

# 3D打印电动电车问世

## 3D Print Type EV

文/ 刘程远 Text/Liu Chengyuan



世界首款3D打印电动电车Strati（斯特拉迪），是美国亚利桑那州Local Motors公司通过3D打印技术制造的，打印零部件和组装共花费44个小时。近日萌萌脑来到纽约街头，为民众提供试驾体验。

“斯特拉迪”只有两个定制的皮革座椅，全身是碳纤维及塑料。在车身的一边，可以清楚看到3D打印层，不过已经被打磨得很光滑。车身给人塑料感，但也非常牢固。尽管称之为3D打印电车，但是事实上并非所有的零件都是采用打印材料。车架、车身、座椅、中控台、仪表盘、发动机罩都是用3D打印的，但是诸如线缆、轮胎、轮辋、电池、悬挂、电动引擎和挡风玻璃则是采用传统方式。

“斯特拉迪”的底盘像赛车一样很低，金属外面是黑色的皮革外套，轮廓分明，与跑车很相似。内饰采用红色座椅，提供类似于网状的座椅，能让人更舒服。内部乘客座椅的前方有两个隔间，这是用来存放东西用的，就像真

The world's first 3D printing electric vehicle – Strati, is made by Local Motors in Arizona using the 3D printing technology. It takes 44 hours for printing parts and assembling. Recently, it came to the street of New York, providing the drive experience for people.

Strati has only two customized type leather seats. It is fully consisted of carbon fiber and

plastic. On one side of the body, we can clearly see the 3D printing layer, but it has been

well polished. The body gives a feeling of plastic, but it very strong.

Although referred to as 3D printing EV, not all of parts are made of print materials. Print materials cover the frame, body, seats, instrument panel, mid-control station, and hood. On the other hand, the cable, tire, rim, batteries, electric engine, suspension, and windshield are made in the traditional way.

The chassis is as low as that in the sports car. Outside the metal is the black and white leather jacket which is similar with that in the sports car. Interior uses red seats which are mesh-like letting a person more comfortable. There are two spacings before the passenger seat, which are used to store things. In the car, we can't



车一样。车内不能完全伸直腿，但有足够空间，椅子不能向前或者向后移动。

“斯特拉迪”虽然是3D打印电车，但没有一种玩具或者是廉价的感觉，皮革金属方向盘很牢固，仪表盘安置在左边。方向盘后面是三个有着DNR记号的按钮，D代表行驶，N代表停止，R代表后退。方向盘上有闪光灯控制。

“斯特拉迪”依靠电力驱动，充一次电花费3.5小时，最高时速可达56公里，电池可支撑其行驶193到243公里。

“斯特拉迪”最高时速可达80公里，由于工厂限制，保证安全，早期投入销售的“斯特拉迪”最高时速不超过40公里。启动时，油门比较轻，车没有动静，几乎听不到一点来自引擎的声音。这不禁让人想，车开动了么？

“斯特拉迪”整车只使用40个零件——成本约为3500美金，而传统电车零部件超过2万个。其最低售价1.1万英镑(约合人民币11万元)。Local Motors公司希望能以1.1万英镑到1.8万英镑(约合人民币18万元)的价格出售3D打印电车，价格取决于买家选择的型号和功能。

Local Motors公司下一步目标，是让打印电车的行驶合法化。“斯特拉迪”或许允许升级，换代时，公司会回收电车底盘，然后打印一个新的。公司希望这种不太昂贵的制造过程可以加速电车工业的革新。



completely straight legs, but there is enough space. The seat can't move forward or backward.

Although as a 3D printing EV, but it does not give a feeling of being a toy or cheap. The leather steering wheel is very strong, and the metal panel is placed on the left. Behind the wheel are three DNR-mark buttons, D represents drive, N stop, R backward. The steering wheel has a flash control.

This car is electrically driven. A charge takes 3.5 hours with the top speed up to 56 km. The battery can support a drive range of 193 to 243 kilometers. It has a top speed of 80 kilometers. But in the early time, in order to ensure safety, its top speed is not more than 40 kilometers. At a start, the quiet effect is good; we barely hear a bit of sound from the engine.

It only has 40 parts with a cost of about \$3500, while the traditional EV has more than 20000 parts. The lowest price is 11000 pounds (RMB 110000). Local Motors hopes to sell it at the price from 11000 pounds to 18000 pounds (about 180000 yuan), depending on the type and function buyers choose.

Local Motors' s next goal is to let it legally run. It may be upgraded during which the chassis may be recycled by Local Motors. This company hopes that the less expensive manufacturing process can accelerate the EV industrial innovation.



# 电动独轮车 率先跑起来

## Electric wheelbarrow, take the leading in running

文/ 费非 Article/Fei fei



即将到来的电车时代，电动独轮车或将率先跑起来。

由solowheel公司研发电动独轮车，早先被称为“电动平衡车”，如今叫做“智能代步车”更为贴切。电动独轮车适用于大型场馆、会场、机场、火车站等大型建筑物内部的通勤使用，不用时可以拎在手上或是存放在背包中。该公司2014年10月1日00:00启动换购活动，备受消费者关注。

近期，电动平衡车的发明公司solowheel更新了一批产品。五款不同型号的自动平衡车有差异化的玩法。而且价格下降、品类增多、智能化增强。

### 核心技术参数

几款产品相同的核心技术参数比较如下：

- 1、最高时速16公里/小时。
- 2、负重120千克，最高到150千克（xtreme款）。
- 3、加入蓝牙4.0，能与手机App相连。
- 4、电机功率为1500~1800W，也有500w的便携款和

The coming era of electric vehicle, electric wheelbarrow or will take the leading in running.

The electric wheelbarrow which was developed by the solowheel company, previously has known as balance "electric vehicle", now it is more suitable to be called "smart scooter". Electric wheelbarrow is suitable for large gymnasium, venue, airports, railway stations and other large buildings within the commuter use, which can carry on the hand or in a backpack when is not used. The company has started the purchasing activity at 00:00 on October 1, 2014, it was attracted a lot of consumers.

Recently, the electric balance car solowheel has updated a batch of products for the company. Five different types of automatic balance car have differentiation. And the declining price, increasing categories, strengthen intelligence.

### Core technical parameters

A few products of the same core technical parameters are as follows:

- 1, The top speed is 16 km/hour.
- 2, Weigh 120 kilograms, up to 150 kg (xtreme).
- 3, Adding bluetooth 4.0, can be connected to the App of the phone.





2000w的超大款。

5、爬坡度30度。

6、采用钴酸锂电池，由SONY提供，快充1小时，慢充2小时，速度可达10公里/小时，续航25公里。

配有3个重力加速计和3个陀螺仪，重量平均在11千克左右，轻便款Orbit只有5千克，最重的xtreme为12千克。

## 产品具体定位

solowheel给几款产品分别命名，其实比较难记。分别为Spirit、Orbit、Cruise、Hover、xtreme。具体定位不同为：

### 1、Spirit

等于是标准款，电池容量、重量等参数都在中等位置。

### 2、Orbit

采用很另类的空心环设计，重量可以做到很轻只有5千克。其它参数则会打一些折扣，续航只有12公里，为基本款的一半。

### 3、Cruise

特点是定制外观更强一些，基本参数与标准款Spirit一致。

### 4、Hover

配备两个车轮，每个车轮各自独立，如同一个平躺的时间沙漏。给出另一种完全不同的玩法，最好的是“漂移”很顺手。

### 5、xtreme

这是一个加强版的Spirit，承重可达150千克。

## 五款销售价格

不知solowheel是何出发点，按照流行的产品思路，集中精力打造精品应该约、精、简，该公司却推出款车。此类设备必须降低身段，让更多的人买得起。

目前，价格有所调整，比之前15800元的价格低。五款售价分别为：Spirit：1199美元、Cruise：1499美元、Xtreme：2199美元，Orbit：2599美元、Hovertrax与Spirit同价位1199美元（合人民币为7500元左右）。

4, electrical power for 1500 ~ 1800 w, also have 500 w paragraphs portable type and 2000 w huge type.

5, Climbing gradability is 30 degrees.

6, using cobalt acid lithium batteries, it is provided by SONY and quick charge for 1 hour, slow filling for 2 hours, the speed is reach to 10 km/hour, the endurance driving range is 25 km.

7. Equipped with three gravity accelerometers and gyroscopes, the average weight is about 11 kg, portable Orbit is only 5 kg, the heaviest xtreme is 12 kg.

## Product Specific positioning

Solowheel respectively named for a few products, actually is difficult to remember. Spirit, Orbit, Cruise, Hover, xtreme respectively. Different specific positioning are:

### 1, the Spirit

As the standard model, parameters such as battery capacity, weight and other parameters are in the middle level.

### 2, Orbit

Adopt a kind of hollow ring design, the lightest weight can be only for 5 kg. Other parameters will be made some discount, endurance driving range is only 12 kilometers, it is the half as the basic model.

### 3, Cruise

The characteristic is the custom appearance, basic parameters are the same with the standard of Spirit.

### 4, Hover

Equipped with two wheels, each wheel is isolated, it is just like a lying time hourglass. Which has been given a completely different driving experience, the most convenient is "drift".

### 5, xtreme

This is an enhanced version of the Spirit, bearing weight up to 150 kg.

## The selling price of these five models

We don't know what the starting point of solowheel, according to the popular product ideas, focus on building high-quality goods should be simple, refined, simple, the company is introduced the car. Such devices must be low down its position, let more people can afford to buy it. At present, the price is adjusted, is lower than the previous price of 15800 yuan. The selling prices of these five models are respectively: Spirit: \$1199, Cruise: \$1499, Xtreme: \$2199, Orbit: \$2599 is the same price with Spirit Hovertrax price \$1199 (RMB 7500



在国家电网、南方电网先后表态暂停城区充换电设施建设之后，谁来做充电设施的建设者？

## 国企普天、中石化欲接棒

目前中国的充换电设施，主要由国家电网、南方电网、中国普天和中石化几家企业运营，其中国家电网占到80%以上的份额，南方电网、普天和中石化约不到10%。

显然，国网在中国的充换电设施市场划走了最大一块蛋糕。如今新能源汽车政策、市场都非常火热，国网此时应该乘胜追击。但是形势恰恰相反，国网的脚步遽然停止。

上半年国网宣布将全面退出城市充电设施建领域，引入更多社会资本参与建设，国网则全力推进交通干道，也即城际互联充电网络建设。

大门洞开，路径已清。其他大国企承接国网任务，似乎是顺理成章的事。

原有的几大充换电设施运营企业中目前就普天还比较积极；不断还有新项目出来，一直在关注新政策的调整与变化，便普天也在等待更具体的可操作的管理办法出台。

充电设施的建设运营最基础的就是要给一个明确的行业定位，这个行业应该有一个最起码的规范体系，用电价格，服务体系，标准、监管等等。理论上，电动汽车充电设施应该是一个新型的能源服务企业，而不是电力销售行为，不应受电力法的约束。

但是，普天显然不会放弃先发优势。2010年11月，普天即进入深圳市场，建立74座充换电站，另外也进入了合肥、上海、北京市场。普天还设计了“裸车销售”、“电池租赁”等模式，为新能源汽车推广提供了范本。在这些模式中，普天都是充换电设施的运营者。为了推广这一模式，普天与中航锂电、合肥昌河、上汽通用五菱以及重庆



## 充电设施建设现真 Joint Effort to Construct the

After the state grid and the south grid said they had suspended the construction of the charge and battery change facilities in urban areas, who will continue to do this job.

### State-owned enterprises Putian and Sinopec to do it

In China, the charging facilities are operated mainly by the state grid, southern power grid, China Putian and Sinopec. Of which, state grid accounts for more than 80% of the share, southern power grid, Putian and Sinopec about less than 10%.

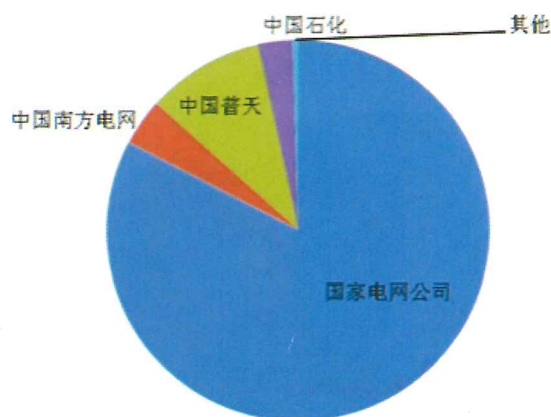
Obviously, the state grid is a main player in the charging electric facilities market of China. At present, there are good policies about the new energy cars, and the market is very good. The state grid should spend more effort in this regard. However, it suddenly stops its step.

In the first half of the year, the state grid announced it would exit the urban type comprehensive charging infrastructure construction field and introduce more social capital to participate in the construction. It would spend more effort to construct the traffic trunk road, namely, the inter-city charging network.

The door opens, and the path is clear. It seems to be a natural thing for the other large state-owned enterprises to undertake this task.

Putian is active in the field. It has new projects successively launched and always concerns about the new policies and their changes. Putian hopes the issuance of the more specific operational measures in the administration.

中国充换电设施运营情况







## 空国企民企各出招 Charging Infrastructure

文/陈亮 Text/Chen Liang

长安等企业都签订了合作协议，以类似“电池租赁”的模式，承担充换电设施的运营，由此进入或即将进入杭州、合肥、上海、重庆等地区。

另外，近期种种迹象表明，中石化正在酝酿大举进入电动汽车充电业务市场：中石化销售公司的投资方牵手宁德时代新能源，准备在电动车充电储能领域与中国石化展开合作。另外，从2012年开始，中石化就对加油站增设电动汽车充电设施开展技术研讨，并选取了4个省级公司进行试点。试点公司之一——中石化子公司广州石油，正在广州市启动首批充电站建设计划。另外，有多家车企传出与中石化合作建设充电设施的消息。

这样一个新的行业，未来一定会发生翻天覆地的变化，将来的新能源汽车充电设施的市场也会有意想不到的格局，今天市场份额很小的企业未来很有可能成长为这个行业的巨头和领导者。这样的企业会不会来自民营呢？

### 民营企业探索自己的商业模式

前述提及，此前中国的充换电市场，基本被几大国企瓜分。

The clear business orientation is a basis for the construction and operation of the charging infrastructure. This industry should have a minimum standard system, including electricity price, service, regulation and so on. In theory, the electric car charging infrastructure should be a new type of energy service companies, rather than power sales behavior, and should not be bound by the law of the electric power.

But, Putian, apparently, does not give up the first mover advantage. In November 2010, Putian entered the Shenzhen market to build 74 charging and battery change stations, and also entered Hefei, Shanghai and Beijing markets. Putian also designed the models such as "naked car sales", "battery lease"; and provided the model for the new energy vehicles promotion. In these models, Putian is the operator in the charging and battery change facilities. In order to promote this model, Putian signed cooperation agreements with Zhonghan Lithium Battery, Hefei Changhe, Wuling and Chongqing Changan so on. In these agreements, the battery lease mode is used in the operation entering Hangzhou, Hefei, Shanghai, and Chongqing etc.

In addition, recent evidence shows that Sinopec will heavily enter into the electric vehicle charging business market. Sinopec Sales Company cooperated with Ningde New Energy in the field of the electric vehicle charging energy storage. In addition, from 2012, Sinopec began to discuss the technology of the electric vehicle charging infrastructure, and selected 4 provincial-level companies for the pilot work. Its subsidiary Guangzhou Petrol is planning the construction of the first batch of the charging stations. It is also said that some car companies will cooperate with Sinopec in construction of charging facilities.

Such new business will have dramatic changes in the future. In the new energy automobile charging infrastructure market, the unexpected pattern will occur. Today's small enterprises having a small market share in the future are likely to grow into giant and leading ones in the industry. Will those enterprises be private ones?

### Private enterprises to explore their own business model

The previous charging and battery change market in China was basically divided by a few large state-owned enterprises.



国家电网  
STATE GRID





前期之所以没有民营资本进入充换电设施建设运营中，就是因为在该领域国家的相关政策不明确。但其实目前的充电设施运营还没有进入到公共领域的运营，前期的充电桩、充电站都是政府牵头给企事业单位建的，用地方面基本是地方政府划拨，用地成本基本为零。所以前期没有社会资本进入这一领域，这些“内部”充电设施也没法开放给普通电动车主。

这次国家《意见》明确了充电设施用地的取得方式以及充电服务费的收取模式，也就给了社会资本参与充电设施建设运营以明确的参与方式。市场嗅觉敏锐的相关企业必然嗅到了蕴藏在这些政策中的巨大商机——

青岛特锐德电气股份有限公司宣布将战略投资新能源汽车充电服务领域，初期规划投入6亿元人民币，计划2015年全国范围内投建100,000个新能源汽车智能充电终端。

易事特拟在马鞍山管委会区域内投资建设新能源汽车充电站(桩)项目。

### 智慧能源表示将重点转向充电设施建设...

民企的玩法又是怎样的？充换电设施大面积撒网需要的投入太大，特锐德则是以点带面，针对同一区域内10台以上需要充电的电动汽车群提出解决方案，实现无桩、无电插头，同时给多台电动汽车集中充电，一个个小循环成功盈利之后，再向更大范围复制。

何谓“电动汽车群充电解决方案”？目前包括特斯拉车主在内的多数用户申请安装充电桩为“一桩一接入”的安装方式。但是当用户越来越多，该方式在应对电动汽车群充电时会面临很多运营管理问题，包括电网安全隐患、设备安全隐患、用户安全隐患、充电成本高、电网投资巨大、设别占地增大停车位面积、一桩一接入申请难且管理无序、充电桩运营维护成本高等。

电动汽车群充电系统将这些问题集中解决，先在企事



Then time, no private capital entered into this market, for the reason that the relevant national policies are not clear. At present, the charging facilities are not yet put into the used in the public domain. The previous charging piles and stations were built by enterprises led by the government. The land was basically allocated by the local government, so the cost of the land was zero. Therefore, the social capital did not enter this market. Currently, these "internal" charging facilities are not yet opened to common electric car owners.

The current national policy clearly specifies how to obtain the land for the charging facility and how to charge the charging service. This gives a new hope for the social capital to participate in the construction and operation of the charging facilities. The relevant enterprises will find the huge business opportunities in the policy. Qingdao Teruide Electric Limited announced a strategic investment in the charging service for the new energy car field. The early plan is to invest 600 million yuan. By 2015 it will build 100000 intelligent charging terminals for new energy cars in the country. YISHITE plans to invest in the construction of the charging stations (piles) for new energy cars in the area of Maanshan Management Committee.

### Wisdom Energy said it would focus in the charging infrastructure construction...

How do the private enterprises do it? The charging and battery change stations need a lot of money in construction. Teruide provides its solution for the area having more than 10 electric cars. A number of electric cars can be charged in the concentrated manner. If a profit is seen, then the promotion will be carried out in a larger range.

What is meant by "EV Group Charging Solution"? At present, most EV users including Tesla car owners apply for installing the charging pile in which each EV is charged in each charging pile. But when there are more and more car users, this charging mode will face the management problems, including power grid security, equipment security, user security, charge costs, grid investment, and parking area etc. The existing charging mode has the following issues: disordered management, high operation and maintenance costs in the charging piles.

Electric vehicle charging system will solve these problems. At first,



业单位或小区停车场建成充电终端，为电动车集中充电。终端可以智能分配充电资源，急于出行的车采用高峰电价充，不着急的车采用低谷电价充，这些功能车主都可以下载相关手机app来控制，还能够通过手机随时了解充电到什么程度。特锐德近期就会在青岛范围内投建30套左右的系统，若能够在试点取得良好的用户口碑，特锐德将会加快建设速度。特锐德与北京新能源汽车股份有限公司草签协议，拟与北汽新能源公司在北京、青岛等地强强联合、共同推广电动汽车充电业务。随后特锐德与安徽芜湖签约，在电动汽车充电系统及终端网络投资建设、充电运营、电动汽车销售、4S电动汽车维修服务、电动汽车租赁等方面展开合作。尽管后两项合作尚未落地，但是安徽、北京也是普天、中石化的必争之地。双方的竞争，已经不可避免。



另一家民营企业——北京中联达电动汽车加电科技有限公司则提出了“1+4”发展方式。1=城市，一方城市政府是项目的市场和孵化器；4个联盟就是整车、电池、能供、资本这几个共同体，政府引导制定市场化的参与机制，车企、电池企业、能源供应和融资途径都要合力推进，建成一个良性循环的生态。以这种模式统一好一个机制，将来做商业模式和整个运营就有路径可循。中联达认为要首先通过建设覆盖城市全城范围的加电站骨干网，采取动力电池2-3分钟快换的方式来打消用户对于续航、网点的顾虑，是成功的关键。中联达目前正在积极和地方政府洽谈，希望由政府牵头在试点城市建立一个完整覆盖的充电网络，形成一个完整的生态体系后再向其他城市复制。如此，大国企和民营企业各有各的玩法。当国企的充换电网络进一步扩张，更多民营企业耕耘地方市场时，双方必将短兵相接。

the charging terminal is built in the enterprise or resident zone. The charging is made in the concentrated manner. The terminal can distribute the charging resources in the smart way. In the urgent situation, the charging is made via the peak price, while in the common situation, via the trough price. These functions can be controlled by the car user through the app of the mobile phone. The mobile phone can be used to understand the degree of the charging at any time. Teruide Limited will soon construct 30 sets of systems in Qingdao or so. If its pilot work is successful and the approval is from the market, it will accelerate the construction of the new systems. It signs a contract with Beijing New Energy Car Limited, and plans to cooperate with this partner to promote the EV charging business in Beijing and Qingdao. Later, It signs the contract with Wuhu City with regard to the EV charging system, terminal network, EV sale, 4S EV maintenance service, EV rental service etc. Anhui and Beijing are the market where Putian and other giants compete with each other. Moreover, the competition will soon take place.

Another private enterprise – Beijing Zhonglianda EV Charging Tech proposes the “1 + 4” development pattern. 1 = city: The government of a city can be the incubator of the project; 4= four factors: vehicle, battery, power supply and capital. The government guides the formulation the market participation mechanism. The enterprises in the fields of car, battery, energy supply, and financing should work together to build a virtuous circle of the ecological systems. In this mode, there will be a unified mechanism. Zhonglianda thinks that the power supply backbone network should be first built which can cover the whole city. The power battery can be changed in 2 to 3 minutes to eliminate the worry from the customer with regard to the mileage and outlet etc. This is a key thing in the successful work. Zhonglianda at present is taking a active attitude to negotiate with the local government and hopes the local government to build a complete charging network in the pilot city. Then, this complete ecological system can be replicated in the other cities. As such, the state-owned enterprises and private ones play a different role. When the charging and battery change network is further expanded, then more private enterprises will come to this market and the competition will take place.

