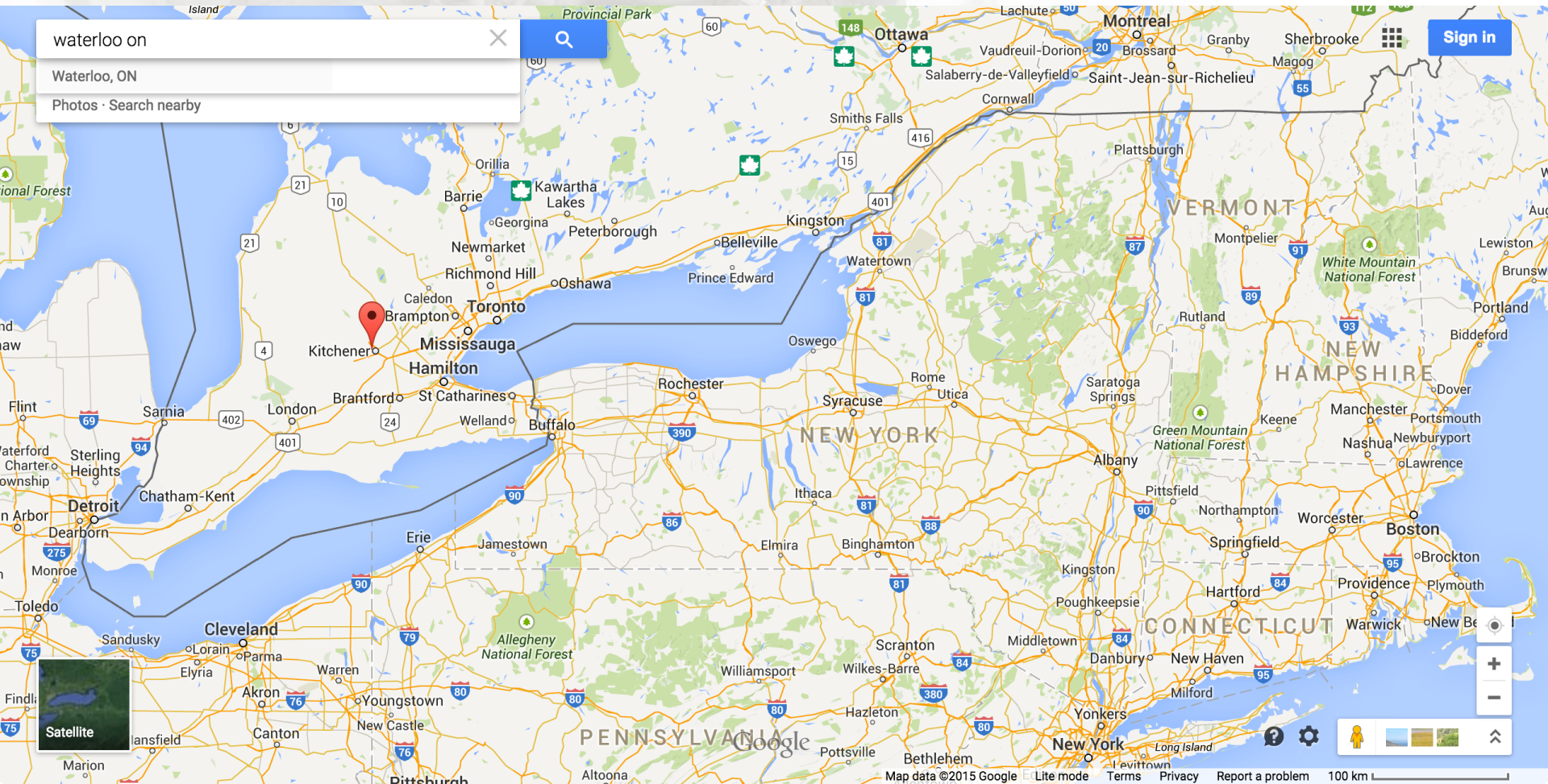
- Grid computing
 - We have been actively pursuing grid (distributed) computing implementations of algorithms in Maple, using both multiple cores on a single machine and more widely dispersed computer grids
- Other parallel computing
 - We are also developing parallel algorithms for execution by a single Maple kernel
- Extension of Physics package
- Extension of symbolic integration and summation algorithms
- Symbolics and numerical evaluation of special functions

Past intern projects

- Feynman diagrams and integrals
 - Software tools for symbolically computing Feynman integrals and supporting drawing of Feynman diagrams
- Symbolic integration
 - Improvements to Maple's indefinite symbolic computation engine

About Waterloo

- Located about 1hr west of Toronto, Ontario, Canada
- ~500,000 inhabitants (together with twin city Kitchener)



About Waterloo

- 1hr from Toronto, 2 hrs from Niagara Falls



About Waterloo

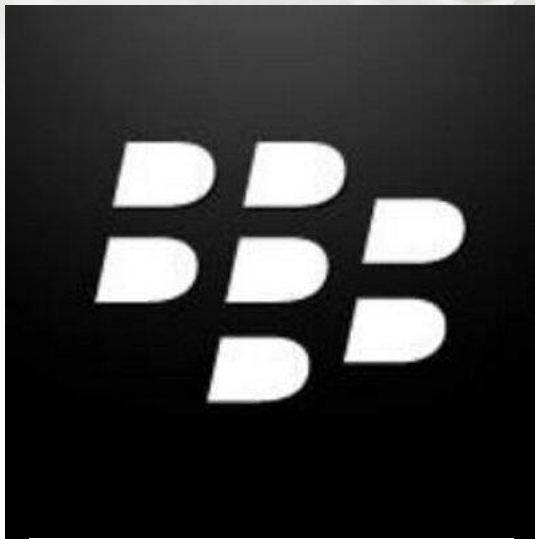
- 2 Universities: University of Waterloo, Wilfrid Laurier University
- Maple was originally developed at UWaterloo

UNIVERSITY OF
WATERLOO



Waterloo is home to:

- Blackberry
- Perimeter Institute for Theoretical Physics



**PERIMETER INSTITUTE
FOR THEORETICAL PHYSICS**



Application process

- Requirements: programming experience
No Maple knowledge required
- Email your CV to: **jgerhard@maplesoft.com**
- Phone interview
- After acceptance by Maplesoft, start visa application process

Logistics

- There are various programs under which internships may be arranged
 - International Experience Canada (IEC)
 - International Association for the Exchange of Students for Technical Experience (IAESTE)
 - AIESEC
- Limited capacities
- It is the intern's responsibility to obtain the necessary visa, work permit and any other required documents
- Maplesoft can provide some assistance, but has no say in the final decision by the Canadian government
- Lead time of **at least 6 months** strongly recommended

Logistics

- Maplesoft / AIESEC will help with finding accommodation
- 1 week introduction to software tools and development environment, then training on the job
- Weekly meetings with supervisor, a senior Maplesoft developer
- Participation in social events: company lunches, skiing and tubing, spring party, carting, ...



Apply with Maplesoft now!