보스턴 다이내믹스 인수합병을 통한 로봇기술의 모빌리티 산업에 적용 사례

이현애[1] · 장대현[2] · 신성윤[1,*]

[1]군산대학교 · [2]대신정보통신

A Study on the Application of Robot Technology to Mobility Industry through Boston Dynamics M&A Cases

Hyun-Ae Lee[1] · Dai-Hyun Jang[2] · Seong-Yoon Shin[1*]

[1]Kunsan National University · [2]DaiShin Information & Communications Co., Ltd

E-mail : tranhyun@gmail.com / daijang@dsic.co.kr / s3397220@kunsan.ac.kr

요 약

본 논문에서는 RT(Robot Technology) 및 관련 산업을 중심으로 현대자동차그룹의 21세기를 이끌어갈 새로운 중추 산업 로봇기술의 보스턴 다이내믹스 M&A를 통해 모빌리티 분야에 현대자동차의 선진사례와 기술을 소개한다.

ABSTRACT

In this paper, Hyundai Motor Group's advanced cases and technologies are introduced in the mobility field through Boston Dynamics M&A, a new pivotal industrial robot technology that will lead the 21st century of Hyundai Motor Group, focusing on RT(Robot Technology) and related industries.

키워드

RT, 현대자동차그룹, Mobility, 보스턴 다이내믹스 M&A, 중추 산업 로봇기술

Ⅰ. Introduction

The development of information technology (IT) has liberated humans from mental labor, but robotic technology (RT) is a technology that brings revolutionary freedom from human settlement and physical labor, and it can be realized that robots that meet in sci-fi in the near future, but are now in the 21st century together. However, for us living in the 21st century, human robots closer than cyborgs meet in our daily lives or business fields at this moment. When it comes to Japan or US, robots such as ASIMO who talk to people, ISAMU which resembles human feet, PET robot AIBO, and real cat Nekoro etc., are serve and work for housewives, children, and the seniors in everyday life at hospitals and schools. The creation of future business opportunities with robotics technology may be a revolutionary event of the near future that robots will bring.

Focusing on Robot Technology (RT) and related industries, we will introduce Hyundai's application of advanced practices and technologies to the mobility sector through Hyundai Motor Group's M&A of Boston Dynamics of robot technologies as a new pivotal industry that will lead the 21st century.

Ⅱ. Main

1) Future Mobility Industry with Robot

* corresponding author

The robotics industry needs to develop and evolve hardware and software together in one product, and the benefits are similar to that of the automotive industry. The strength of the know-how of the automotive group is that the capabilities accumulated in developing the car can be incorporated into the robot planning, production, and operation process. In addition, automotive technologies such as autonomous driving and ADAS are the main points that can increase the impact of future mobility along with the development of robotics technologies.

Before discussing the future mobile industry's relationship with robotics, autonomous driving technology is the first challenge in changing the automotive industry. The autonomous driving revolution of the existing automotive industry has led to major changes across the form factor, service, and value chain of automobiles, and requires major changes in the shape of automobiles. This means that technology research and product strategies related to the development of autonomous vehicles are difficult to survive in a new era.

In general, autonomous driving is defined by Society of Automotive Engineers, NHTSA as a level of six levels (Fig. 1) of autonomous driving in two aspects: the driver's car and the vehicle. The robot is remotely controlled without direct intervention from the operator, i.e. operator, so autonomous driving technology can be applied at level 4 or higher.

- Level of Autonomous Driving

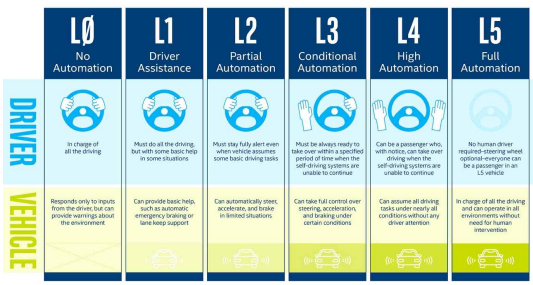

Fig. 1. The 6 levels of Autonomous Driving*

- Details of Autonomous Driving**

Level 0: No Automation-Zero autonomy; the driver performs all the driving, but the vehicle can aid with blind spot detection, forward collision warnings and lane departure warnings.

Level 1: Driver Assistance-The vehicle may have some active driving assist features, but the driver is still in charge. Such assist features available in today's vehicles include adaptive cruise control, automatic emergency braking and lane keeping.

Level 2: Partial Automation-The driver still must be alert and monitor the environment at all times, but driving assist features that control acceleration, braking and steering may work together in unison so the driver does not need to provide any input in certain situations. Such automated functions available today include self-parking and traffic jam assist (stop-and-go traffic driving).

Level 3: Conditional Automation-The vehicle can itself perform all aspects of the driving task under some circumstances, but the human driver must always be ready to take control at all times within a specified notice period. In all other circumstances, the human performs the driving.

Level 4: High Automation-This is a self-driving vehicle. But it still has a driver's seat and all the regular controls. Though the vehicle can drive and "see" all on its own, circumstances such as geographic area, road conditions or local laws might require the person in the driver's seat to take over.

Level 5: Full Automation-The vehicle is capable of performing all driving functions under all environmental conditions and can operate without humans inside. The human occupants are passengers and need never be involved in driving. A steering wheel is optional in this vehicle.

2) HMG and Boston Dynamics

In particular, Hyundai Motor Group is consolidating and expanding its initiatives on future mobility, including autonomous vehicles, logistics, and urban aviation mobility, through the acquisition of Boston Dynamics, with the slogan "Progress for Humanity" in the status of robotics R&D and future development direction. This is why we are internalizing core-based technologies around robotic mobility and ordering the development of future robotic services.

As for an industry where robots can be applied directly, you can review the feature for various businesses by value chain, such as Automotive, Logistics, Stealth/Auto Parts, Construction, Finance,

* Suorces : Society of Automotive Engineers, NHTSA

** Sources: Society of Automotive Engineers (SAE); National Highway and Traffic Safety Administration (NHTSA)

and Service. In addition, various types of industrial robots are active in the logistics field (Fig. 2).

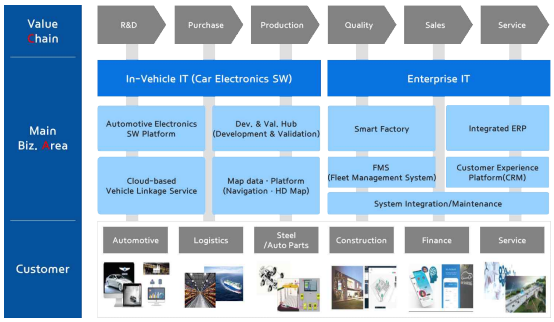

Fig. 2. Business Area for Customer Field

3) FMS (Fleet Management System)

Future mobility systems are very similar to basic robot system configurations, such as environmental cognitive technology through sensor fusion, judgment technology using artificial intelligence, and control technology using mechatronics. In this respect, the role of robotics in future mobility technologies is important. In particular, technologies applied to automobiles such as autonomous driving and driving assistance can increase the impact of future mobility with the development of robotics technology.

Boston Dynamics' first commercially available four-legged walking robot, Spot, is a quadruped robot that can be used as a robot for detecting and inspecting hazardous situations such as gas and remote operation (Fig. 3). It is already being used to monitor construction sites or monitor gas, oil and power installations.

Autonomous navigation, tele-operation technology and computing payload features are able to accelerate the

Thus, what can be seen in common with autonomous driving technology in applying robotic technology to future mobility services? In order to apply robots to real-world industries, fms technology applied to unmanned autonomous driving or robot taxis can be used as an essential technology to remotely monitor and control robots. FMS is a system for incorporating vehicle-trained autonomous driving operation know-how into robot operations, and FMS allows robots to be effectively applied in a variety of industries.

Fig. 3. The 3RD Mobility Forum: Boston Dynamics's Quadruped Robot called SPOT

4) Adaptation in FMS (Sample)

Aligns with the concept of total mobility services, including mission reception, selection of options, creation of action scenarios, selection of optimal alternatives, and deployment of robots and scenarios.

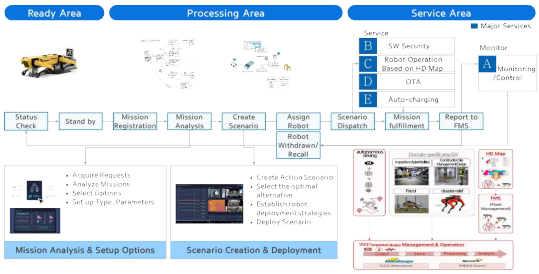

Fig. 4. Sample Scenario of Robot Operation Process

As for key services in robot operation (Fig. 4), 1) A. Control/Operation System, 2) Robot Abnormal Detection Control, 3) HD MAP-based Robot Movement, 4) OTA (Over the Air), 5) Auto-charging etc. for the next session, details of them could be followed

III. Conclusion

Including automotive industry, variety of industries are trying to adopt RT in its field. Boston Dynamics, a U.S. based robotics firm acquired by Hyundai Motor Group, has started test operations of its factory safety service robot in an effort to expand the use of its robotics products for various industrial tasks.

Autonomous navigation, tele-operation technology and computing payload features are able to accelerate the convergence of dynamic industries.

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