

Kickoff presentation content (January 16th, 2011)

Table of Contents

Kickoff presentation content (January 16th, 2011).....	1
Who are you?.....	1
What is it?.....	1
How did you start?.....	1
What was the original motivation?.....	2
What is the approach?.....	2
Who's involved?.....	2
How much did it cost?.....	2
What's the educational potential of this project?.....	3

Who are you?

My name is Ricky Ng-Adam. I'm a software engineer working in Shanghai. I moved to Shanghai last July. I previously worked in California and I'm originally from the French-speaking part of Canada, Quebec.

In university, I was involved in robotics, both for student competitions and as an internship. At that time, I was one of the founder and leader for 2 years for the SONIA¹ (Système d'Opérations Nautique Intelligent et Autonome), an autonomous robot submarine project to participate in the AUVSI AUV² competition. I also did an internship at the robotics department of the Electrical Research Institute of Quebec (IREQ: Institut de Recherche Electrique du Québec)³.

What is it?

Autonomous Robot Toy (ART) is a project to use a common toy as a basis to learn robotics. It's using an RC car as a mechanical base, adds an Arduino (a very tiny computer) and one or more sensor(s) to act on.

We also want to extend this to an event open to all to race robotics cars on a racetrack.⁴

1 <http://sonia.etsmtl.ca/en>

2 <http://www.auvsifoundation.org/AUVSI/FOUNDATION/Competitions/AUVCompetition/Default.aspx>

3 <http://www.robotique.ireq.ca/microb/>

4 <https://github.com/rngadam/ISUR/blob/master/Documentation/OfficialRules.txt>

What's the current state?

ART version 4 is a bunch of breadboard, wires and a microcontroller platform with two ultrasonic sensors on a motor that is kind of able to move around but still pretty stupid... But it moves!

There's a lot of work to be done software-wise before this can race. But all the work is in the open⁵ under the Apache OpenSource licence. It's actually one of the requirement from my company so that they will assign copyright of my moonlighting work to me. I've written an extensive set of instructions so others can try to do the same and more likely, better⁶!

How did you start?

I've become involved with Xinchajian (the first hackerspace in China) while participating at a Barcamp (unconference) activity at Xindanwei and hearing David Li talk about demystifying the magic of technology through disassembling customer electronics and remaking them into something else.

Seeing the ease with which the Arduino could be used to prototype robotics was really appealing to me. I knew from my background and experience that the really hard parts had become a lot easier with the current software and hardware solution.

Although I led in university a robotics team made up of multidisciplinary engineers, I didn't have as much of a chance to get involved in the nitty-gritty of building robots, designing the electronics and programming microcontrollers.

What was the original motivation?

Any such project starts with an itch to scratch. My itch was to have making laps on our floor to annoy my colleagues at work and get them interested into Xinchajian...

It's obviously turning into much more than that. Now, I'm really interested by organizing and helping teams from all kind of backgrounds build their own and discover the fun of robotics competition.

What is the approach?

Prototyping and iterating quickly. Took the RC car apart and had it moving around using the Arduino within a day. Using infrared sensors within two days. Now the development is slowing down its pace because we want to take it to the next step and move beyond breadboards to PCB, but that original demonstration that it works has been a big motivation to help us go forward and to get to the hardest point; making the software.

Robotics is all about using sensors feedback (information on the surrounding, such as obstacles) to control actuators (what makes the robot move). The more sensors, the more information, the more accurately we can navigate an environment. However, sensors need to be added one by one rather than everything in one go as processing that information and acting intelligently on that information is difficult.

⁵ <https://github.com/rngadam/ART>

⁶ https://github.com/rngadam/ART/blob/master/ART_Control3/BUILD.txt

Who's involved?

If you look at the Xinchajian blog⁷ (xinchajian.com) you'll see that David Li has also started hacking his own car, taking it apart to figure out how to drive the motors directly.

My wife, Min Lin, has also been a big help. She has a software engineering background and was also one of the co-founder and co-lead in university for the autonomous robot submarine. People in the Xinchajian space are also helping out with many tips, ideas and suggestions for the mechanical and electronics parts.

I've also reached out to some of the electrical engineers I knew from university and at least one (Patrick Bélanger from Hikaritech in Vancouver⁸) is really excited and wants to help with taking our PCB designs to a professional level).

So this is becoming somewhat of an international effort.

I'm hoping that anyone who has an interest in robotics in China (companies, individuals or students) will build their own.

How much did it cost?

Thanks to Taobao, the number one online shopping site in China, my wife Min Lin Hsieh (one of the administrators for Xindanwei) has been able to find most everything for a really affordable price, compared to last year.

The current list of components for the next generation of A.R.T. (ARTv5) comes out at less than 800 yuans (120\$USD). By the time I'm done with having the PCB produced, I don't expect the total cost to be more than 1000 yuan (150\$USD).

Of course, if you take into account all the tools and engineering time involved it's much more than that – perhaps a few thousands dollars! That's why Xinchajian is a big help; it gives you access to other knowledgeable people here and around the world.

What's the educational potential of this project?

Robotics relates to mechanical, electrical and software engineering. It's an exciting and fun introduction to those domains and tends to push discovery and learning of programming, mathematical subjects while instilling self-confidence to build stuff on our own.

I'm often joking with Min Lin that I'm working towards my Electrical Engineering degree through this project... I think it has a great potential as a student semester project in a programming class, a microcontroller class or a digital logic class. I knew by experience that robotics can give you knowledge that will be valuable in your career in addition to teamwork skills as you collaborate with others.

It's also a way for anyone else not in university to develop such skills as a hobby. It's a fun platform to learn programming, electronics and how to construct stuff with a reasonable level of difficulty that should be – with some help – quite doable by anyone.

It's a much better way to learn than sitting down in class reading abstract knowledge for which you don't know the real-world application yet!

⁷ <http://www.xinchajian.com/>

⁸ <http://www.pbelconsulting.ca/>