Do I Need To Worry About Security Updates To My Car???

Sarah LaCroix - @punkrockgoth on the internet

Hi! My name is Sarah!

- 3rd LongCon talk
- I like to talk about social issues in security and technology.
- My cat helped me with the slides.
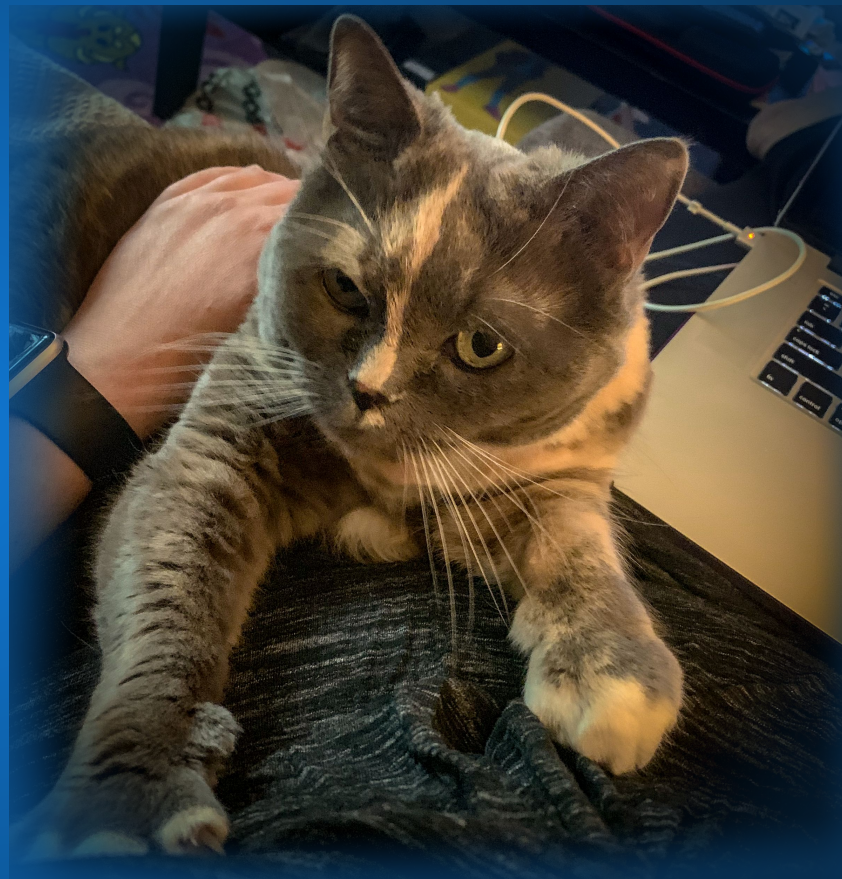
@abbycat204 on Instagram

A lot has happened since my LongCon 2018 talk...

- Got my CCNA!
- Graduated from Red River College's Business Information Technology program with honours!

I adopted not one...

@bootsandlilysneks on Instagram

...but two snakes!

@bootsandlilysneks on Instagram

(The cat adores them if you were wondering)

@bootsandlilysneks on Instagram

I moved!
(twice)

I got an awesome job!

- InfoSec Analyst at IC Group

- Doing compliance, security awareness & training and project management

- Learning a lot and loving my workplace

- Fun fact: IC Group is hiring

I enjoy the long bus commute less.

...but

Free parking at work and at home!

So I decided it was time to get my license and buy a car.

Yay perks of no longer being a student!

How to buy a car

- Make some decisions:

  - What can you afford?

  - Buy or lease?

  - New or used?

- Consider quality, reliability & total cost of ownership

More detailed instructions may include mentions of:

- VIN and Carfax
- Test drives
- Vehicle inspection
- Warranty
- Safety ratings

No one said anything about software or security updates.

No one mentioned security at all.

Nothing I read about buying or maintaining a car mentioned it.

The "car" people I knew didn't mention anything about this.

No one said anything about software or security updates.

The "tech" people I knew said I was overthinking this and this isn't an issue.

- They've never done updates and nothing bad has happened to them
- We're not talking about self driving cars.
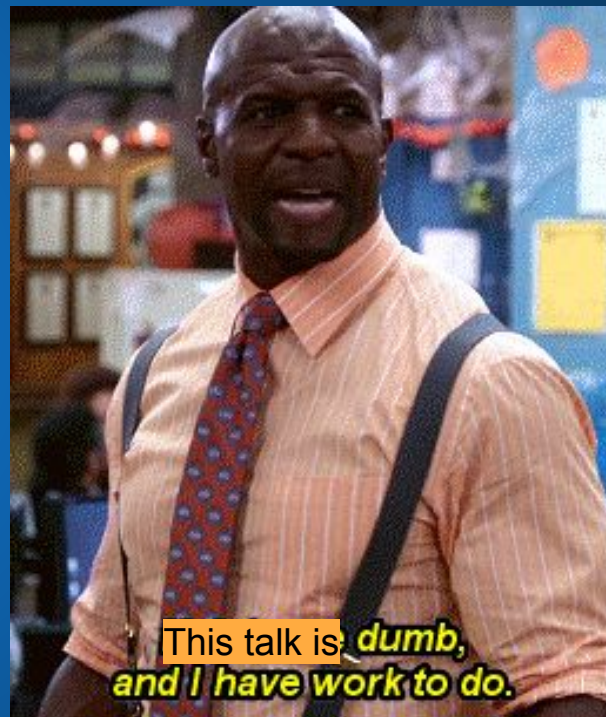- It's software, it obviously needs updating. Duh.

All of them thought this talk idea was dumb

I almost emailed the organizers to back out of this talk. I mean, smarter, more experienced people than I are telling me that this is a useless talk. Maybe I should listen before I make a complete ass of myself.

But, my anxiety over having to email the organizers to bounce on this talk was far greater than my anxiety over giving this talk, so here we are.

So I pushed forward with research and hoped that I was on to something.

Spoiler alert: I think I was.

What does software do in a car?

Everything

Today, vehicles are distributed systems comprising of 40+ computers and millions of lines of code. Everything from steering to braking to lights and emissions control is controlled by software.

Also the stuff you'd expect like GPS and infotainment systems and apps.

2015: Jeep Cherokee Remotely Hijacked

In 2015, two researchers presented their work with car hacking at Black Hat:

They took control of a Jeep Cherokee while it was driving 70 mph down a public highway. The researchers were able to adjust climate control settings, the radio, windshield wipers and they were able to control steering, brakes, and acceleration.

In order to fix the vulnerability, Chrysler mailed out USBs to 1.4 million vehicle owners and advised them to take their vehicle to their dealership.

In 2013, the researchers also hacked a Toyota Prius and a Ford Escape.

There have been many other examples of vehicle hacking as well.

Vehicle updates are not standardized in any way and the exact processes differ between manufacturers. However, they pretty much fall under 3 categories.

Performed by a dealership mechanic	Over-the-air (OTA)	DIY with a USB
• Most common • Updates included while the vehicle is under warranty	• Many manufacturers do some OTA updates, but limit these to non-safety-critical updates such as updates to infotainment systems • All Tesla updates done OTA since 2012	• User downloads updates from manufacturer website, copies them to USB and installs them on the vehicle themselves

Each method of performing updates comes with its own set of challenges.

Performed by a dealership mechanic	Over-the-air (OTA)	DIY with a USB
- May not be notified of available updates to your vehicle - Likely won't be informed of applied patches - User responsible for paying for updates after vehicle is out of warranty - Exception: legal requirement to do update such as critical safety or emissions control	- In the case of Tesla: - Take 20-90 minutes, car cannot be driven or charged during updates - Updates cannot be paused or stopped once started - so once you hit "update" you've committed. - Even non-safety critical updates can have massive adverse impacts	- Can be complicated to the average user - Potential to "brick" the car

February 2018: SiriusXM Satellite Radio

SiriusXM deployed an OTA update to certain Chrysler Uconnect systems. Not safety critical.

- The update caused the infotainment system screen to reboot every 45 seconds.
- Because Uconnect was unavailable, drivers also lost access to
  - Climate control
  - Rear-view cameras
  - Voice assistant
  - User settings
  - "SOS" feature

A class action lawsuit was filed against Chrysler in September 2019.

OTA Updates

Advantages

- Saves time and money for both user and manufacturer
- Higher percentage of patches being applied
- Easier to support out-of-warranty vehicles
- Higher customer satisfaction

Disadvantages

- When things go wrong, it will likely be wider spread
- Need for improved networking capabilities in vehicles
- Opens the door to more vulnerabilities

And the Winner Is...

Despite some very real and scary drawbacks, OTA updates are likely the best option available.

Because of this, manufacturers are following Tesla's lead and moving towards making all updates being delivered OTA.
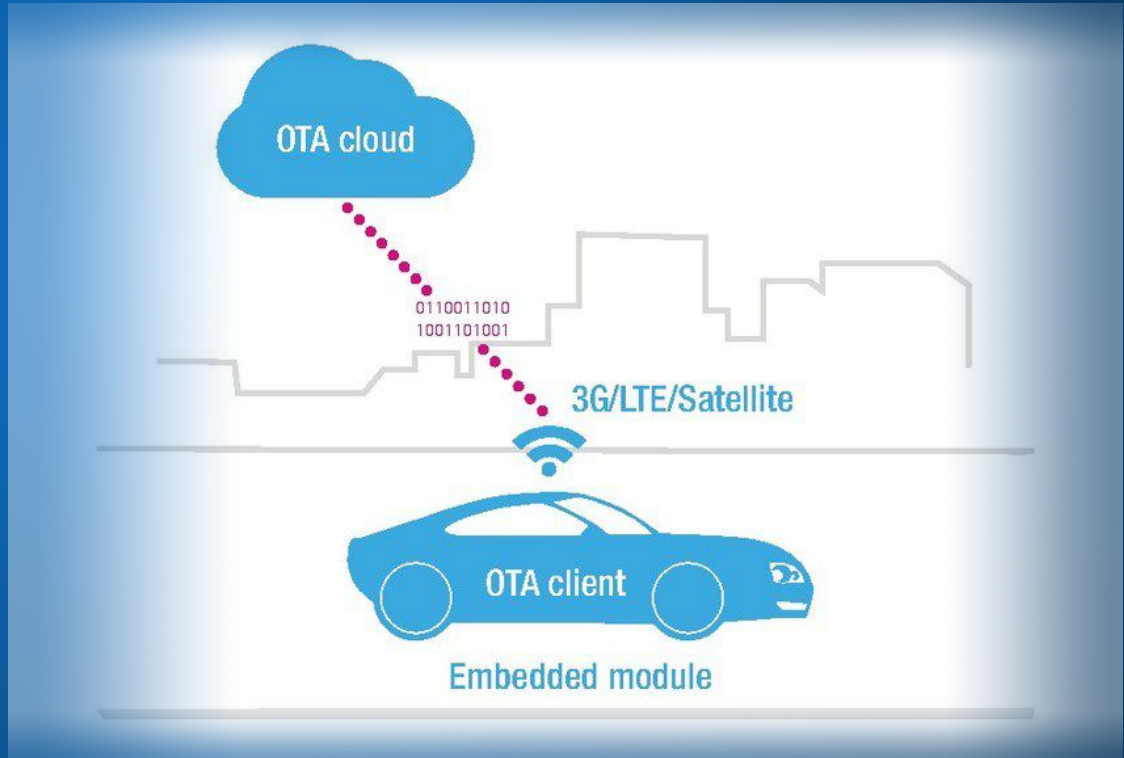
So...
Do I need to worry about security updates for my car?

Well I mean, it's basically an IoT device that can kill people. I'm not going to tell you how to live your life, all I can say is that I am concerned about security updates for vehicles on the road.

What about extended support for cars?

- Parts are more complex than ever
- Licensing protections means fewer third party manufacturers
- Manufacturers don't have the ability to maintain software for each of their cars on the road, so even if critical parts don't need replacing, there is still the issue of outdated software operating older vehicles
  - Older vehicles may not meet current emissions or safety standards
- To try to fix it yourself will void your warranty and violate DMCA

December 2014: John Deere

In December of 2014, California farmers wanting to maintain their own equipment fought the copyright bureau. Farmers have no right to access or modify source code of any farm equipment software and can't get repair parts without going to a dealer. They can't change engine settings, retrofit old equipment with new features and can't modify their old tractors to meet new standards on their own.

John Deere argued that farmers receive an "implied license for the life of the vehicle to operate the vehicle".

In 2018, the copyright office ruled in favor of John Deere.

What does it all mean?

Some are calling this most recent generation of vehicle "disposable cars". I think that between the growing complexity of repair and maintenance, and the general trend of moving towards subscription models, as we push forward, leasing will likely become a much more attractive option.

Given the outcome of the John Deere lawsuit, "buying" became has definitely become a lot more complicated than in the past.

tl;dl

- Your car needs updates.
- It's not actually your car though.

Thank you for coming to my LongCon talk.

Why does it matter?

Today, I am here talking about cars because this represents where I am in my life right now.

But one day, I might be buying a house. At which point, I'll find myself researching smart homes and wondering if my furnace will kill me.

Maybe one day, I'll have children in my life. Then I will need to ask these questions about baby monitors and teddy bears. Just how much spying are they doing?

We are losing the choice between IoT device and not internet connected when it comes to our purchases. We need to learn to start asking what impact that could have in our lives.

Thank You!

Got questions?

I feel you. So do I. Oh. You wanted me to answer them. I suppose I could try.