

Research in Context (ADAD5003)

Design Thinking Question 4.

Outline a current environmental, political, or social issue that requires redesign

Sivan Schechner

Student ID: 2004529

Product and Furniture Design BSc

Lecturer PhD. Julia Lockheart

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Introduction

Through this essay I will explore the impact automating the work force of manual labour professionals, how this affects the current economic climate and the workers it displaces. The current system is brutally unfair to those workers affected. They are dismissed with little to no compensation. As more and more potential jobs they are qualified to do becomes automated the market becomes smaller and more saturated. This in turn makes it harder to find employability in an oversaturated market of professionals. Through this essay I would like to explore how countries are adapting to overcome this issue or if they aren't, what actions to the people this has affected take.

I will be seeking information from multiple sources, as well as ideas to create a better system when jobs are displaced to machines. After I feel I have collected enough relevant data to make an informed decision I will try to compose a new system for the displacement of

How long do we have until most jobs today will be automated if possible?

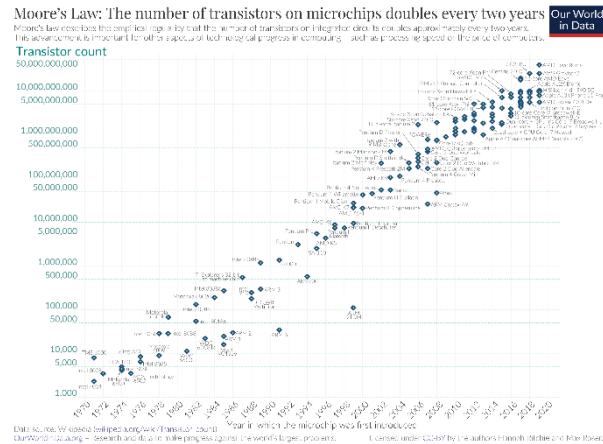
Method

I plan to conduct my research through exploring the impact automating has had on developing countries that have relied on exporting labour goods to western societies. I plan to target much of my research on which jobs are being targeted, understand where this happened in the past and how governments are dealing with the issue at hand.

Main Body and Research

The concern on the topic of automation replacing humans developed in me around the time Neuralink, founded by Elon Musk and Max Hodak had successfully preformed neurosurgery on a number of animals in early 2020. I was concerned how one of the most prestigious and highest paid medical professions at \$875,000 (Qvariani, 2021), had been taken over by an automated robot. Eight years of specialised training can now be completed by a robot that's faster, safer and by the looks of it, leaves smaller scars than the professionals. I often wonder what would happen if I were in a situation where I had been studying for six out of the eight years required to become a neurosurgeon, only to have a robot uprising take my job and leave me with hundreds of thousands in student loan debt. And how long will it be until robots can create the same luxury and appeal that top brands and designers can? Neuralink seemed like a good place to begin my research. However, I was unable to get any strong information that looks at the links between the advancements of medical autonomy and the displacement of medical professionals in the work place, I was able to find one quote by Dr. Danyal Fer stating "For the foreseeable future, automation will be something that works alongside surgeons rather than replaces them" (Fer, 2021). Being such a recent quote and from a medical professional who understands and works in the field I find it a reliable source. Although on the contrary, perhaps it's smarter to say that surgeons will always be needed, if people thought their career were at stake would they invest 8 or more years into studying such topics? If we didn't meet the technological standards, could we have a shortage of professionals in that industry, especially one as vital as medical.

It would be understandable for people to not assume the future, as technology advances, I find it becomes more difficult to predict. As we are on the topic of machines and artificial intelligence taking over jobs and creating mass unemployment, it would be important for me to understand



the technology advancements we have made so far.

Graph 1 Ourworlddata.com (Max Roser, 2013)

As can be visualised in Graph 1, approximately every two years transistor count doubles creating more powerful machinery. To help me understand this better I conducted some research of my own. Using UserBenchmark.com I looked at a few central processing units (CPU's) and graphic processing units (GPU's). Here I compared the data from a few models, I looked at the same model's predecessor from the years 2018 – 2020 for AMD Ryzen 7 4000 series. Although the same model, the performance increase over the past two years was somewhere between 20% and 30% (see fig 2 below). I saw even lower performance difference between Intel i7-7700k and i7-10700k with only an improvement of 48% to 18% in a three year difference(see Fig 2).

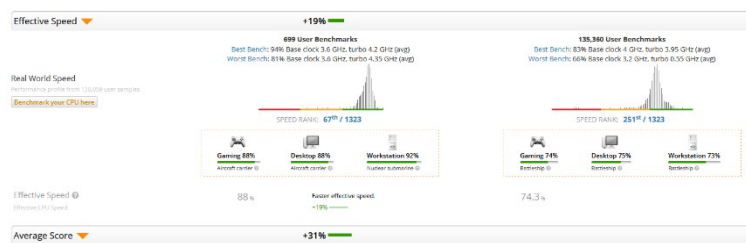


Fig 1 AMD Ryzen 7 4700G (2020 Q2) (left), Ryzen 7 2700 (2018 Q2) (Right) (User Benchmark, 2021)

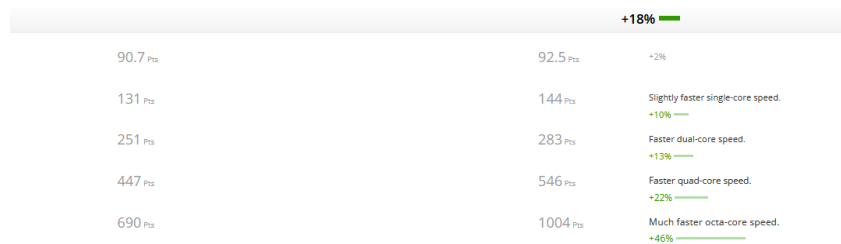


Fig 2 Intel i7-7700k (2017 Q1) (Left), Intel i7-10700k (2020 Q2) (Right)

I answered my question, doubling transistors every two years does not necessarily mean a performance double in consumer goods. While graphs may appear that we are leading into the future at an incredibly fast rate, it is not as fast as it seems. However occasionally new processes revolutionise our technology, such as SSDs in 2009s growth of data capacity and becoming affordable to the public personal computer market (Genuth, 2008). With a better understanding of the rate, we are currently progressing in, it remains unclear when AI will take over most jobs, but I would like to look at the current jobs being replaced by them.

At the time of writing, we are currently in the second year of the Corona virus pandemic. An article written on Time.com titled 'Pandemic—And Robots and AI Are Replacing Them Faster Than Ever'. The article raised some good points, about the take over of industry machines are making and while this isn't the first time, this time it is taking more jobs away from people faster. I would like to investigate what other older, even ancient machinery took peoples jobs, and perhaps the answer to the problems we face now are in the past. And in the next 3 years, more than two million jobs will be taken from manufacture labourers according to an economist at MIT(Samuels, 2020). In this article McKinsey mentions that cashiers, food-service employees and customer-service representatives are some of the most threatened jobs by automation.

The article in Time brought up the U.S response to the soldiers after World War Two, 7.8 million veterans were sent to colleges and universities through 1944 to 1956. I carried out further research on the GI Bill to get a view of the overall effect it had on the economy. The GI Bill cost the government

approximately \$14.5 billion USD. The veterans that took advantage of the bursary received \$10,000 to \$15,000 more per year compared with those who did not. In turn this generated ten times the tax revenue of the initial cost (Khan Academy, 2005).

So far, I have learnt a few pros and cons to the rise of AI and machines in the workplace. Searching for more information online I came across a useful article in the American Economic Review journal. While most of the information was looking at job polarization in Europe and finding growth trends and not focused on why markets were declining or growing in certain areas due to the automation specifically. It does briefly note the trend of technology advancements in manufacturing. The following graph (Graph 2) is from the journal (Maarten Goos, 2009).

TABLE 2—CHANGES IN SHARES OF HOURS WORKED OVER 1993–2006 FOR HIGH-, MIDDLING, AND LOW-PAYING OCCUPATIONS

	Four lowest paying occupations	Nine middling occupations	Eight highest paying occupations
<i>Employment share in 1993 (std. dev.)</i>			
EU average	22% (3.5)	46% (5.2)	32% (7.1)
<i>Percentage point change 1993–2006</i>			
EU average	1.58	−7.77	6.19
Austria	−0.59	−14.58	15.17
Belgium	1.48	−9.50	8.03
Denmark	−0.96	−7.16	8.13
Finland	6.66	−6.54	−0.12
France	−0.74	−12.07	12.81
Germany	3.05	−8.71	5.67
Greece	1.75	−6.08	4.34
Ireland	6.19	−5.47	−0.72
Italy	−8.20	−9.08	17.28
Luxembourg	−1.66	−8.45	10.10
Netherlands	2.27	−4.68	2.41
Norway	4.96	−6.52	1.57
Portugal	2.39	−1.13	−1.26
Spain	0.96	−7.04	6.07
Sweden	1.90	−6.93	5.03
UK	5.77	−10.32	4.55

Notes: Years 1993–2006. Employment shares in 1993 and 2006 imputed on the basis of average annual growth rates for countries with shorter data spans. Occupational employment pooled within each country. Low-, middling, and high-paying occupations are as listed in Table 1.

Chart 1 (Maarten Goos, 2009)

TABLE 1—CHANGES IN SHARES OF HOURS WORKED OVER 1993–2006 FOR OCCUPATIONS RANKED BY THEIR MEAN 1993 EUROPEAN WAGE

ISCO occupations ordered by 1993 mean European wage rank	Percent employment share in 1993	Percentage point change over 1993–2006
<i>Eight highest-paying occupations</i>		
Corporate managers	4.54	1.25
Physical, mathematical, engineering professionals	2.92	1.02
Life science and health professionals	1.86	−0.14
Other professionals	2.82	0.70
Managers of small enterprises	3.60	1.28
Physics, mathematics, engineering associate professionals	3.99	0.91
Other associate professionals	6.77	2.07
Life science and health associate professionals	2.28	0.66
<i>Nine middling occupations</i>		
Drivers and mobile plant operators	5.48	−0.17
Stationary plant and related operators	1.75	−0.39
Metal, machinery, and related trade workers	8.33	−2.33
Precision, handicraft, and related trade workers	1.31	−0.40
Office clerks	12.04	−1.98
Customer service clerks	2.00	0.19
Extraction and building trade workers	8.17	−0.52
Machine operators and assemblers	6.71	−2.01
Other craft and related trade workers	3.19	−1.37
<i>Four lowest-paying occupations</i>		
Personal and protective service workers	6.94	1.15
Laborers in construction, manufacturing, transport	4.11	0.48
Models, salespersons, demonstrators	6.73	−1.42
Sales and service elementary occupations	4.47	1.02

Notes: Years 1993–2006. All 16 countries, pooled. Employment shares in 1993 and 2006 imputed on the basis of average annual growth rates for countries with shorter data spans. Occupations are ordered by their mean wage rank in 1993 across the 16 European countries.

Chart 2 (Maarten Goos, 2009)

As seen above in Chart 1, the nine middling occupations have taken the largest hit from the employment market. “there is growth in employment in both the highest-skilled (professional and managerial) and lowest-skilled (personal services) occupations, with declining employment in the middle of the distribution (manufacturing and routine office jobs)” (Maarten Goos, 2009). I understood manufacturing jobs were being taken over by machinery that is capable of faster and non-stop production. In Chart 2 we can see all nine middling occupations and the percentage of employment shares after the 13 years.

In Chart 2, while not mentioned by the specific means technology may be the cause of this decreased employment rates. The article does mention that it could be due to a technology. It mentioned the difficulty comparing as the European countries measured were similarly technologically advanced. It also stated that this could be caused by offshoring. However, in the likely case of the jobs that have declined in the higher paid and lower paid sections, its most likely cause by the automation of non-routine jobs.

Overall, the article appears to confirm that job polarization is also a large factor in western countries already. I originally had only manufactured and online services such as accounting in mind when I began this essay. While I find it difficult to create a solution from the information in this article. It has confirmed my hypothesis, shows potential growth sectors for those unemployed and affected by job displacement. I should conduct further research on associate professionals and management of small enterprises, as I feel they are amongst the most achievable and flexible jobs in the high paid sector.

While the previous study by Goos, Manning and Salomons looked specifically at the European job market and concluded the non-routine jobs were being automatized from the research collected from 1992 to 2006. Frey and Osborne have a paper from 2016 looking at the automation of routine intensive jobs and following tasks that can be replicated using algorithms (Carl Benedikt Frey, 2016). Looking at a Table from the article, it appears that much of the automation in the modern western civilisation has already occurred. As seen below in Table 1 the automotive industries in Germany and Japan have moved to a much higher rate of automation.

Country	Year	Automation level (%)
Germany (IAB)	2006	92
Germany (IAB)	2002	92
Germany (IAB)	2002	92
Germany (IAB)	2004	90
Germany (IAB)	2005	80
Germany (IAB)	2005	88
Germany (IAB)	2005	88
Germany (IAB)	2001	90
Germany (IAB)	1999	92
Germany (IAB)	1999	92
Germany (IAB)	1998	100
Germany (IAB)	1993	100
Germany (IAB)	1993	100
Germany (IAB)	1992	88
Germany (IAB)	1992	82
Germany (IAB)	1994	93
Germany (IAB)	1993	100
Germany (IAB)	1993	100
Germany (IAB)	1993	92

Table 1 (Krywdzinski, 2021)

Reading through Krywdzinskis article I remembered the devastation the change in automation had in Detroit, with a 60% decline in population and 150,000 jobs lost in the span of 50 years (Angelova, 2012). The devastation of Automotive industries automating displacement was far less notable in Germany and Japan in comparison to Detroit. Is there a reason for this, or is has it just not been covered as much by the media?

Phillipp Frey's report published by Autonomy has looked at the political stance Germany has taken on the AI autonomy on jobs. The movement has shown the public the positive possibilities of automating more of the work force, with benefits to the workers resulting in shorter work weeks, and creating a 30 hour, four day work week where pay is unchanged from the 40 hour 5 day work week. Frey estimates that this system will create 610,000 full time jobs in Germany (Frey, 2021). The report looks at the costs of implementing a 30 hour work scheme and the benefits of reduced cost of unemployment and regained tax revenue, Frey concluded it could cost as little as thirteen billion euros to establish, 0.8% of Germanys spending budget the past recent years.

Frey's report and concept of reducing the hours worked to create more jobs for the unemployed while keeping the same benefits from unchanged annual salaries resonated with me. I understand that as medical science gets more advanced, people in general are healthier and active as they age. In turn this has increased the life expectancy of humans, but we have also seen a rise in the retirement age. This is well noted by Griffin, Hesketh and Loh, who wrote an article about the correlation between age, health and retirement (Barbara Griffin, 2012). Due to this, I feel it is best to create a shorter work week. As noted in the article on retirement and age, as long as the human resource is in a fit enough state to complete the tasks, the age of retirement increases.

Conclusion

With manual jobs being taken by robots, Dr. Danyal Fers opinion that robots will work alongside people, helping them to do the tasks they are unable to do. The age of retirement could be increased significantly. This would create unease among many individuals who feel trapped in a certain field of labour. With people living longer and fewer jobs available, and those jobs expected to be conducted to an older age of retirement I believe that Phillipp Frey's 30 hour work week is a logical step to generate more jobs for unemployment. However, this is not the only step that society should take. Just as the GI Bill in the U.S. had overwhelming success for the economy of the country and welfare of the individuals.

It should not only be the government looking to create solutions to the current issue. Titans of industry should be creating free educational training in the form of online videos, books, guides and tutorials to educate people into jobs that don't require strict health and safety regulations. Teaching tools such as programming, design, software and so on, all free online and specific to that companies desired employability goals. When applying for a specific job with that company, they can simply provide the applicant with a test, testing them on the topic that their online resources helped educate. These companies should rely less on degrees and begin using their own specialised education. The benefits would be more job applicants to desired areas, guaranteed knowledge and training using the companies' standard

tools and software. The cost of training would be a one-time payment by the company and free to everyone who accesses it from the webpage. They could then charge to take a company test once they feel knowledgeable in that area.

Further thoughts.

The number of jobs lost, compared to the number of jobs gained from automation, such as mechanics, engineers and programmers still creates diminishing jobs in total.

But at the end of the day, perhaps job loss is not such a bad thing. If you consider the average life span of a human to be 80 years, more than half of them still able to retrain and learn new things. I believe the governments should embrace this and use it as an opportunity to lower the human population. Each person takes up resources, and in turn contributes tonnes (literally) of greenhouse gasses each year. The governments should make back their money they invest in providing people with contraception to continue the reduction of the population; pour more money into their citizens education, at least until the population is reduced enough that rising global emissions are no longer an issue due to the decreased population. Overall making their money back as less was needed to fund environmental problems, not just carbon emission agreements but construction on sites of natural disasters caused by global warming, such as hurricanes and rising sea levels.

By influencing the creation of more small enterprises we can see more high paid jobs without the need for advanced retraining. Those who have been displaced also have freedom over what field to go into. For those less determined we could elementary

However, about four fifths of the way through writing this essay I came to an ironic conclusion. What's my role as a product designer? It's to design and style a machine that is better than all other machines and humans at doing its job.

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