## How can I develop a new and useful robot application

To develop a future robot, we should do from the following three aspect: **Requirements**, **Technology** and **Application**. In this paragraph, I will briefly explain and supplement it with an example.

As described in the documentation [Robotics 2020 Multi-Annual Roadmap], this three points I mentioned also influence and reinforce each other at the same time. Many different domain made different requirements, all the requirements can drive and be limited by application which is provided by technology.

I think requirements are the most important Influencing factors and root causes of development. We should begin with a market research. There is a very simple truth to this: If there is no market for your product, even if it uses cutting-edge technology, you will not be able to sell it through traditional methods to earn back the R&D costs, let alone make a profit. Of course, if you think you can use Internet marketing to create new requests, you can ignore the market research step, but I believe that starting with a request is the key starting point for developing a successful robot.

So how do we do market research to get some useful information? It is also well represented in the report. You can analyze the size of the market, the maturity of the supply chain, predict the future direction of the whole market, or gain insight into the current incomplete automation process and improve it. Also we need to concern about R&D funding.

Let's talk about the example I want to give today to demonstrate the process of requirements and market analysis. I will briefly research the disabled market in China and analyze the prospects for robotics applications within it. At present, there are 85 million disabled people, more than 44 million disabled and semi-disabled elderly people, and nearly 300 million chronic patients in China, and the demand for rehabilitation services is huge**[[1]](#footnote-0)**. Among the 10.777 million licensed disabled people, there are 5.428 million physically disabled people. They receive only basic subsistence, have limited access to areas through wheelchairs, and can barely participate in regular recreational and social activities. As people's standard of living improves, it is only right that we get them out of their wheelchairs and walking independently. The large number of disabled people guarantees a corresponding market size. Then we can invest and develop for such needs.

As for technology, since I haven't learned much about it myself, I can only talk directly about my examples regarding people with disabilities from the perspective I can search for. Now there is a potential application out there: Exoskeleton devices.**[[2]](#footnote-1)** But exoskeletons are now mainly used in the military and still do not have the same burst of development as self-driving cars. The industry judges the performance of exoskeleton devices by an indicator called cost of harvesting (COH), which is the ratio of the change in the user's metabolic power to the electrical energy generated by the device. The biggest obstacle in the technical route is that the COH value in current products is positive, which means that the user must pay additional metabolic costs to achieve electrical energy storage. If we can obtain the key technology of exoskeletons in the civilian sector and make them lightweight (because civilian exoskeletons do not need to carry weight excessively larger than their body weight and do not need to move too fast), it can be worked to solve the needs of people with disabilities to walk upright alone and access social places. There is also a good news that developers have already found a way which has a negative COH**[[3]](#footnote-2)**. We can make commercial development on this basis.

Finally, application. I imagine that the exoskeleton I develop should add private customization modules based on proper standardization, in addition to the lightweight feature (cost reduction). Specifically describe its characteristics, to have almost silent drive motor, lightweight lithium battery pack, advanced brain-computer interface or voice control system, and customized mechanical structure (carbon fiber material) according to height and weight. Such an exoskeleton can be used for leg support only or extended to the back to meet different levels of needs. The last point is that it should get rid of the wheeled support structure like a wheelchair. Boston Dynamics' humanoid robots are able to balance themselves, and so should our exoskeletons.

All companies have not yet been able to make low-cost exoskeleton equipment, let us look forward to the field of materials science to develop higher energy density of energy storage materials and cheaper lightweight materials to reduce the price of existing technologies.

This is my complete conception.

1. https://www.qianzhan.com/analyst/detail/220/210517-f2cf4e9a.html [↑](#footnote-ref-0)
2. https://eksobionics.com/exoskeleton-suit-for-the-disabled-who-qualifies/ [↑](#footnote-ref-1)
3. https://www.science.org/doi/10.1126/science.aba9947?rss=1 [↑](#footnote-ref-2)