

Tue, 28 March 2023  
Weekly Newsletter

**DVN**  
Lighting & ADAS

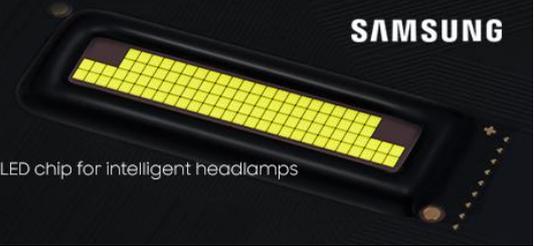
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# Editorial

## Now: DVN Report On Universities, Women's History Month

This week's DVNewsletter is a biggie! Today we release our latest DVN Report, [Universities and Lighting](#). Institutes of higher learning represent an essential talent pool for the automotive sector entire, and naturally for the lighting industry. Close collaboration is essential so universities can tailor their programs to industry needs, particularly now these needs are changing and growing faster than ever.

Another kind of collaboration is also crucial: universities are uniquely positioned and resourced to do the research which propels every aspect of vehicle lighting forward—including basic and advanced research to unleash breakthroughs, and to quantify, from a neutral and disinterested perspective, the safety performance potential of innovations requiring regulatory adaptations.

The report we release today brings you detailed information; facts and figures; achievements and interviews, about universities around the world supporting and participating in the vehicle lighting and driver vision ecosystem. Download your copy today.

We're glad you're with us; enjoy the report!

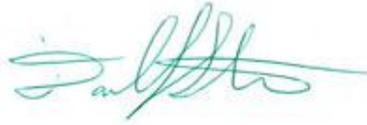
A handwritten signature in black ink, appearing to read 'JP Ravier'.

**Jean-Paul Ravier**  
DVN advisor

March is international Women's History Month, a recognition important in male-dominated fields like engineering. Women have been actively innovating in vehicle lighting and signalling ever since it was a brand-new thing, as you'll see in this week's news. There are skilled; talented, hard-working women throughout the vehicle lighting world—they're on standards boards like the SAE Lighting Systems Group and GRE. They've started successful driver-vision companies like IRYS tec, whose founder Dr. Tara Akhavan is the subject of this week's in-depth DVN Interview. And they're renowned researchers at prestigious universities, like

Fudan University's Dr. Yandan Lin, profiled and interviewed at length in the Universities and Lighting report.

We're glad you're with us; enjoy this week's news!



Daniel Stern  
*DVN Chief Editor*

# In Depth Lighting Technology

## Universities and Lighting: A Cooperation Worthy of Study!



The vehicle lighting industry employs about 100,000 managers and engineers, and recruits about 10,000 per year. Where from? Universities, overwhelmingly.

Universities are also important for the lighting industry as their cooperation accelerates fundamental research, as well as research to demonstrate the safety benefit of new technologies—a necessary step before new kinds of lighting is allowed by regulations.

For the DVN Report released today, [Universities and Lighting](#), we spoke with professors and researchers closely involved in these cooperations. We interviewed professors from Fudan University in China; Osaka University in Japan; ICAT in India; TU Darmstadt, KIT, THM, TU Berlin, and L-Lab in Germany; ESTACA in France, and Mount Sinai in the United States:



**Professor Yandan Lin, Fudan University**

“Industry should be more patient to cooperate with universities, and the university group need to move much more forward to meet the demand from industry. Each partner has its key role and advantage, and only Communication is important.”



**Professor Cornelius Neumann, KIT (Karlsruhe Institute of Technology)**

“For automakers and suppliers, cooperation with universities gives objective results, independent on company strategies or marketing opinions. For universities the advantage is to be at the pulse of time for serial applications and advanced developments. So, it is fruitful for both sides”.



**Professor T-K Khanh, TU Darmstadt**

“Lighting today is adaptive and deals with unexpected fields like biology; agriculture; energy saving, and efficiency”  
“Lighting today is interdisciplinary”



**Professor Dirk Meyer, THM**

"I have to inform students about basic know how of Lighting and generate a team of students working on this subject achieving practical solutions. This could be best done and supported in the industry, where students could have a position in the individual company to learn not only the lighting know how but also the processes in the industry".



**John Bullough, Mt. Sinai Light and Health Research Center**

"Culturally in Europe there's high value placed on the opinion of engineers, so we see many examples of an engineering school scrutinising a new lighting technology or technique, giving it a thumbs-up, and shortly thereafter it's acceptable under ECE Regulations. In North America, there tends to be a higher value placed on medical schools—over the years, often the head of NHTSA has been a doctor, for example".



**Professor Stephan Völker, TU Berlin**

"The lighting industry offers a highly exciting field of work with great depth of application which should be made even clearer to university graduates. In part, this can be achieved via contacts with universities and jointly supervised theses. In the long term, sustainable mobility concepts can only lead to success in an inter- and transdisciplinary way. That is why it is important to network disciplines and involve all levels in development work".



**Professor Bertrand Barbedette, ESTACA**

"The two major challenges for automotive market are the transition towards sustainable development, and the transition from a transport system to mobility systems. Surely at first, lighting will continue to improve the safety, for the car passengers but the other road user, and now vulnerable users. The lighting connected to the intelligence like a new source and mixed to other sensors, will propose new technical solutions."



**Professor Sébastien Saudrais, ESTACA**

"Finally, Lighting communication and signalization will be the future, not basically for the car, but the car communicating with its environment. These challenges generate multiple technical problems to solve for which our young engineers will be trained."



**Dr. Niedling, L-Lab**

"Future automotive lighting systems will have more functions and support autonomous driving by additional sensor integration."

The cooperative symbiosis between universities and the lighting industry is complex and intricate, with diverse needs and preferences on both sides. When those are known; understood, and addressed, universities get the resources they need to provide industry with a better-trained talent pool to recruit from, as well as research more responsive to the rapidly evolving basic needs for innovative development. And everyone benefits when university research objectively demonstrates the safety-performance potential of innovations to the satisfaction of regulatory authorities in charge of approving them!

In context of the long and ongoing history of collaboration between universities and the vehicle lighting industry, there's still room for improvement in what's requested; how it's

requested; how it's funded, and more. The flow of information must run in both directions; industry and government should be encouraged to listen to universities and vice-versa.

A widely-shared opinion among universities involved with driver vision is that improvements in adverse weather conditions and in crowded urban environments are top priorities. In parallel, vehicle lighting is becoming more and more adaptive. Headlamps can now adapt optimally to their surroundings, and they're acquiring more functionalities. But surely not everything we can do from a technical point of view is necessarily reasonable or desirable from a physiological point of view, and more lighting is not necessarily better. There is also a trend with the emotional aspect of lighting in vehicles being the most attractive, lighting being more and more interdisciplinary, establishing a kind of bridge to other disciplines. All of this demands more research and development, and universities are key players in this ecosystem.

The cooperation between universities and lighting has been productive in the past, particularly to build the bases of regulations. This cooperation is perhaps more fragile today, as competing demands exert stress and strain. Shared efforts are needed to keep it going and growing.

Read all about it—from a wide array of relevant perspectives—in the full DVN Report published today, [Universities and Lighting](#).

# Lighting News

## DVN Interview: IRYStec Founder Dr. Tara Akhavan *from Daniel Stern, DVN Chief Editor*

LIGHTING NEWS



Dr. Tara Akhavan (Ph.D) is an acclaimed technology entrepreneur and leader in automotive display image processing. She is the founder; president, and CEO of Forvia IRYStec. Akhavan was crowned Entrepreneur of the Year 2019 by EoY Canada, and listed as a top-20 innovative Canadian startup founder in 2018 by CIX. Originally from Iran, she moved to Vienna to study before moving to Canada to start her company. Their technology so favourable impressed us at CES that we asked for an interview, which she graciously granted:

**DVN: The Forvia display at CES was one of the most impressive in terms of information density. Your technology grabbed my arm and wouldn't let go! How did you get into this field? How did you start your company?**

**Dr. Tara Akhavan:** I started a small image-processing software startup in Montreal in 2015, called IRYStec. our speciality was using image processing to improve visibility and power consumption; those are the two USPs [unique selling propositions]. We built a consumer-targeted product for about a year, then we changed directions to automotive; between 2017 and 2020 we worked closely with Mercedes-Benz on our sunlight-visibility image-enhancement product called Smart Dimming—it's in production with Mercedes since 2020.

That same year, we got acquired by Faurecia (and so we're part of the Forvia family now). What you saw at CES was our new image processing software solution we have for visual enhancement in camera displays. What it does is to particularly improve visibility in harsh lighting and weather conditions, day and night—foggy; rainy, or a combination of those where the visibility is poor, particularly for electric mirrors or rearview cameras.

**DVN: If you have rain; fog; snow; headlight bloom from cars behind, sun glare... can you do multiple kinds of enhancement? If you have light bloom and falling snow, how does your tech handle that?**

**T.A.:** We can do areas-of-interest: specify different parts of the display and then process them differently knowing that this area has light bloom, that area has more fog in it, etc; that is in our roadmap. There are different ways to do it with different degradation in the image—the kind we get from reflection versus from a night scene which is more noisy, versus sun glare. There are advancements in the AI world based on some very interesting machine learning approaches: you can discern and define the different kinds of degradation and then apply the technology properly on the areas of the image that have that degradation. So you can have a very smart tuning based on the area and based on the content for image enhancement, rather than applying the same algorithm on the full image.

**DVN: Until then, if you're faced with multiple kinds of image 'badness', how do you choose; how do you strike a balance? Whose decision is it?**

**T.A.:** Ultimately, it's the automaker. The beauty of a software solution with a flexible STK [software development kit] is that there are so many parameters you can give to the automaker customer to tune. They can then decide how aggressive they want to be on, say, the contrast enhancement. And of course, there's always a balance. Imagine there's a night scene: there are details to the road signs, and you can't read them well, but there's also flash glare from the cars. So you want to enhance the road signs, but not the flash glare. What is the right balance to get the sign readable, but without the flash glare becoming unpleasant to the viewer? That's flexible in our solution. Of course, we have a default value and a range to play with; in our experience, automakers will all choose differently based on their use cases and the hardware they have and their ergonomics.

**DVN: In addition to differentiable regions of interest, what else do you foresee as the next evolutionary stages?**



**T.A.:** We have multiple solutions. Now we're looking at pillar-to-pillar displays, bigger and bigger. Power consumption is a challenge with them, so we're working on an optimized system performance—not only improving image quality, but also improving and optimizing the power consumption, also helping the 'smartness' of the screen in terms of how it works in different conditions, with different viewers. We take a [whole-] system approach: power (especially with EVs); visibility; readability; flexibility of adapting to use cases, and all the metrics important for automakers. If we can have all of that in the package, that adds USP.

Another aspect is personalisation. The same way we tune our seats and mirrors and everything to the person, the displays need to be tuned to our eyes as well. Our eyes are unique; they differ from one person to another person. As we age our eyes age with us (sometimes our eyes age faster than our nominal age—me, I'm 36, but my eyes are '50' because I'm always in front of a computer, so my eyes have lost contrast sensitivity). Then you can make sure you tune the display to the driver or the passenger looking at it, so that's a personalisation.

There is some new hardware technology coming, as well, on the display and camera sides. The more the hardware advances, that's another dimension we need to pursue; they always come with benefits and challenges. MicroLED displays are completely different to OLED or LCD, so we have to adapt our solution to these very different hardware technologies. For LCD, my main goal would be to enhance visibility, but for OLED my main goal would be lifetime.

### **DVN: What kind of time scale do you have in mind for the roadmap?**

**T.A.:** We have some internal innovation metrics that we've been very strictly following when we were a startup and also post-acquisition. So we very strictly follow the metrics: Number of POCs we want to do per year; number of innovation projects, and how many successful innovations should come out of it. You saw two of them at CES from my team; they were pure image processing innovations. We started with three projects, and two made it with the expected results. That's how we measure the process.

Every year we look at, say, five projects (the number is an example). For system-level innovation, especially with Forvia being very strong in interiors and seating, that gives us leverage of cockpit information: when I'm doing my image processing on the display, I have cockpit and sensor info my competitors might not have. So that's a system approach; or adding new USPs (like the personalisations we talked about), or adding new hardware. So we diversify the innovation projects in each of these domains and we [strive for] around 70-percent success rate. That's strict, for innovation, but we try to define our proofs of concepts and innovation process realistically enough that we can [do it], and we partner very early. That's inherited from our frugal startup days, that we partner very early with the customer, especially when we're doing software. We can afford to be as agile as possible.

### **DVN: That sounds like a cooperative approach with automaker customers, rather than just sort of plunking a product in front of them and saying "Here's our offer".**

**T.A.:** The moment you put the first iteration of even a laptop or mobile version of the demo in front of the customer, it initiates those interesting discussions. And then they start to think what they would want in the next generation.

### **DVN: We've talked up to now about making life easier for a human driver. Can your technology help machine vision? Can it expand the capabilities of visible-light sensing and maybe reduce the need for other technologies?**

**T.A.:** Yes. The areas right now are very separate, when we are targeting showing content on display for a [human] driver versus the path it takes to process the content for [machine] object recognition. It's very different. But there are similarities because eventually you want the object visible enough to the driver and to the machine. Our technology can help, because the moment you remove, let's say, the fog from an image, of course the bicycle will be more visible! So we take that into account for human and machine. But one thing we're careful about is the paths. The camera input goes to the image signal processing unit (part of the camera), so there are optimisations happening there, and we—later in the pipeline, on the display side of things—need to make sure we know what has already happened. We collaborate with the camera guys and the ADAS and AD teams within our customers, and also the display guys.

**DVN: The buzz is that human vision and machine vision are converging. I'm sure that's true when you zoom out, but this what you describe sounds like the two things are still very different, and to a large degree separate.**

**T.A.:** Absolutely. But when it comes to object recognition and visibility, there are a lot of similarities. There are so many areas which are really different in their architecture and pipelines, but when you're looking at visibility, there is a degree that helps both. Removing noise, removing degradation would help both systems.

**DVN: You mentioned your technology has been commercialised with Mercedes-Benz. More generally, what stage are things at with regard to interest or orders by automakers?**

**T.A.:** With some of our products we are more advanced—the older products; they're in production, so the first product, Smart Dimming, we're in production with MB since 2020—we won the Automotive News PACE award for most innovative products for that in 2021. And there's a pipeline of customers we're globally discussing and evaluating with. And then the newer products like the one at CES, the C-DIVE, that was actually the first time we were publicly showing that. It's very fresh out of the oven! We got great traction at CES, and we're showcasing that to our North American customers. The steps usually are the same for us; at the early stages we are very involved with the customer. We have the first version of a product; showcase it get traction; do joint-engagement developments and evaluations. There is an element of 'perceived quality' in image processing; we make sure we partner with our clients when they do the tests, so we help them with the evaluation, and then comes the RFQ and the SOP.

**DVN: Coming back to the origin of things: you said you started a startup of your own. What came before? What's your educational background? How did you come to start your startup?**

**T.A.:** I have my bachelor's degree in software engineering; master's in artificial intelligence, and for my PhD I did image processing and computer vision. I was a second- or third-year PhD student in 2013-14 when I came up with the idea. I was at a conference in Greece, presenting this idea I had, which my supervisor at that time was not very keen on pursuing because it was a bit more industry-driven, and he wanted to be more like a pure academic and publish something and put it on the shelves. Just by dumb luck, I was talking about this big idea, a very vague version of what would become IRYStec, and there was an investor sitting in the conference. He approached me at the coffee break and said he would write me a \$500,000 cheque if I would move to Montreal. I moved from Vienna to Montreal, we did more fundraising, went through the whole process for building a startup, with all the check marks the investors need—market valuation; patenting; cofounder and teambuilding, POC (proof of concept) for the product etc. Within six months I got that cheque; the investment happened, and then I stayed in Montreal.

**DVN: So you broke out of the strictures of a typical PhD thesis—a lovely paper that gets defended and then maybe never read again; it goes on the shelf. You gave it wheels instead, and here you are with this company you built. How have things changed as the result of Faurecia and now Forvia ownership? In terms of day-to-day life and company function and reach, what has changed now you're under the Forvia umbrella?**

**T.A.:** I've talked about this a lot, because people are interested in what happens when a small company is bought by a big company. The horror stories I heard, before acquisition...*Oh my god, what's going to happen to us?* Swallowed up, disappear and never heard from again—that's mostly what I heard from my entrepreneur friends: six months in everything has disappeared; everybody leaves; the product's in the corner, nothing's going to happen to it any more.

We had a very unique acquisition process, I would say. An adaptive process; Faurecia called it 'docking'. So we were not getting integrated; it was a docking process. That's what we discussed from the beginning—full integration would not make sense, because we were a team of 20 in Montreal and this is a 100,000+ employee company! But at the same time, it would not make sense to leave us completely autonomous, because then what is the point? So, we really figured out areas of integration. Roadmap needs to be integrated, and product. Sales needed to be handled by Faurecia, because we as a small startup had no presence internationally. It was actually very hard for me to close that deal in Germany; I was on the road every other week! But Faurecia had great strong presence in all the regions—Japan; China; Europe; North America, South America. So that would greatly expand our sales arm. I think this really helped us in the last two and a half years to keep our momentum and keep building the types of innovative products that we were building before. Post-acquisition, our innovation KPIs [key performance indicators]—number of patents; proofs of concept; engagements, etc—have improved by 30 per cent.

So I would say kudos to everybody at Faurecia who took care of us, because this is definitely a successful integration. Of course, there were still the pain points to get plugged into this big finance machine; legal, HR...but step by step, we really adjusted. I'm still here...my team is still here...we've expanded!

**DVN: Given that you haven't been swallowed up and disappeared by Forvia, what activities do you do at your facility there in Montreal, Quebec? Do you do manufacturing work there?**

**T.A.:** No, Faurecia is very strong in manufacturing with a global footprint, and we just work with them. Taiwan, China, Mexico have big Faurecia manufacturing sites. Montreal is a pure-R&D innovation centre; an image-processing and software centre of excellence. We started here with our expertise in software, now we're expanding that expertise toward hardware as well. Definitely the focus and core of our knowledge here is computer vision and AI; these are the tools we use to build new products. So we're an innovation centre.

**DVN: Thanks for showcasing your technology; your company, and your great success...keep going!**

**T.A.:** My pleasure!

# Ford's 'Men-Only' SUV is Minus Woman-Invented Tech

## LIGHTING NEWS



Ford are advertising a new Men's-Only Edition of their popular Explorer SUV. But it isn't reserved for only male drivers—it's been stripped of all equipment invented by women. That means no brake lights; no turn signals; no rearview mirror; no windshield wipers; no heater, and no navigation system. All those things were invented or made practicable by women, did you know? (neither did we, and that's the whole point). The advert, which can be [seen online](#), aims to raise awareness that the other half of the human race are automotive innovators, too.

## Florence Lawrence: Brake Lights & Turn Signals



Florence Lawrence was known as the first movie star, for silent motion pictures did not name the cast on-screen at first, and Lawrence was the first actor to be credited by name. She was also an enthusiastic motorist in those early days of automobiles. She was self-taught and highly capable in ministering to the constant needs of those early cars' mechanicals, and in 1920 (when driving was a sign of women's liberation) she told a reporter, "A car, to me, is something that is almost human, something that responds to kindness and understanding and care, just as people do. The average woman does her own repairing. She is curious enough to investigate every little creak and squeak of her car, and to remedy it".

She found it alarming that there was no signal of a leading driver's intent to stop or turn, so she set about fixing the problem. As she described it to Green Book Magazine in 1914, "I have invented an 'auto-signalling arm,' which, when placed on the back of the fender, can be

raised or lowered by electrical push buttons. The one indicating 'stop' works automatically whenever the foot brake is pressed".



So it was a mechanical sign which extended from the driver's side of the vehicle and informed following drivers "LEFT"; "RIGHT", or "STOP". It's easy to see the short, straight line from these early solutions to what would eventually become stop and direction-indicator lights.

Lawrence never patented her inventions; when asked why, she said they were for the good of all humanity. Humanity being what it is, of course, others quickly swooped into patent and profit from her work.

### **Mary Anderson: Windshield Wipers**



Mary Anderson was born in the U.S. state of Alabama in the mid-1860s. In the winter of 1903, she visited New York City and noticed a trolley driver with his window open despite the falling sleet, for he couldn't see through the windshield.

Anderson thought there had to be a better way, and devised the windshield wiper: a rubber blade, held to a vehicle's windshield by an arm, with spring tension to hold the rubber in firm contact with the windshield. The other end of the arm was mounted to a pivot above the windshield, and the other end of the pivot shaft had a crank handle on it so the driver could sweep it back and forth to clear the view.

She had a prototype made and applied for (and received) a [patent](#) in 1903 for her windshield wiper. Commercial success, though, was a bit elusive. She tried to get a Canadian company interested, but they turned up their nose at it: "we do not consider it to be of such commercial value as would warrant our undertaking its sale".

Her patent expired in 1920, and the auto industry happily turned out cars with windshield wipers according to Mary Anderson's basic design, construction, and operating principles.

### **Dorothy Levitt: Rearview Mirror (idea)**



Dorothy Levitt was a successful auto engineer and businesswoman—and the first female British race car driver. One day while zooming along the racetrack, she held up a small hand mirror to see the male drivers she was beating in the race. Aha! The rearview mirror was born.

### **Dorothee Pullinger: Rearview mirrors (Practical fitment)**



After leading 7,000 female war workers producing aircraft wings during World War II, Dorothee Pullinger started Galloway Motors, a company where cars were made by women, for women. Higher seats; a lower dashboard and smaller steering wheel; optimised pedal and lever control configurations, and rear- and sideview mirrors were all included.

Dr Nina Baker, an engineering historian from Glasgow, Scotland, says, "There is a delightful book which is a guide for women drivers in the very early days. It suggested taking your hand mirror off the dressing table when you went out in the car. The idea was to drive one handed, looking into your dainty ivory-backed mirror to see behind you!" No need for dodgy antics like that in the Galloway, with its three mirrors—a configuration still in use today.

# Driver Assistance News

## Mobileye : Robotaxis ready for Norway, end 2024

### DRIVER ASSISTANCE NEWS



The goal is to bring a fleet of 50 fully autonomous vehicles to Oslo's roads by late 2024 or early 2025. The promise of driverless on-demand vehicles whisking passengers from the airport to the city center or providing last-mile transport services remains unfulfilled.

Self-driving technology projects continue to run around the world. In Norway, the goal is to bring a fleet of 50 fully autonomous vehicles to Oslo's roads by late 2024 or early 2025.

The team working to make this a reality includes autonomous mobility implementation specialist Holo, self-driving system developer Mobileye, and Ruter, Oslo's public transport authority.

The partners are currently collecting data via a small fleet of Nio ES8 full-electric SUVs while simultaneously working to secure the necessary driving permits for the vehicles.

Mobileye will equip the vehicles with Mobileye Drive, its Level 4 self-driving system, which is part of the Intel subsidiary's Mobility-as-a-Service (MaaS) solutions to enabling autonomous shuttle services.

The Nios' cameras, radars and lidars run on Mobileye's EyeQ system on chip that helps enable the vehicle's self-driving features.

# General News

## After 2022 H1 surge, China's market recovery moderate

### GENERAL NEWS

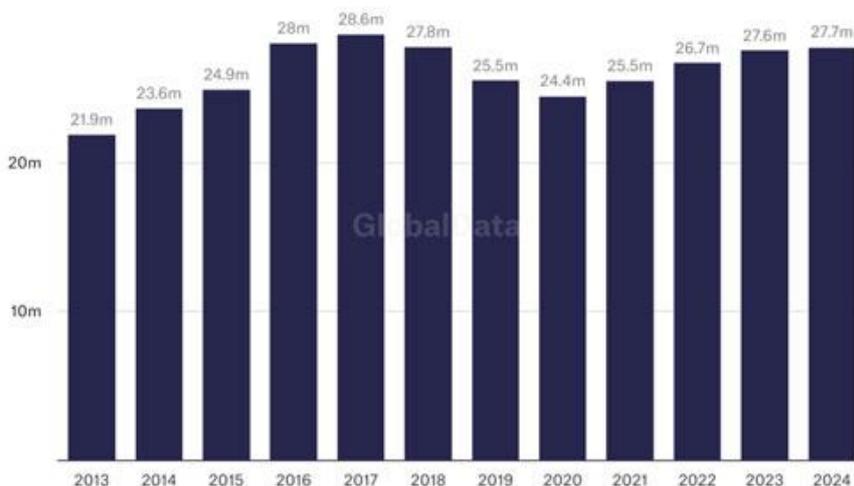


The Chinese vehicle market increased in 2022 to 26.7 million vehicles from 25.5 million in 2021.

At the opposite, January 2023, light-vehicle wholesales were 1.65 Mn units, which was a sharp contraction of 34 per cent year-on-year. The decline in sales in the first month of this year was caused by a combination of factors.

- Firstly, Chinese New Year, one of the most important holidays in China, fell in January. The 7–9-day long holiday had a significant impact on car sales and production.
- Secondly, the temporary purchase tax cut on ICE passenger vehicle models and the decade-old new energy vehicle (NEV) subsidy programme both expired at the end of 2022. This led to considerable consumption being pulled forward.

Forecast for 2023 is 27.6 million vehicles in progression of 0.9 million after a progression of 1.2 million one year earlier.



China light vehicles market