My personal interest is criminalistics or forensic science. Specifically, I find forensic ballistics to be incredibly fascinating. Forensic ballistics is the study of firearms and ammunition as it relates to evidence in a crime. Ballistics includes analyzing whether a bullet matches a specific gun, as well as crime scene mapping to determine the path a bullet followed. Each and every gun has a specific fingerprint that it leaves on it a bullet, and forensic ballistics is the tool used to identify that fingerprint.

The first time I learned about forensic science was in middle school when I watched an episode of NCIS for the first time. On this TV show is a forensic scientist named Abby, and I remember being enthralled by what she was able to uncover in her lab. I like forensic science, because there are so many diverse subcategories. I was drawn to this (and still am) because I have varied interests. I love history, but I also find certain sciences incredibly interesting. Forensic science can be divided up within those various interests as there are forensic psychologists, forensic anthropologists, forensic accountants, and forensic ballistic experts. I enjoy analyzing data and finding patterns, and that is exactly what Abby on NCIS did.

Technology and Forensic science go hand-in-hand as a large portion of forensics involves some form or another of technology. One of the major technological advancements in the forensics field has been the development of three-dimensional modeling and imaging systems. These 3D imaging systems have had a significant impact specifically in the ballistics field. One of the more recent developments has been the upgrade from 2D to 3D images in the National Integrated Ballistics Information Network (NIBIN) as David Thorton highlights in his article “New 3D imaging assists ATF, police partners in arresting shooters.” The NIBIN is the national database of images of bullet casings recovered at crime
scenes or from test-firings. Essentially, this database records the specialized marks that each gun leaves on a bullet, and then it projects a 3D model. The NIBIN provides investigateable leads from these highly accurate models. With this upgrade in the system, the NIBIN has not only become more accurate in cross-matching shell casings to guns, but it has an increased ability to establish connections with other crimes (Thornton, 2019). The improved NIBIN system is further attested to by the Laredo Police Department. In August of 2019, from the lead generated by NIBIN, the LPD was able to successfully prosecute suspects in a shooting (Mack, 2019). One of the negative aspects of the new NIBIN system is that 3D images take up more space within the two physical servers. This can make the server function slowly. In the future, I see this technology increasing the accuracy of prosecution in gun crimes across the US. I can also see how this imaging technology could improve the quality of other databases. In fact, 3D imaging technology is already being used for facial reconstruction software and across other forensic fields.

There are many other technological advancements within the forensic science realm, but within the ballistics field the NIBIN system has been making the most recent headlines. With an interest in ballistics and other topics within forensic sciences, it is clear that technology plays a huge role in allowing this field to become not only more effective, but also more accurate.
Part Two: In The Media

Show: NCIS, Season 4, Episode 11: “Driven”

The episode I have picked is entitled “Driven,” and it is episode 11 in season 4 of NCIS. NCIS is a crime drama television series centering around a team of four special agents from the Naval Criminal Investigative Service: Agent Leroy Jethro Gibbs, Agent Ziva David, Agent Tony DiNozzo, and Agent Timothy McGee. Two other principal characters in the show are the forensic scientist, Abby, and Dr. “Ducky” Mallard, the medical examiner. Each episode of NCIS focuses on a different crime and the proceeding criminal investigation. In the episode “Driven,” the team is investigating a possible homicide after a navy lieutenant is found dead inside of an autonomous, robotic car. The lieutenant, Ronnie Seabrook, was working a high level Department of Defense project, entitled “OTTO.” The aim of this project was to make a fully autonomous car, which could make decisions. “OTTO” was controlled through a computer algorithm. While performing driving tests on “Otto,” Ronnie Seabrook suffers from fatal CO2 poisoning. When she tries to unbuckle her seatbelt, the doors all lock, and the windows shut. Ronnie tries to initiate a program shutdown on the computer, but “OTTO” won’t respond. Then, “OTTO” pumps the car full of exhaust, and Ronnie dies. The case is solved when Abby is able to identify that someone hacked into the system and coded for a “kill switch” in order to murder Ronnie.

In this TV show, the autonomous car is only a government prototype and is not available to a consumer market. In real life, however, this AI car technology is currently being developed by automotive companies, like Tesla and Cadillac. Currently, consumers only have access to semi-autonomous technology, but the technology to make cars fully-autonomous cars is in the works. Like in NCIS, this technology is incredibly expensive. Cars with some AI features can add up to $20,000 to the base price of a car, and fully-autonomous programing is projected to add more than $100,000 in costs (Hernandez and Nunes, 2019). These extraordinary costs mean that this technology is limited to the wealthy. While cars with AI are available, the current models are limited to semi-autonomous features. These Highly
Automated Vehicles (HAVs) have systems like hands free driving in certain conditions and regulated acceleration and braking. For example, higher end models of Tesla cars, like the Model 3, have autopilot features (Templeton, 2019).

Semi and fully autonomous AI systems have the potential to prevent many car crashes as automatic braking systems can act faster than drivers. For instance, one driver claimed that Tesla’s Automatic Emergency Braking System saved him from hitting a police officer on a motorcycle (Lambert, 2019). It is the simpler features of these AI systems that have the capabilities to solve problems for drivers, like blind spots or over-correction. These technologies can also offer the driver a greater semblance of safety in some cases.

The development of semi and fully autonomous cars, while innovating, does bring with it a new set of problems. Firstly, there is the question of whether these AI systems are able to accurately respond to road conditions. AI features in cars have to learn to recognize dangers, and this learning takes time and driver control. Many of the semi-autonomous driving systems require that drivers interact with the steering wheel in order to learn the drivers’ tendencies (Templeton, 2019). These semi autonomous AI systems also have their shortcomings. For instance, Tesla’s Traffic-Aware Cruise Control is designed to ignore large, stationary obstacles. It is ill-equipped to handle situations of stopped vehicles, as revealed by multiple instances of Teslas crashing into stopped firetrucks (Stewart, 2018).

Another emerging risk is the interaction between these developing AI systems and drivers. The issue lies within the definition of autonomous. If I am using a “autonomous” driving system, then can I fall asleep at the wheel? There have been quite a few instances of this exact problem: drivers falling asleep at the wheel while using some autopilot feature, then crashing. Who is responsible then for the crash: the driver or the ill-named system? This grey area of culpability marks one emerging legal issue (Bellet, 2019). Another emerging issue is whether these AI cars should have some moral decision making. In the event of a situation where either the driver or a pedestrian will be killed, what is the car to do?
Should the car value the young over the old or the many over a few? All of these questions revolve around the idea of whether or not these AI systems should reflect a “society’s moral preferences” (Wembley, 2018). One other problem that I would like to highlight is the potential for these AI systems in cars to be hacked, just like in the NCIS episode. The repercussions from this type of hacking could be incredibly deadly. As detailed in the NCIS episode, the car became an instrument for murder that left very little evidence. “OTTO” almost killed Abby, when she accidentally activated the kill switch.

In my opinion, current AI technology in cars is ethical, so long as its purpose and abilities are made clear to drivers. I think semi-autonomous features are more ethical than fully-autonomous tech, as they still require drivers to be aware. I don’t think cars should be programmed with society’s moral preferences because I think that opens the floodgates for issues of weighing human value. If AI is causing more accidents or deaths then the ones it prevents, that is when it becomes unethical. To me, this technology could be used in unethical ways if it was programmed to place different weights upon a person based on their age or gender. It could also be used unethically if it is used to commit crimes. In five to ten years, this technology will be leaning more towards fully-autonomous cars; then, the main issue will be determining whether AI is more capable than the human driver. “Driven” highlights this issue of cars becoming more and more autonomous, while examining the potential for this type of AI to be hacked.
Works Cited

BBC. (2019, September 2019). Tesla Autopilot design ‘led to’ crash. Retrieved from

Bellet, T, & Cunneen, M., & Mullins, M., & Murphy, F., & Pütz, F, etc. (2019, May). From semi to fully
autonomous vehicles: New emerging risks and ethico-legal challenges for human-machine

CBE5

Brandom, R. (2018, July 3). Self-driving cars are headed towards an AI roadblock. Retrieved from

Hernandez, K., & Nunes, A. (2019, January 31). The Cost of self driving cars will be the biggest barrier
to their adoption. Retrieved from


from https://www.theatlantic.com/technology/archive/2018/12/7-arguments-against-the-autonomo

us-vehicle-utopia/578638/

Stewart, J. (2018, August 27). Why Tesla’s Autopilot can’t see a Stopped Firetruck. Retrieved from

Templeton, B. (2019, September 13). Sleeping with Tesla Autopilot may explain some of Tesla’s safety
numbers. Retrieved from
n-some-of-tesla-safety-numbers/#dfe6f3311851

Retrieved from
artners-in-arresting-shooters/

Wamsley, L. (2018, October 26). Should Self-Driving cars have ethics?. Retrieved from
https://www.npr.org/2018/10/26/660775910/should-self-driving-cars-have-ethics