

### **Challenge-1: “The Brain”**

There are many changes that need to be implemented in order to make the transition from human drivers to AI drivers safe and efficient. First, a central system must be in place to connect all the cars and the general traffic infrastructure. This system involves the re-engineering of “The Brain” created by Iron Ox to build a fully-autonomous farm. The farm consists of software and robotics that replaces human agricultural workers and carries production activities as shown in figure 1. To monitor all the different machines on the farm “The Brain” software was developed. In the re-engineered system, “The Brain” acts as the main monitor that receives real-time information about all the cars and traffic conditions in the range and send instructions. It will make its decisions based on a branch of Machine Learning called Neural Networking which essentially sorts through data and applies algorithms to it in order to find a solution. If it is unaware of what to do in a particular case it will prompt the user to make a decision and will record this instance to do further research and learn from its decision.

Furthermore, since fifty percent of the cars on the road will be AI operated, it would be reasonable to assign specific lanes for cars operated for AI. This would optimize traffic flow and simultaneously reduce accidents because by keeping a safe distance between human-driven cars and AI, it would reduce the chance that the AI may encounter a situation that it is not prepared for since humans can be very unpredictable and AI is not always able to correctly decipher between certain behaviors. The possible circumstance is shown in figure 2 of the appendix. The cars would however, also be able to travel in the non-AI lane if it is presumed to be the faster route. The Brain will be more involved during these cases as it works by using a software that keeps track of traffic conditions and routes as it is driving and constantly updates all the cars. While the AI car is in its respective lane, “The Brain” wouldn’t have as many responsibilities whereas it would be more sensitive to the cars that are interacting with human drivers. The AI cars will have both long-range and short-range radars which will be able to detect other cars, pedestrians, etc.

Another precaution that can be taken would be adding more lights around the city so that the cars have clear vision at all times and do not make wrong decisions based on not being able to analyze their surroundings correctly. This leads to the fact that autonomous cars alone cannot be depended on to make the right decisions always, passengers and bystanders alike need to be educated about the way these cars operate. By being aware, bystanders can intervene in the case that anything goes wrong. Moreover, knowing that AI cars do not operate the way that human drivers do, it is essential to make harsher laws when it comes to pedestrians jaywalking for example. In order to avoid any accidents we need to enforce stricter laws on people who do not follow road rules because once AI cars are officially on the road, these simple actions could potentially put many lives at risk. The cost of these cars would be less than normal cars since one would not need to worry about parking or insurance. The general price would be around five thousand US dollars for one

car which is significantly less than the price of a car today. Although in terms of marketability many people may initially be against it, it would be the cheaper, faster, and more efficient option leading people to change their minds. The most common fear which is that it is not safe could be warded off by making everyone aware of the way that the cars run and also the fact that even though the AI car would be much better at following the rules and is pre-programmed to react in certain ways, when it comes across an unknown situation, it will give a warning to the passenger and ask how to proceed. It could also be quicker by finding the fastest routes to travel. By implementing our changes, it will change the future of transportation by making it much more efficient.

### **Challenge-2: "Smart Bin"**

One of the major issues with sorting waste is that it needs to begin from the household level. Although there are bins that separate the different types of garbage, there needs to be more done at every site of disposal. The best and most efficient way to tackle this situation would be to reverse engineer a garbage bin. The focus would be to design a product similar to an already existing recycling bin that uses a camera and a sensor to differentiate between different types of waste. The improved proposal involves using x-ray technology to determine the density of the material placed on the garbage bin and flash a green LED light at the right disposal hole (recycling, organic waste, garbage) to help the user decide where they should place their garbage. This will reduce the risk of contamination of waste which will ensure that waste is properly sorted and not all directed to landfills or incineration plants.

Currently there are separate bins for recycling and garbage and there are also separate garbage trucks that collect from their respective bins. However, apart from that, no other sorting process occurs other than the one that happens at the main facility. This leads to many materials being contaminated already.

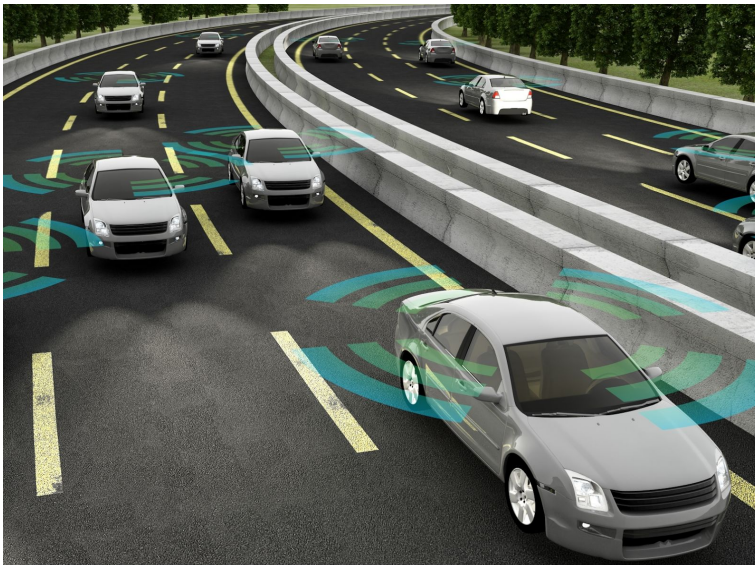
The first way to optimize it should be to have multiple stages at which sorting occurs-beginning from the household level- so that it is constantly updated and it is as efficient as possible. While separating recyclable material from waste could be the first step. To distinguish between what kinds of waste would be reasonable as well. Moreover, instead of having waste go to landfills, it could be incinerated and be converted to electricity.

The cost of these specific garbage cans wouldn't be significantly more expensive seeing as how when produced on a mass level, the prices would be even less. Moreover, the market would be very open to it as well. Especially big companies looking to be more environmentally friendly. Once these big companies take this step, it would cause a chain effect causing even more people to implement it. Overall, this would lead to more accurate results from sorting and save on costs, and ensure a more sustainable lifestyle for all.

## Appendix A



**Figure 1: Robotic arms plucking lettuce as instructed by “the brain”**



**Figure 2: Separate lanes for AI-cars**

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