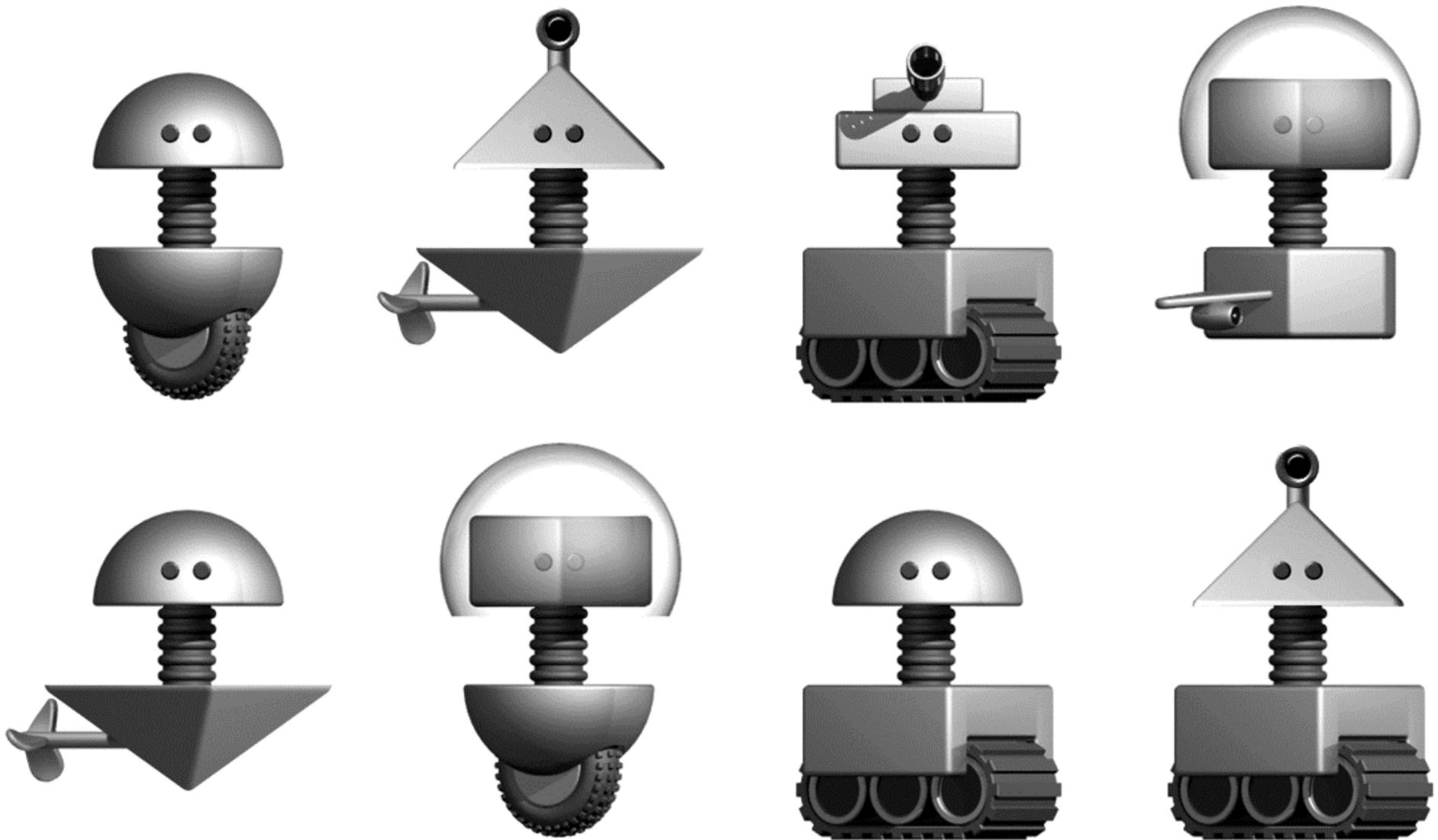


Will your child survive the automation economy?



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Recently, we have seen more and more evidence that jobs typically done by humans are now being automated. From self-driving cars under development by Uber, Lyft, GM, Tesla, Ford & Toyota to automated kiosks being rolled out at McDonald's, Wendy's, and Panera. Research from Massachusetts Institute of Technology Economics Professor, David Autor, shows that **middle-skill jobs like bookkeeping, clerical work and repetitive assembly line jobs are being rapidly displaced by automation** (<http://blogs.wsj.com/economics/2015/02/25/be-calm-robots-arent-about-to-take-your-job-mit-economist-says/>). While Professor Autor does not believe that automation will devour existing jobs, a **2014 Pew Survey** (<http://www.pewinternet.org/2014/08/06/future-of-jobs/>) shows that 48% of technologists believe that automation would displace a significant number of blue and white collar workers by 2025; the remaining 52% believe that while there will be displacement, technology will be a net job creator. Given these two competing viewpoints, it is important to consider not necessarily the types of jobs that will be available in the future which as the Pew Survey shows is hard to predict even 10 years from now. Instead, it may be more important to think about the skills the current generation of kids will need in order to successfully compete in the **automation economy** given emerging industry trends.

Transportation

Automotive manufacturers have been using robots to **automate the manual, repetitive tasks associated with building cars since 1961** (<http://science.howstuffworks.com/robots-changed-manufacturing.htm>). However, in recent years, both established automotive companies like **Ford and GM along with emerging startups like Uber and Tesla along with technology companies like Google and Apple** (<http://www.techinsider.io/google-apple-tesla-race-to-develop-self-driving-cars-by-2020-2015-10>) have been working hard to develop self-driving vehicles by 2020. Yes, robots assisted by humans are building cars that will be driven by computers assisted by humans! In fact, from this **video of Tesla's autopilot feature** (<http://www.techinsider.io/google-apple-tesla-race-to-develop-self-driving-cars-by-2020-2015-10>), one can see that not only has significant progress been made with the underlying technology (sensors, software, algorithm design, mapping) but also consumer adoption. It's not hard to imagine real-world data eventually showing that self-driving cars are safer than their human driven counterparts or alternatively insurance company premiums may become prohibitively expensive for human driven vehicles. From the changing road conditions to the variability in individual skill and experience, driving has long been considered an extremely difficult task. Not only has Tesla successfully launched an early prototype of this feature, but they also are collecting **real-time data at the rate of 1M miles / 10 hours about the usage to help improve the functionality** (<https://www.technologyreview.com/s/601567/tesla-tests-self-driving-functions-with-secret-updates-to-its-customers-cars/>). Self-driving will create a massive disruption in how we think about personal transportation; it's not hard to also imagine applications within mass transport (bus, trains, planes – don't we already have auto-pilot?), logistics (UPS, FedEx) and delivery (US Postal Service, Pizza Delivery).

Restaurant/Retail

Recently, **there has been a big push to increase the minimum wage with protests of McDonald's employees** (<http://www.chicagotribune.com/suburbs/oak-brook/news/ct-dob-mcdonalds-protest-tl-0602-20160525-story.html>). In response, the former CEO of McDonald's hypothesized that increasing the minimum wage would lead to **increased automation** (<http://fusion.net/story/307506/robots-minimum-wage-mcdonalds-ed-rendis/>). Whether the goal is to reduce labor costs, increase efficiency or improve service delivery; companies are developing automated kiosks and robots to do many of these tasks. In fact, Pizza Hut recently developed and rolled out a **robotic waiter at restaurants in Asia** (<http://www.businessinsider.com/pizza-hut-employs-pepper-robot-workers-2016-5>). We have seen the pre-cursor to this coming shift at grocery stores in the form of self-checkout. Instead of 10 cashiers, one highly trained employee can manage several registers with only the occasional need for human intervention. Beyond the cost benefits, robots and automated kiosks can provide a highly personalized experience for millions of customers at scale that would be impossible for humans to replicate. In fact, social scientists estimate through **Dunbar's number that 150** (https://en.wikipedia.org/wiki/Dunbar%27s_number) is the limit on the number of people one can maintain stable social relationships – individual knows each person and how each person relates to the other. While retail based interactions do not require the same depth of social interactions as friendships, one can estimate that even with reduced depth, the number would not exceed 500. However, a computer with the support of relational databases can use the customer's identity through the scanning of a loyalty card as a starting point to recall prior purchase history and remind that you haven't bought batteries in 3 months since purchasing a remote control helicopter for your child or conduct a real-time analysis of your current purchase and wish you luck on hosting your dinner party if your quantities of coconut shrimp are in excess of your normal amount.

Financial Services

Technology driven changes are also impacting financial services. While high-frequency trading platforms have been utilized by firms to generate above average returns, companies like **Betterment** (<https://www.betterment.com/>) and **Wealthfront** (<https://www.wealthfront.com/>) have developed automated investment platforms to help individuals manage their money. While their assets under management are small (\$20B) compared to the total (\$24T), their lower cost (1/3 or 1/4) in comparison to their human

counterparts suggests that the market for this type of offering may continue to increase going forward especially for price-sensitive customers. However, what is most impressive, is that an automated platform now exists that can develop a sophisticated, diversified investment strategy simply using a computer algorithm and driven by consumer preferences for risk and asset allocation.

Publishing

This week, one of the most storied and iconic brands in the history of publishing, The Chicago Tribune, rebranded as 'tronc'. Embedded within the press release announcing the change was a statement that this company would be **transforming from a legacy news company to a technology & content company** (<http://www.businesswire.com/news/home/20160602006557/en/Tribune-Publishing-Announces-Corporate-Rebranding-tronc>). This shift will be aided by access to over 100 machine learning & artificial intelligence patents. While it remains to be seen how exactly these patents and technology will be utilized, there is another company, Narrative Science, that illustrates the potential of technology. Narrative Science uses a combination of big data, machine learning, and artificial intelligence to tell stories. It is not hard to imagine 'tronc' leveraging this type of approach to generate future content across their platform. While print media has been in decline for a long period of time, there has never been more web and video-based content. Imagine a future where annual company financial reports are researched and written entirely by an artificially intelligent computer algorithm and traded by an automated investment platform like Betterment.

Many of these disruptive innovations would have been inconceivable a few years ago. However, as technology continues to develop, the costs required for development of ground-breaking new platforms decreases and the potential to launch imaginative new technologies like self-driving vehicles and automated investment platforms is the new reality. The earlier studies hypothesized the impact of these developing technologies on the labor market in 2025. However, that is around the time that most current 3rd graders will begin college. The subsequent 30 years of their working careers are most relevant and it's not hard to imagine that the **automation economy** will be firmly established by that point. As we all know, jobs will not completely disappear. Instead they will most likely be augmented or improved by technology. However, if the underlying impetus for this change is increased application of technology, then it makes the most sense to develop fluency in the language of technology-based problem solving and innovation (computer science, engineering, math & science) to effectively prepare for the coming shift. Those who have the skills to: develop, launch and manage future innovations in the *automation economy* will be in high demand.

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[How it Works \(/how-it-works/overview\)](/how-it-works/overview)

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