



SELF - DRIVING
**MOVING
HACKATHON**

Self-driving
Hackathon

2020.

5.21-27

What is Moving Hackathon?

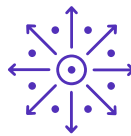
The advent of cars pushed the city a giant step forward and the city entered into explosive growth ever since. However, opportunities and potentials the automotive industry brought to us have now been exhausted. The growth of city is stagnating into a bottleneck, without any new city paradigm coming to life. Overcrowded places, unaffordable housing, traffic congestion and the relationship between human and space becoming unprecedentedly tense, all these are expecting a new round of revolution upon City, the "habitat" of human beings. Among the emerging urban technologies, autonomous driving is trending to be the most promising technology that will facilitate city revolution. But at current stage, the wide application of autonomous driving seems not so optimistic. Meanwhile, the flowing-in of heavy funding into the industry has instead built the high entry barrier for autonomous driving innovating, and the technical roadmaps of AV companies become undifferentiated, which hinders the creativity, diversity and independence of autonomous driving ecology.



Transformation of the city



Autonomous driving



Decentralization



Diversity



Independence

Back to the late 19th century, when venture capitals were not prevailing, a great variety of talented engineers and pioneers tinkered their early car mixtures, ploughing the significant path to technology maturity, which eventually led to city revolution. In 2018, with Moving Hackathon launched for the very first time, we greeted our respect to the early innovations and creations of cars. Along with that, we also began our journey for the collaborative innovation on autonomous driving. In 5 days, 30 engineers from more than 14 countries worldwide collaborated with each other and finished the hacking, drive-by-wire engineering, basic autonomous driving function of one car plus one chassis. Moving Hackathon ignited the sparks for lowering the threshold of autonomous driving application and involved more individuals, institutes, enthusiasts, startups and general developers in the autonomous driving revolution, further taking decentralization and democratization into technology innovation. In the past two year, we've organized multiple hackathon events themed around autonomous driving and product design. Starting from the designer and engineer participants, Moving community has grew from zero to 300 now, with like-minded community members from diverse culture backgrounds. Instead of developing in closed circles like pyramid, autonomous driving technology and its application stack have been springing up and growing like rainforests. It's inspiring to witness the process. In joint efforts with every single participant, we're committed to reshaping the paradigm of transportation and the city.



2018-2020



20+ Countries



300+ Engineers/Designers



4 offline events



Democratization



moving community

What is Moving Hackathon?

2020.

Now, two years after the launching of Moving Hackathon, we've successfully developed high-performance and affordable autonomous driving chassis. From coding to messaging and design, the chassis is fully open source. This 2020, we once again call out for global engineers that don't want to be limited by closed innovation and those who hate to be defined by existing rules. You'll be gathering here to hack autonomous mobility, to get hands-on the chassis, brainstorm, develop and solve all kinds of engineering challenges, including autonomous chassis fleet control, V2I collaboration and more.



As the prerequisite for the scale application of autonomous driving, V2V and V2I collaboration can further improve the autonomous driving safety and also create new solution for traffic efficiency. However, currently there are major differences among the industry regarding the understanding of V2I and V2V, whose standards and technical path haven't reached a common ground. Moving Hackathon 2020 is aimed to explore the possibility of Cooperative Intelligent Transportation System (C-ITS) through open collaborative innovation. Based on multiple open source autonomous chassis, the event is dedicated to sparking engineering challenges on V2V and V2I collaboration. All the outputs will be open source. By this approach, Moving Hackathon empowers democratization in bringing autonomous driving technology to daily life application, and reimagines how space and human interact via autonomous mobility, ultimately contributing to the next paradigm shift of city.

▼ Introduction



Autonomous Driving Dive

In-depth training courses from experienced engineers and mentors



Full-sized Autonomous Driving Vehicle Onsite Challenge

V2I | V2V | Collaborative Hacking



DIY Robocars Donkey Car Onsite Challenge

Small-sized

Past Events Highlights

HACK WITH LOVE

2018.3

Move-it Hackathon



2018.5

KuaiKai Self-Driving Racing



2018.8

Generative Hackathon - Design For Additive Manufacturing



2019.5

Moving Hackathon





Moving Hackathon Participants - What They Say

Dr. Filomeno Martina

CEO of WAAMMAT project, metal 3D printing expert at Cranfield University

It's been great to see so many designers, coming from all over the world. We wanna come out a goal which is that of reinventing the way cars are designed and manufactured. And it's also being great to see 3D printing and digital fabrication of hackathon of the initiative. Thanks to its advantages of flexibility and empowering the way it uses.

I think the idea that PIX had which is to put additive of the core of the car is the right one and that's because the business model that PIX is looking at is the manufacturing of relatively small batches of automotive and for additive and 3D printing with its capability of two layers of manufacturing in direct digital fabrication is going to be a key and to make this pieces of model successfully. Also it's very nice to see such a dynamic and young and affluent environment here at PIX headquarters, It's very nice facilities with people going all over the place and it's very fun atmosphere. And it's nice to see that creativity is reinforced with the latest technology available and the promotion of the creativity in the people that work here.

Adam Shen

Senior Autonomous Driving Engineer at Mercedes-Benz R & D Center China

I was glad and honored to participate in Move-it Hackathon. I was a graduate student back then and now I've become a professional engineer in the autonomous driving industry. The hackathon allowed me to truly apply my knowledge and skills on a real autonomous vehicle for the very first time. More importantly, I built the connections with the other engineers and experts inside this technology circle during the event and we still stay in touch. I believe the future hackathons will be more successful and the events held by PIX will motivate and inspire more engineers to seek their visionary career from the autonomous driving industry!

To me looks like it something really important and something that emm, has a lot of power to be something bigger to attract more people and to pretty much follow the aim of the whole city has and know how the technology should be developed.

Francesc Sòria Castellet

Spanish industrial designer, MIAU partner, Grasshopper tool developer

Sergio

Founder of MIAU project, mentor of the Polytechnic University of Madrid

It's been a great pleasure and a big surprise both, it's been super interesting. I mean you guys are greeting and beyond context where you can share your ideas freely and we've been very confident now.

It was a fantastic experience. I have done other hackathons in the past, but they were more focused on other issues not focused on technology. I think this was my first actual hackathon where we are coding and designing together, and just working with the engineers and other designers, the product designers to come out with solution with something that was very helpful and also enjoyable. And I think that we wouldn't have reached that solution without working together. So yeah, it was a very good week

William

Forbes 30 Under 30, Urban Planner, Architect, Australian Day Ambassador

WHAT'S IN THERE



New task: collaborative sensing & V2X

V2I | V2V | Collaborative Hacking



First-hand Experiences On Real Self-driving Cars

Get your hands on real self-driving cars and verify your algorithms while the car driving by itself



Introductory to Open Source Software Autoware

Autoware is the most active and powerful self-driving ecosystem in the world



Software Deployment

Experience the full software stack based on the self-driving framework to finish the challenges



Mentorship and Guidance

Experienced hardware and software engineers at PIX to provide onsite mentorship and assistance



Igniting Engineering Spirit

Challenge yourself and finish the meaningful adventure through collaboration



Global Engineer Meetup

Meet with global self-driving engineers to network, connect, beer and make friends



Sharing and Spreading Insights

Fireside chats and presentations to share opinions and spread thoughts

Calling-Out For

Autonomous driving developers, engineers, designers, teams, institutes and startups, also engineering-background fanatics who want to reshape the innovation and application of cutting-edge technologies with their own efforts.

WHERE

Moving Hackathon Site



Guizhou Science City

WHEN

Moving Hackathon Date

May 21-27.2020

Mentors



Alexander Carballo Segura

Autoware software mentor

Designated Assistant Professor at Nagoya University, Research Consultant at TierIV Inc. Doctor of Engineering (D.Eng.) in Computer Science from University of Tsukuba, Japan. Member of the Institute of Electrical and Electronics Engineers (IEEE) Robotics and Automation Society (RAS), Computer Society, and Systems, Man and Cybernetics Society. Professional Member of the Robotics Society of Japan (RSJ). Active reviewer for IEEE Int ref Intelligent Robots and Systems (IROS), also Advanced Robotics Journal and the Journal of the Robotics Society of Japan. Great research and work experiences in the autonomous driving industry. Main research interests: Human-robot interaction, social robotics, autonomous robot navigation, autonomous vehicles, robotic perception, machine learning, computer networks, unmanned aerial vehicles.

Dowson Tseng

Autonomous Driving Engineer

Full-stack engineer at PIX. Deep proficiency in car hardware and software. Specialized in applying software and controls into vehicles to realize autonomous driving applications in real scenarios. Majored in Automation, Dowson holds years of experience in autonomous driving and have participated in the mechanical designs of PIX Robo-vehicle and coffee car. Dowson is the main lead in the mechanical and drive-by-wire controls of PIX cars, with rich engineering experience in the autonomous driving upper system.



Angelo Yu

CEO of PIX

Interdisciplinary innovator, entrepreneur, and architect, specialized in the industrialization of high-tech projects. Global perspective and deep insights into industrial trends. Successfully expanded product to global users in 20+ countries. 17 patents owner. Visit from President Xi.

MOVING HACKATHON 2020 CATEGORIES



Autonomous Driving Dive

In-depth training courses from experienced engineers and mentors





Full-sized Autonomous Driving Vehicle Onsite Challenge

V2I | V2V | Collaborative Hacking

Moving Hackathon 2020 is aimed to build a Cooperative Intelligent Transportation System (C-ITS) themed around V2V, V2I, collaborative sensing, collaborative control and vehicle behaviour sharing. The goal is to complement the perception and capacity limitation of single intelligent vehicle, further enhancing the safety and traffic efficiency of autonomous driving.

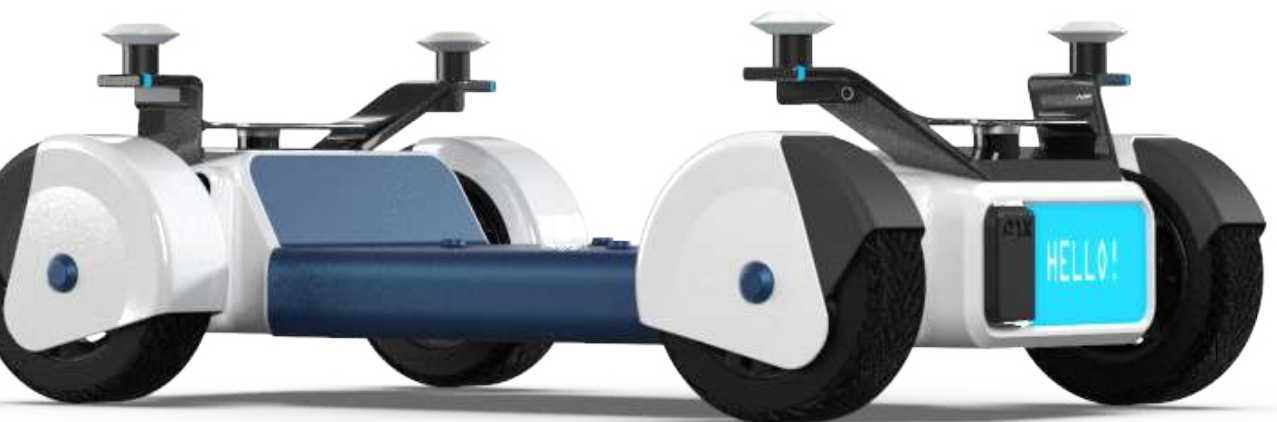
Participating engineers will be divided into three teams

TEAM1: Hack open source autonomous chassis and build the algorithms

TEAM2: Hack autonomous driving passenger car and build the algorithms

TEAM3: industrial park roads and setup, deploying on-board units (OBU)

Three teams collaborate to achieve V2V and V2I, and complete the corresponding challenges

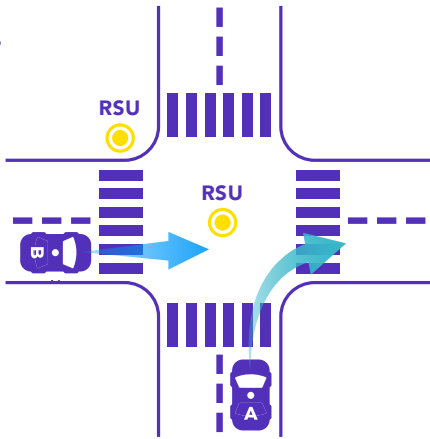




Full-sized Autonomous Driving Vehicle Onsite Challenge

Eight scenarios will be challenged in Moving Hackathon 2020

1.

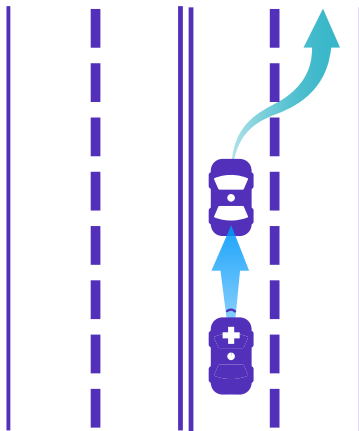


Intersection Collaboration (V2V | I2V)

A, B, C are the vehicles driving in one direction. Vehicle A intends to change lane to the left. Through V2V and V2I, vehicle B gives way to Vehicle A and Vehicle C slows down for Vehicle A.

Traffic accidents usually occur at intersections frequently. In this scenario, vehicles will communicate and collaborate through V2V when passing by complex intersection so that they understand mutual driving intentions and reduce the possible accidents. Meanwhile, roadside devices such as cameras, radar and other sensors are used to monitor pedestrians on crosswalk and vehicles at relevant intersections. Collected sensor data allows collaborative perception and decision with the vehicles, proving helpful information to the vehicles which can make driving decisions in advance, reducing potential car accidents.

2.

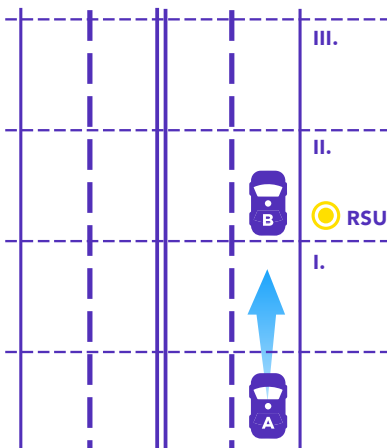


Giving Way To Priority Vehicles (V2V)

A, B, C are the vehicles driving in one direction. Vehicle speed $A > B > C$. Via V2V, Vehicle A completes the overtaking behavior.

When a high-priority mission car is approaching, for example an ambulance, the vehicle receives a reminder to give way to the priority car which is behind in the same lane or in the front coming from the opposite direction.

3.



Dynamic Speed Limit (I2V)

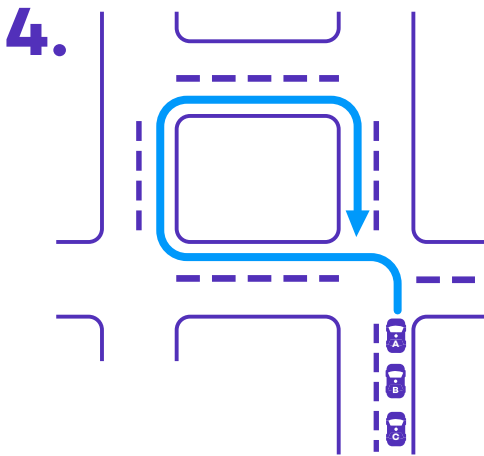
A, B, C are the vehicle fleet on the same lane. During the whole driving process, Vehicle B and C collaborate with Vehicle A to achieve automatic adjustment on speed, following distance and trajectory.

Vehicle adjusts its speed dynamically after receiving the relevant speed limit signals from the road side unit. It's similar to how the phone App reminds the driver to slow down or speed up based on the GPS navigation from geographic information or based on the speed limit sign data perceived by the in-vehicle camera. In this case, the signals are delivered via I2V, making the information manageable, which is not possible in the GPS-based navigation system.



Full-sized Autonomous Driving Vehicle Onsite Challenge

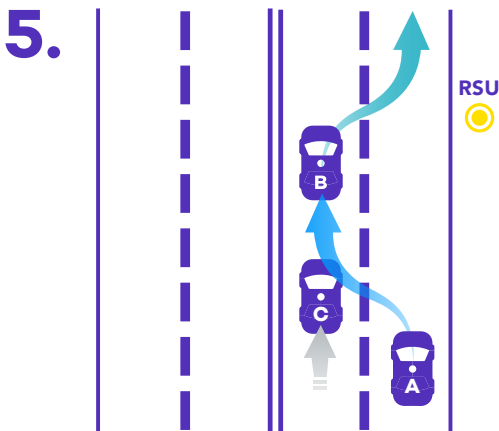
Eight scenarios will be challenged in Moving Hackathon 2020



Vehicle Fleet (mainly V2V)

A, B are the vehicles driving in one direction on the same lane. B is a high-priority vehicle (for example an ambulance). A and B communicate and A gives way to B.

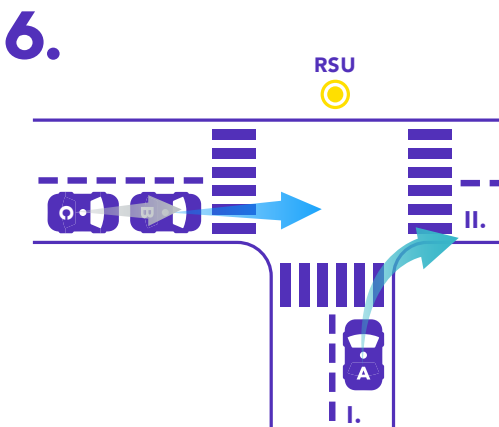
Adjacent vehicles on a single lane form a fleet, and adjust their movement automatically according to the status the lead or adjacent vehicle, ultimately achieving the desired driving speed and following distance. Vehicle fleet can significantly reduce traffic congestion, improve traffic efficiency, enhance driving safety and facilitate the utilization of fuel.



Collaborative Lane Change (mainly V2V)

Vehicle A and C are driving in the opposite direction on the same road. B is a breakdown vehicle and is at the same lane with A. Through V2V and V2I, Vehicle A takes the opposite lane temporarily and Vehicle C slows down for A.

Collaborative agile lane change indicates the scenario in which the target vehicle needs to change lane while driving and sends its driving intention to other vehicles or roadside facilities on the relevant lanes (current lane and target lane). The other vehicles speed up and slow down or coordinate by the roadside facilities based on the target vehicle request, so that the vehicle can successfully complete the changing-lane behavior.



Collaborative Free Merging (mainly V2V)

Vehicle B turns left and Vehicle A goes straight. A and B communicate to understand mutual driving intentions and current vehicle positions. Meanwhile, RSU (road side unit) monitors the crosswalk and other surrounded vehicles, and sends out the reminders.

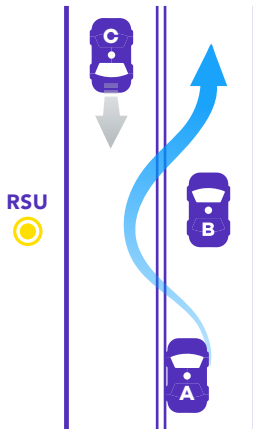
The target vehicle needs to merge into main road during driving. It sends its driving intention to other vehicles or roadside facilities on the relevant lane (target lane). Based on the priorities of the vehicles in the traffic area for merging, the corresponding vehicles will accelerate and decelerate or coordinate by the roadside facilities based on the target vehicle request, so that the vehicle can successfully complete the merging-into-traffic behavior.



Full-sized Autonomous Driving Vehicle Onsite Challenge

Eight scenarios will be challenged in Moving Hackathon 2020

7.

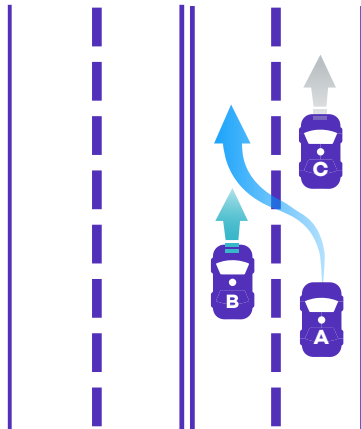


Collaborative Lane-Taking (mainly V2V)

Vehicle A is driving on the road and B is a breakdown vehicle ahead. Through RSU (road side unit), Vehicle A dynamically adjusts its driving speed when passing by block I, II and III.

The target vehicle needs to take the opposite lane due to an emergency (for example a car ahead on the same lane breaks down). The vehicle sends its driving information to the roadside facilities or other vehicles, including the vehicle position, speed, acceleration, and the intention of lane-taking (the target lane the vehicle wants to take). While ensuring the safety of the opposite lane, the target vehicle or road side unit completes the driving behavior to temporarily take the opposite lane based on the driving information of surrounded vehicles and the spontaneous traffic rules.

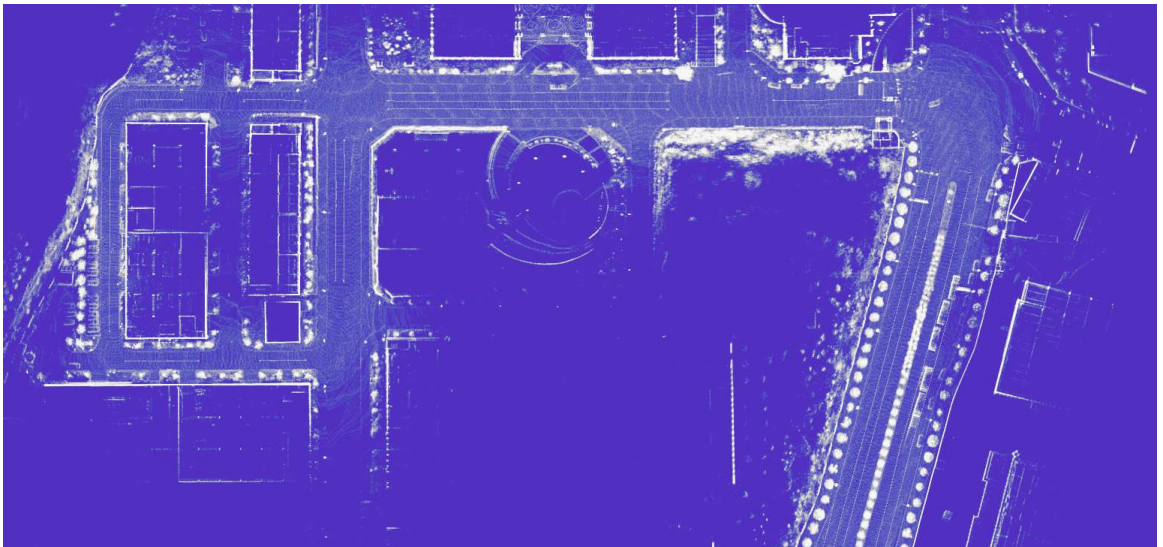
8.



Collaborative Overtaking (mainly V2V)

Vehicle A is merging right into road II from road I. Through V2V and V2I, Vehicle A, B and C adjust their speeds accordingly to complete the traffic merging behavior of Vehicle A.

When multiple autonomous vehicles of different performances drive on the same road, vehicle with faster speed can send request for overtaking so that the other vehicles can collaborate to facilitate and complete the overtaking process.



PIXBOT

PIX Open Source Autonomous Chassis

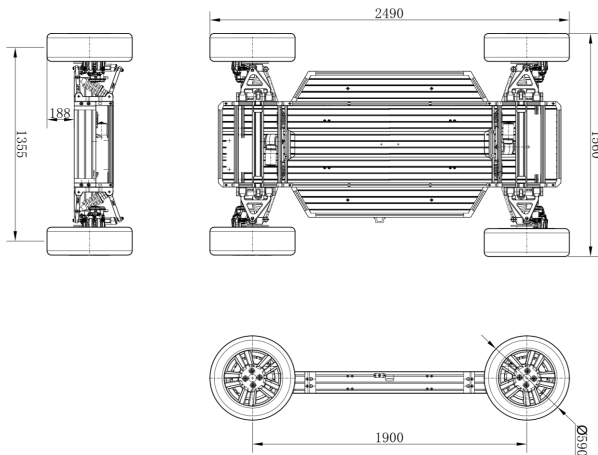
- Level 4 autonomous system
- Drive-by-wire system
- 4-wheel-drive hub-motors
- Twin-axle steering system
- Support ROS robot framework



PIXBOT is the world's first open source autonomous chassis, which is dedicated to lowering the innovation barrier of autonomous driving products and reducing the lead time of product development. As an open source solution for industries, academia and developer communities, PIXBOT is reliable, robust, easy-to-use, high-performance, affordable and extensible. PIXBOT applies software-defined modular design, provides accessible hardware interfaces, adopts open architecture, delivers hardware safety redundancy and supports a diverse range of autonomous driving software stack. Cars are ubiquitous nowadays, but the cost of building a car is growing exponentially. Only a few mogul enterprises are able to customize vehicles. PIX, is making a difference, paving the way for future city innovation. It's inspiring and exciting to see each innovator building their own dreams based on PIXBOT, reshaping a better planet in joint efforts.

Drive-by-wire Parameters

Left and right limit angles of rack and pinion gearset	±124°
Left and right limit angles of steering motor	±720°
Steering speed of steering wheel	0.360°/s
Voltage	12V
Power	240W
Position Sensor Accuracy	0.1°
Steering Control Accuracy	0.1°Steady-state error



Electrical System

Power Battery Type	Ternary lithium battery
Power Battery Nominal Voltage	72V
Power Battery Capacity	10KWh
Power Battery Maximum Output Power	22KW
Power Battery Overcharge Protection	BMS management system has overcharge protection function
Power Battery Over-Discharge Protection	BMS management system has over-discharge protection function
Charging Current	220AC
Charing Time	7 hours(Slow charging state)
Cooling Method	Natural air cooling
Controller Battery Type	Lead-acid batteries
Controller Battery Nominal Voltage	12V
Controller Battery Capacity	1.9KWh
Controller Battery Output Power	3KW

Mechanical System

Material For Frame High-strength aluminum alloy	Energy Type Fully electric	Maximum Load 1200KG	Minimum Turning Radius 3m	Pressure Initiative Servo hydraulic
Suspension Type Front and rear dual wishbone independent suspension	Drive 4X Hub motors (In-wheel motors)	Top Speed 40KM/h	Maximum Wheel Turning Angle Control Outer wheel 22°, Inner wheel 32°	Braking Type Drive-by-wire electronic brake
Wheel specs 195/60R14	Drive Power 4X4KW	Maximum Slope 40%	Driving Range 120KM (Customizable)	
Ground Clearance 190mm	Chassis Weight 200KG	Steering Type Four-wheel steering (Multiple modes available)	Braking Type Four-wheel disc brake	

Hardware Support 02

Drive-by-wire Cars (Autonomous Driving Compatible)

Drive-by-wire vehicles that are retrofitted based on the original vehicle communication message and original electronic actuators. Stable and reliable. High-level autonomous driving is supported.



Parameter	Vehicle model	Honda CIVIC 2016 / BAIC BJEV EU400
	Control interface	CAN(DB9) / Ethernet(RJ45)
	Drive-by-wire kit	steering, throttle, brake
	Power supply	AC 220V/4000W(4 sets of 12V/50A lead-acid batteries)
	The CAN bus baud rate	500kbps
	Equipment	Velodyne VLP-16 Swift RTK-GPS Camera

Hardware Support 03

Equipment

- Large CNC Machining Equipment
- Desktop Precision Equipment
- Hands Tool
- Plasma Cutting Machine
- Soldering Robotics
- 3D Printers
- CNC Tube Bending Machine
- Robotic Metal 3D Printing
- Electrical Equipment

Vehicle Hardware

- RTK
- LiDAR
- HDR Camera
- Millimeter-wave Radar
- GPU Onboard Computer
- Drive-by-wire Chassis
- Lidlar sensor



DIY Robocars Donkey Car Onsite Challenge

Small-sized

Challenge Schedule

- 12 individuals will be selected globally for the onsite challenge
- Participants use the donkey cars provided onsite by the Organizer to test and compete (or bring their own small-sized cars)
- Run laps on the indoor tracks and each individual gets three runs. The fastest lap will be recorded
- Participants with the shortest time records and best driving performances are the winners
- RC CAR + Raspberry Pi + Python (tornado, keras, tensorflow, opencv,)

Hardware Support

Fifteen Donkey Cars
(1/10 scale car powered by Raspberry Pi)

DIYROBOCARS
FAST | CHEAP | OUT OF CONTROL



Timeline



2020/2/8 - 4/25

Online Application

Launching the official Moving Hackathon webpage with detailed information of different categories. Global participants fill in online application form on the website to apply for the Hackathon

2020/4/25

Pre-Challenge Selection

The application form will be an important factor for selection. Besides that, certain applicants may receive a detailed technical form for the Pre-hackathon selection as supplementary material

2020/4/27

Final Participants List

Announcing the final participants list based on the application form and Pre-Hackathon Selection material

2020/5/21

Autonomous driving software workshop and course training

2020/5/21 - 5/26

Hackathon Challenge

Full-sized Autonomous Driving Vehicle Onsite Challenge

2020/5/25 - 5/26

Hackathon Challenge

DIY Robocars Donkey Car Onsite Challenge

2020/5/27

Awarding and Closing Ceremony

Challenge results showcase and awarding ceremony for the Challenge winners



2020 MOVING HACKATHON

Self-driving

ORGANIZER



数博会
BIG DATA
EXPO
中国·贵阳 GUIYANG·CHINA

China International Big Data Industry
Expo 2020 Organizing Committee.

CO-ORGANIZERS



贵州翰凯斯智能技术有限公司
贵阳市科学技术局
贵阳市大数据委
贵阳高新产业投资有限公司
启林创客

SUPPORT

贵州大数据发展管理局
国家工业信息安全发展研究中心
贵阳市国家高新区管委会
贵州省科技厅

PARTNERS (Confirming)

The Online
Education partner



The Lidar
Partner



The Computing
Platform Partner



The Exclusive Cloud
Computing Partner



DIY Robocars (<http://diyrobocars.com>) was founded by Chris Anderson in California in October 2016. The overall aim of DIY Robocars community is to make and race pro-level autonomous cars on a budget, for people who want to make and race DIY autonomous cars of any size, from tiny 16th scale to full-size, including go-karts.

Moving Hackathon second category is a local event companion to DIY Robocars, an opportunity to hack, compete, and show and tell. Donkey Car (<http://www.donkeycar.com/>), an open source DIY self driving platform for small scale cars, are used as standard challenge car for DIY Robocars Donkey Car Challenge of Moving Hackathon.

GUIYANG, CHINA

**Guiyang is a city
for innovation and entrepreneurship**

Global vision is cultivated in Guiyang and new-emerging industries meet the most incentive policies here. As the Data Valley of China, Guiyang is the pioneering advocator of big data, blockchain, artificial intelligence and smart manufacturing. Apple, Intel, Qualcomm, Huawei, the top enterprises have chosen Guiyang as their data center, innovation base or chips production factory. If you've missed the opportunity to see the growth of Guangdong and Zhejiang 20 years ago, then Guiyang will be the fast-growing revolutionary city that you should definitely witness.

The cool and mild weather, delicious specialties, local minorities and beautiful sceneries, all bring special charms to this city, attracting people both home and abroad to come here for local exploration and inspiration sparking.



数博会
**BIG DATA
EXPO**
中国·贵阳 GUIYANG·CHINA

CHINA INTERNATIONAL BIG DATA INDUSTRY EXPO

Guiyang International Big Data Expo, as the world's first big-data-themed Expo, has been successfully held for four consecutive years. Premier Li Keqiang sent a congratulatory letter, and Vice Premier Ma Kai addressed the summits. Industry leaders at home and abroad, including Jack Ma, Pony Ma, Robin Li, Terry Gou and Derek Aberle, also spoke at the summits...





Contact Us

◆ Sponsorship & Partnership

We offer a variety of sponsorship opportunities and are eager to work with you to create a custom presence for you onsite that will meet your marketing goals.

E-mail: chase@pixmoving.com / nancy@pixmoving.com

◆ Apply For Moving Hackathon

Please visit the official website of the event (www.pixmoving.com/movinghackathon2020) for details and fill out the registration form for online registration. We look forward to your participation. If you have any questions, you can also send an email to inquire about the content of the event.

E-mail: nancy@pixmoving.com

◆ If you are a media interested in the event

We are very pleased that you are paying attention to Moving hackathon. We invite and look forward to your being a media partner of hackathon, jointly promoting, initiating recruitment, or making a real record of the event and sharing the results of the communication event.

E-mail: chase@pixmoving.com

◆ If you want to be a volunteer for the event

Please send your resume to email (yusi@pixmoving.com), and we look forward to working with you to witness the exciting moments of Moving hackathon and gain an unforgettable and interesting experience.

E-mail: yusi@pixmoving.com

Hackathon Website:

www.pixmoving.com/movinghackathon2020



Media Support - Confirming





MOVING HACKATHON

www.pixmoving.com/movinghackathon2020

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