2_3_ROS&PeopleUpdate 8/17/2022

Here is a short description of the following organizations and people who contributed to Robotics and ROS.
a. Willow Garage
b. Fetch Robotics Melonee Wise
c. iRobot
d. Rethink Robotics - A Sad Goodbye
e. People

a. The Origin Story of ROS, the Linux of Robotics Created by a small team at Willow Garage in Silicon Valley, ROS went on to become the world's most influential robotics software platform.

Willow Garage hired its first employees in January 2007, Jonathan Stark, Melonee Wise, Curt Meyers, and John Hsu. All four were recruited by Scott Hassan to work on Willow Garage's first projects which included an SUV entrant into the DARPA Grand Challenge and an autonomous solar powered boat for deploying scientific payloads in open oceans. In the Fall of 2008, Eric Berger and Keenan Wyrobek pitched Willow Garage on creating a common hardware (PR1) and software (ROS) platforms and the idea of creating a Personal Robotics Program at Willow Garage. They had previously started the Stanford Personal Robotics Program to build the platform technologies that would enable the personal robotics industry. At Willow Garage they led the development of PR2, the common hardware platform for robotics R&D, and ROS, the open source robotics middleware.
https://placeandsee.com/wiki/willow-garage

https://spectrum.ieee.org/automaton/robotics/robotics-software/the-origin-story-of-ros-the-linux-of-robotics

Willow Garage currently has eight spin-offs (Probably more!) : Here are four of importance:

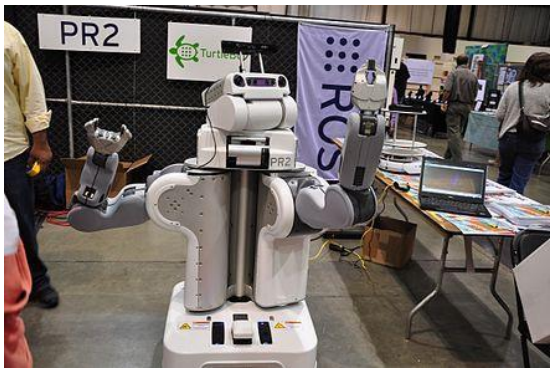
- OpenCV - An open source computer vision and machine learning software library built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception in the commercial products.
- Open Perception Foundation – Their mission is to advance the development and adoption of open source software for 2D/3D processing of sensory data, for the benefit of the industrial and research communities.
- Open Source Robotics Foundation - OSRF is an independent non-profit formed to support the development, distribution, and adoption of open source software for use in robotics research, education, and product development. (Now Open Robotics.)

https://www.openrobotics.org/blog/2022/3/22/a-decade-of-open-robotics

Thanks to that success and his early Google stake, Hassan amassed the kind of money that eventually allowed him to buy office space in Menlo Park before he even knew exactly what he wanted to do with it. Its address — **68 Willow Road** — ultimately inspired his new company's name.

In addition to spinoffs, former employees have created several other companies: **Savioke** led by Steve Cousins (former CEO of Willow Garage) produces a service robot for the hotel industry.

Willow Garage's first major robot is called PR2. It is of a size similar to a human. PR2 is designed as a common hardware and software platform for robot researchers. PR2 is a spinoff of PR1, a robotics platform being developed at Stanford University. *PR* stands for "personal robot".



PR2 Pricing & Open Source Discount | Willow Garage

www.willowgarage.com/blog/2010/09/07/pr2-pricing-and...

After years of design, prototyping, and testing, and with 11 **PR2 robots** already in **the** field, Willow Garage is proud to announce that **PR2** is officially for sale. As of today, you can take home your very own personal **robot**. **PR2** is priced at $400,000.

b. Important Spinoff and success for Melonee

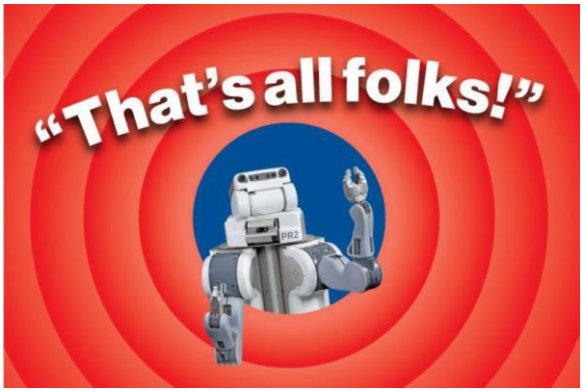
Melonee Wise Robot Ninja CEO Fetch Robotics

Now Doing Very well since her company was bought for $290 million.

TurtleBot - 2011

Recognizing that not everyone can afford to drop $400k on a PR2, Willow Garage has created a much more affordable, but still capable, ROS development platform

TurtleBot consists of an already sensored iRobot Create base, a 3000 mAh battery pack, a gyro, a Kinect sensor, an Asus 1215N laptop with a dual core processor to run everything, and a mounting structure for you to get creative with. TurtleBot runs ROS, of course, and will come with everything preconfigured so that the robot can make maps, navigate, and follow you around straight out of the box.



Note the base! Roomba -

Late 2013 – Closed Shop. Many spinoffs and PR2 and TurtleBot still doing OK.

Now TurtleBot 4 is running ROS2.

Freight and Fetch

Deploying Robots

- Unpack and initial setup
- Build and annotate the map
- Do the first navigation task
- Create UV disinfection workflows and schedules
- Test the workflows and scheduling
- Charge management

Key Differentiators

- Completely autonomous UV disinfection
- Peace of mind through automated reporting and verification
- No residual chemicals or odors
- Speed and flexibility

Fetch Robotics said the SmartGuardUV autonomous mobile robot (**AMR**) combines the safety and flexibility of its hardware and software, the strength of PURO Lighting's pulsed xenon UV lamp, and the disinfection reporting of the Piedmont 4Site cloud analytics platform.

c.iRobot

https://www.kpax.com/news/national/consumer-data-concerns-as-amazon-is-set-to-acquire-irobot-roomba#:~:text=Amazon%20recently%20struck%20a%20%241.7,incredibly%20important%22%20to%20the%20company.

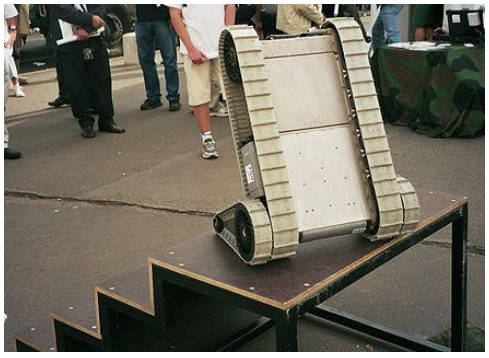
Amazon recently struck a **$1.7 billion** deal to acquire iRobot — the company behind Roomba — and it's creating worries about data protection. (8/2020) **(Billion WITH A B!!)**

https://en.wikipedia.org/wiki/IRobot

iRobot Corporation is an American advanced technology company f**ounded in 1990 by three MIT graduates** who designed robots for space exploration and military defense. Incorporated in Delaware, the company designs and builds consumer robots for inside and outside of the home, including a range of autonomous home vacuum cleaners (Roomba), floor moppers (Braava), and other autonomous cleaning solutions.

iRobot was founded in 1990 by **Rodney Brooks**, Colin Angle and Helen Greiner after working in MIT's Artificial Intelligence Lab.

- In 1998 the company received a DARPA research contract which led to the development of the PackBot.
- In September 2002, iRobot unveiled its home robots flagship, the Roomba, **which sold a million units by 2004.**

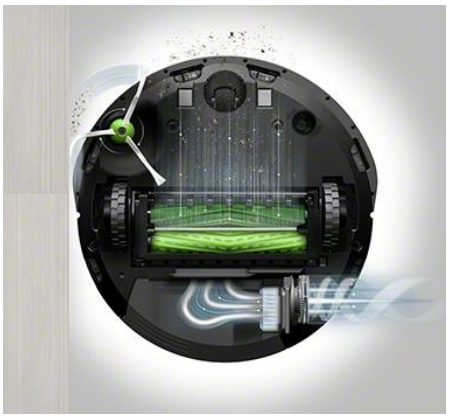


https://www.reuters.com/article/us-irobot-stocks/irobot-shares-surge-on-strong-sales-of-roomba-vacuum-cleaners-idUSKBN1AB2QW

Eighth generation: I series and E series

In September 2018, iRobot introduced a new Roomba series with three models: the premium i7 and i7+ and the more basic e5.[33] The i7 models use the same motor as the 980 but feature updated brush extractors and Imprint Smart Map navigation.

Our Roomba downstairs is called “Jeeves”.



Internal Odometry and Map following; Camera and bump sensor; IR sensor for home base

Intelligently maps and cleans an entire level of your home. Cutting-edge **vSLAM®** navigation, Roomba® i7 robot vacuum maps your home to navigate in neat, efficient rows leaving clean floors in its wake.

vSLAM®

July 2017

SAN FRANCISCO (Reuters) - Shares in iRobot Corp jumped 23 percent to a record high on Wednesday after the Roomba robotic vacuum maker posted better-than-expected quarterly results and said it was buying its largest European distributor.

The stock surged by $21.27 to $109.03 and was on track for its biggest one-day percentage gain since 2010.

IRBT $ 74.68 8/27/2020

The market for smart home devices was worth $9.8 billion in 2016 and is projected to grow 60 percent this year, according to market research firm IHS Markit.

d. Rethink Robotics

When Rethink Robotics founder Rodney Brooks was producing the Roomba vacuum at iRobot in the 2000s, he saw first-hand how challenging and inefficient the manufacturing process could be, with so many manual processes. By the end of that decade, **he founded Rethink Robotics**, with the intent of providing an entirely new type of automation to manufacturers. One that was safe to work next to without cages, easily trained by non-engineers, flexible enough to move quickly from job to job, and affordable for companies of all sizes.

That vision was realized with the introduction of Baxter® in 2012. For the first time, manufacturers had a cost-effective and easily deployed solution. And the market had a new category of automation: collaborative robots.

We expanded that vision with the introduction of Sawyer™ in 2015, a smaller, faster robot designed for high precision tasks. Best of all, we continue to deliver on that vision with frequent upgrades to our one-of-a-kind Intera® software. Our unique combination of hardware and software enables the easiest train-by-demonstration functionality in the industry, and reduces the time it takes to deploy the robots.

Our mission is to make robotics more accessible, usable and practical than they've ever been before. We're here to *Rethink Robotics*. We're redefining automation. And we want to help you rethink what's possible on your factory floor.

Sawyer is outselling Baxter ten to one, and we tripled our revenue in 2016. In China, the appetite for Sawyer has been quite high. We've sold a large quantity of Sawyer robots. In addition, we are looking to 2017 to be a big year for our deployments in Europe, as we expect to have additional distribution agreements in place in that region soon, as well.

What happened to Rethink Robotics?

https://www.roboticstomorrow.com/article/2018/12/what-caused-rethink-robotics-to-shut-down/12904

In early October 2018, news broke that Rethink Robotics — the pioneering company behind the Baxter and Sawyer cobots — was shutting down.

Rethink Robotics

2008 - Founded as Heartland Robotics
2012 - Changes name to Rethink Robotics in June; launches Baxter in September
2015 - Introduced Sawyer cobot
2018 - Rethink Robotics shuts down on October 3
2018 - HAHN Group acquires Rethink IP on Oct. 25

We have not seen the last of Sawyer the collaborative robot. **HAHN Group**, a German automation specialist, has acquired all of the patents and trademarks from Rethink Robotics, including the Intera 5 software platform. The HAHN Group says it will further develop Rethink's technology, "combining it with German engineering and know-how of industrial applications." HAHN Group says it "intends to make the [Intera] software platform available to suitable partners through licensing or other arrangements."

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e. People

A 2014 Review of people important in Robotics- Melonee To Steve Jobs:

http://www.businessinsider.com/important-robotics-people-2014-6#

A short biographical sketch of the following persons – brief history and present positions. Includes stheir contribution to robotics and ROS and the references.

i.Rodney A. Brooks and look at his important papers:
"New Approaches to Robotics"
" A Robust Layered Control System For A Mobile Robot"
OPEN ROBOTICS People
ii.Brian Gerkey
iii.. Morgan Quigley
iv.. Tully Foote
v. Kat Scott

i. Rodney Brooks, founder of Rethink Robotics and Panasonic Professor of Robotics at MIT

Brooks is a co-founder of iRobot alongside Colin Angle and Helen Greiner, and is also a former director of MIT's Computer Science and Artificial Intelligence Laboratory (CSAIL) . He founded Rethink Robotics, the company that makes the noted Baxter manufacturing robot.

Baxter is hardly your conventional manufacturing robot. It can be trained manually by moving its arms without the need to program a line of code. And considering its $25,000 price tag, Baxter is mighty affordable as far as heavy-duty robots go.

Brooks also popularized the idea of behavior-based robotics, in which a robot uses information obtained by its sensors to "gradually correct its actions according to the changes in immediate environment."
https://en.wikipedia.org/wiki/Rodney_Brooks

Instead of computation as the ultimate conceptual metaphor that helped artificial intelligence become a separate discipline in the scientific community**, he proposed that *action* or *behavior*** are more appropriate to be used in robotics. Critical of applying the computational metaphor, even to the fields where the action metaphor is more appropriate, he wrote that:

> Some of my colleagues have managed to recast Pluto's orbital behavior as the body itself carrying out computations on forces that apply to it. I think we are perhaps better off using Newtonian mechanics (with a little Einstein thrown in) to understand and predict the orbits of planets and others. It is so much simpler.

Baxter Main article: Baxter (robot) - 2012-2018
Introduced in 2012 by Rethink Robotics, an industrial robot named Baxter was intended as the robotic analogue of the early personal computer designed to safely interact with neighboring human workers and be programmable for the performance of simple tasks. The robot stopped if it encountered a human in the way of its robotic arm and has a prominent off switch which its human partner can push if necessary. Costs were projected to be the equivalent of a worker making $4 an hour.

Subsumption Architecture – A famous and influential paper circa 1991:

http://people.csail.mit.edu/brooks/papers/new-approaches.pdf

A very interesting talk:

Rodney Brooks "The Future of Innovation in Artificial Intelligence and Robotics"
17,826 views Jan 16, 2019 1:48:04

https://www.youtube.com/watch?v=4P_ZhwvA8kA

THE DIGITAL FACTORY] Rodney Brooks on the Future of Robotics
347 views Jun 28, 2022 19:34

https://www.youtube.com/watch?v=J2XZyIc4OV0

Rodney Brooks discusses the evolution from automatic guided vehicles to autonomous mobile robots to collaborative mobile robots, and what it means for the world.

Rodney is a Serial robotics entrepreneur and is currently the CTO and co-founder of Robust AI.

Before that he was Founder, Chairman and CTO of Rethink Robotics (it ran from September 1st, 2008, through October 3rd, 2018, and was originally called Heartland Robotics). He is also a Founder, former Board Member (1990 - 2011) and former CTO (1990 - 2008) of iRobot Corp.

Anything he says or does will probably change the future of robotics!

OPEN ROBOTICS (FORMERLY OSRF)

https://www.openrobotics.org/company

https://www.openrobotics.org/team

ii.Brian Gerkey, was CEO of the Open Source Robotics

Foundation

Screenshot

https://brian.gerkey.org/

I'm CEO of **Open Robotics.** We build open source software and hardware for the global robotics community.Before co-founding Open Robotics, I worked at **Willow Garage**, the **SRI Artificial Intelligence Center**, the **Stanford Artificial Intelligence Lab**, and the **USC Interaction Lab**.

The Open Source Robotics Foundation, or OSRF, (Now Open Robotics) exists to "support the development, distribution, and adoption of open source software for use in robotics research, education, and product development."

Brian Gerkey is founder and CEO of the nonprofit organization, and under his leadership, it has

continually developed two big robotics projects: the previously mentioned ROS (Robot Operating System), and Gazebo, a piece of software that can simulate robots' moving around in a 3-D environment as they receive feedback from their sensors and various objects.

Both pieces of software have saved roboticists countless hours by providing a common, open foundation for people to build on.

iii.. Morgan Quigley

2014 At MIT
https://www.technologyreview.com/lists/innovators-under-35/2013/inventor/morgan-quigley/

Chief Architect, Founder
Morgan Quigley was one of the founders of OSRF. He received a PhD in Computer Science in the AI Lab at Stanford University in 2012. His previous work includes contributions to the initial design and implementation of ROS and its ancestors back in ye olden days, and electronics and firmware for sensor-rich, high-performance robot legs and hands. His research interests include creating systems tools to simplify collaboration and enable greater use of open-source software and firmware in modern robotic systems.

Morgan Quigley is the Chief Architect, Founder at Open Robotics.

- Open Robotics

iv. Tulle Foote

ROS Platform Manager
Tully Foote was the ROS Platform Manager at the Open Source Robotics Foundation. His work at the Open Source Robotics Foundation is a continuation of his work at Willow Garage where he focused on

ROS development, building core tools and libraries to support the ROS community. Prior to Willow Garage he worked on all three DARPA Grand Challenges, twice on the Caltech team and in the Urban Challenge on the University of Pennsylvania team. **He is also the co-creator of the TurtleBot, a platform designed to expand the availability of robotics to new communities.**

NOW: Director, Community & Business Development of Open Robotics.

ROS: an open-source Robot Operating System

Morgan Quigley , Brian Gerkey, Ken Conley, Josh Faust, Tully Foote, Jeremy Leibs, Eric Berger, Rob Wheeler, Andrew Ng
*
*
Computer Science Department, Stanford University, Stanford, CA;
Willow Garage, Menlo Park, CA; Computer Science Department, University of Southern California

A worthwhile Article by the creators of ROS. http://robotics.stanford.edu/~ang/papers/icraoss09-ROS.pdf

v. Katherine Scott

Katherine Scott

Developer Advocate

Many videos and very helpful. She recommended someone at Clearpath Robotics for a TB4!

She has created many videos explaining the use and updates to ROS2.

Full Team at Open Robotics!
https://www.openrobotics.org/team