

ESG & Power Equipment & New Energy & Utilities

马斯克演示 FSD Beta V12“端到端”技术，推动自动驾驶加速渗透

Musk Demonstrates FSD Beta V12 "End-to-End" AI Technology, Accelerating Penetration of Autonomous Driving

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热点速评 Flash Analysis

(Please see APPENDIX 1 for English summary)

事件: 8月26日，马斯克展示了搭载 FSD Beta V12 的 Model S 车辆的自动驾驶试驾。试驾直播历时 45 分钟，期间马斯克仅接管一次，主要是在直行等红灯时对左转信号产生混淆。在其他时间段，FSD Beta V12 系统表现出色，对障碍物、环形交叉路口等复杂路况实现了流畅处理。

马斯克宣布 FSD Beta V12 为全球首个实现“端到端”的 AI 自动驾驶系统。该技术范式基于随机在地图上标记路径点，系统从起始到目的地全程接管，更加强调对算法的优化。FSD Beta V12 完全由 AI 神经网络训练，不涉及任何传统编程代码来识别道路和行人等。AI 系统替代了传统控制模块，减少 C++ 代码控制量约 10 倍（从约 2 万行左右减至约 2 千行）。该系统允许驾驶者在不熟悉地形的情况下，无需倚赖导航或地图数据连接，从而进行本地工作。

一万块 H100 GPU 集群上线，助力 FSD V12 加速落地。据悉，特斯拉将于近日上线一万片 H100 GPU 集群，用于支持 FSD 系统的训练。该集群的算力峰值可达 340 FP64 PFLOPS，AI 算力峰值可达 39.58 INT8 ExaFLOPS。目前，智能汽车主要面临训练算力方面的挑战，该集群的上线将助推 FSD Beta V12 的进一步发展。2023 年 7 月，特斯拉已投产超级计算机平台 Dojo，并规划于 2024 年 10 月将其算力提升至 100E，训练算力将显著增强。目前，FSD Beta V12 仍在调试中，正式发布时间尚待确认。

本次演示车型采用 HW3.0 硬件，HW4.0 硬件暂时不受支持。FSD Beta V12 的训练依托于大量视频训练数据，车辆配备 8 个摄像头，以每秒 36 帧的速度进行拍摄（实际运行速度可高达每秒 50 帧），系统则通过 AI 对视频进行实时判断。此次直播所演示的驾驶车辆采用 HW3.0 硬件，其推理计算功率仅约为 100 瓦。当前，系统尚未支持 HW4.0 硬件，主要因为本次演示车型采用了“视觉输入、控制输出”系统，包括输入视觉等传感器信号以及输出转向、刹车、加减速等控制信号，然而两者数据不兼容。马斯克表示未来会对 HW4.0 进行重新训练以适应。

特斯拉 FSD 国内即将落地，推动自动驾驶产业链加速渗透。据悉，FSD 测试版将向中国区用户推送，初期将以“影子模式”收集数据，在完成相关可行性的验证后将逐步展开小规模试用。6 月，马斯克宣布将向其他汽车制造商开放 FSD 技术的使用权限，并于 8 月宣布已经在国内建立数据中心以实现数据存储的本地化。政策方面，7 月，北京正式开放智能网联乘用车“车内无人”商业化试点，符合要求的企业可在示范区内提供常态化的自动驾驶付费出行服务。上海首批获得测试牌照的三家企业可在浦东新区内的划定区域开展全无人自动驾驶测试。自动驾驶技术的不断进步叠加相关政策支持，有望进一步推动自动驾驶产业链的加速渗透。

投资建议: FSD Beta V12 等 AI 创新技术的逐步落地将推动相关产业链加速渗透，以特斯拉为代表的自动驾驶企业正在引领自动驾驶技术应用进入实际落地阶段。建议关注特斯拉产业链及自动驾驶产业链两条主线的投资机会；建议关注领域包括大模型技术以及域控制器等；建议关注【拓普集团】、【中科创达】、【经纬恒润】、【均胜电子】等。

风险: AI 技术发展不及预期，市场竞争，政策落地不及预期。

APPENDIX 1

Event: On August 26, Musk showed a self-driving test drive of a Model S vehicle equipped with an FSD Beta V12. The live test drive lasted 45 minutes, during which Musk only took over once, mainly to confuse a left-turn signal while waiting for a red light straight ahead. In the rest of the time, the FSD Beta V12 system performed well, achieving smooth handling of complex road conditions such as obstacles and roundabouts.

Musk announced that FSD Beta V12 is the first "end-to-end" AI autonomous driving system. The technology paradigm is based on randomly marking path points on the map, and the system takes over the entire process from start to destination, placing more emphasis on optimizing the algorithm. FSD Beta V12 is fully trained by AI neural networks, and doesn't involve any traditional programming code to recognize the road, pedestrians, etc. The AI system replaces the traditional control module, and reduces the amount of C++ code to be controlled by a factor of 10. The system allows drivers to work locally without having to rely on navigation or map data connections when they are unfamiliar with the terrain.

10,000 H100 GPU clusters are online to help accelerate FSD V12. It is reported that Tesla will recently go live with a 10,000 piece H100 GPU cluster to support the training of the FSD system. The peak arithmetic of the cluster can reach 340 FP64 PFLOPS, and the peak AI arithmetic can reach 39.58 INT8 ExaFLOPS. At present, intelligent cars are mainly faced with the challenge of training arithmetic, and the on-line launch of this cluster will boost the further development of the FSD Beta V12. In July, Tesla has already put into production the supercomputer platform Dojo, and is planning to October 2024 to increase its computing power to 100E, which will significantly increase the training computing power. Currently, FSD Beta V12 is still in debugging, and the official release date is yet to be confirmed.

The demonstration vehicle adopts HW3.0 hardware, HW4.0 hardware is not supported for the time being. The training of FSD Beta V12 relies on a large amount of video training data, the vehicle is equipped with 8 cameras, shooting at a speed of 36 frames per second (the actual running speed can be as high as 50 frames per second), and the system makes real-time judgments on the video through AI. The driving vehicle demonstrated in this live broadcast uses HW3.0 hardware, whose inference computing power is only about 100 watts. Currently, the system does not yet support HW4.0 hardware, mainly because the demonstration model uses a "visual input, control output" system, but the two data are not compatible. Musk said that HW4.0 will be retrained in the future to adapt.

Tesla FSD will soon land in the country, promoting the accelerated penetration of the autopilot industry chain. It is reported that the beta version of FSD will be pushed to users in China, and will initially collect data in "shadow mode", and will gradually launch a small-scale trial after completing the relevant feasibility verification. In June, Musk announced that he would open up the use of FSD technology to other automakers, and in August, Tesla already set up a data center in China to realize the localization of data storage. In terms of policy, in July, Beijing officially opened the commercialization pilot of "unmanned vehicle" for intelligent networked passenger cars, and enterprises that meet the requirements can provide regular self-driving paid travel services in the demonstration area. In Shanghai, the first three companies to obtain a test license can carry out fully unmanned self-driving tests in a designated area in the Pudong New Area. The continuous progress of autonomous driving technology, coupled with relevant policy support, is expected to further promote the accelerated penetration of the autonomous driving industry chain.

Investment advice: We believe that the gradual landing of AI innovative technologies such as FSD Beta V12 will promote the accelerated penetration of the relevant industry chain, and the automatic driving enterprises represented by Tesla are leading the application of automatic driving technology into the actual landing stage. It is recommended to pay attention to the Tesla industry chain and the investment opportunities of the two main lines of the autonomous driving industry chain. The focusing areas include ARBE solutions, large model technology and domain controller, etc. It is recommended to pay attention to [Ningbo Tuopu Group], [Thunder Software Technology], [Beijing Jingwei Hirain Technologies], [Ningbo Joyson Electronic], etc.

Risks: AI technology development less than expected, market competition, policy less than expected

附录 APPENDIX

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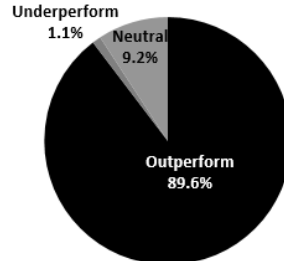
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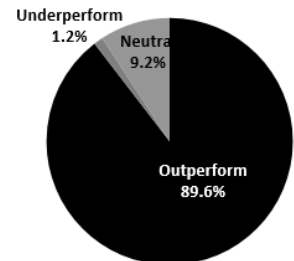
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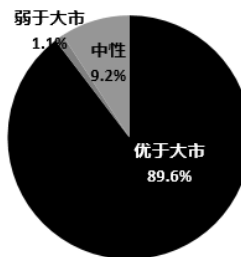
Most Recent Full Quarter



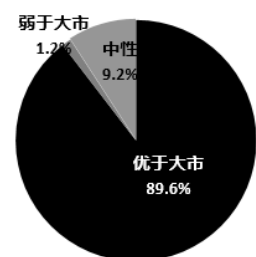
Prior Full Quarter



最新季度



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