



# QR + RFID Key System

Vehicle Key Tracking, Security,  
and Cost Savings  
December 2024

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Steven Szachara



# Why Continue Without A System In Place?



## Inefficient

Reduce the time it takes to find a key, have a path that can find the key



## Un-Professional

Not knowing where keys are for customers, delays in test drives, unable to move cars unorganized



## Lack of Security

Once the key leaves the room, no one knows where it is, there is no history



## -\$\$\$\$\$

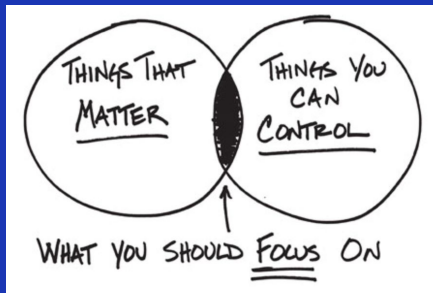
Hundreds or Thousands of keys needing to be replaced each year

# Why Build Your Own?



## Customizable

Any features you want, full hands on access, not restricted to a company



## Total Control

Want to upgrade? Want to downgrade? Want to change things on the fly? You can, whenever



## Ownership

Scalability, answering to no one, and the potential to outsource the system as another revenue driver



## +\$\$\$\$\$

Significantly reduces money spent on replacement keys, improves efficiency and tracking, creates additional security, pays for itself over time

# Why Me?

- Currently pursuing M.S. in Data Science at RIT
- B.S. in Systems and Information Science from Syracuse University
- 6 years of corporate experience
- Family of entrepreneurs, my grandmother owned her own art teaching and supplies company, my mother owns her own pilates studio, and my father owns his own construction service company
- I'm cheaper than the competition
- This project is aligned with my career path and current coursework



# Other Systems \$\$\$\$\$\$+

Start-Up Costs (One Dealership):

**\$25,000-\$50,000+** materials/start  
up

\$\$\$+ Hourly labor at their discretion

Maintenance/Subscription Fees:

**\$200-\$500/month**

\$\$\$ / At their discretion in-person labor  
fees to fix common issues



# My Proposed System

Start-Up Cost

(One-Dealership):

**Low-End Start: \$2,000**

**High-End Start: \$5,000**

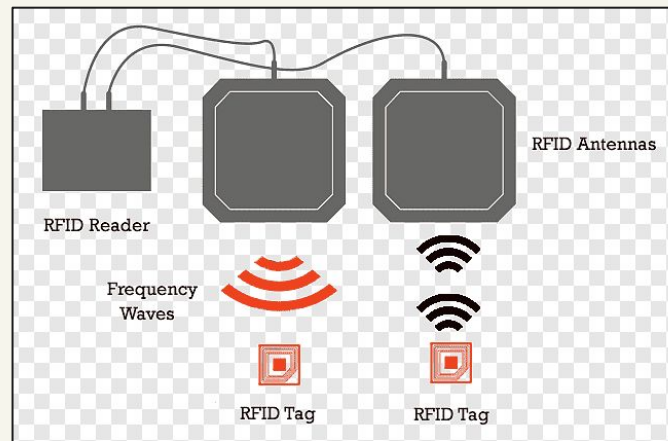
40\$/hr Labor (Below hourly rate for my experience and credentials)

Any additional costs, maintenance, help, etc:  
40\$/hr

Item	Cost per Unit	Quantity	Total Cost
Raspberry Pi 4 (with accessories)	~\$35–\$55	3	~\$105–\$165
QR Code Scanners	~\$30–\$60	3	~\$90–\$180
RFID Readers (ACR122U)	~\$20–\$40	9	~\$180–\$360
Mounting/Enclosures for RFID	~\$10–\$20	5	~\$50–\$100
RFID Tags (13.56 MHz)	~\$1–\$2	300	~\$300–600
Power Supply for Raspberry Pi	~\$5–\$10	3	~\$15–\$30
USB Cables for RFID Readers	~\$2–\$5	5	~\$10–\$25
USB Cables for QR Scanner	~\$2–\$5	3	~\$6–\$15

# What is the Proposed System?

- RFID's prevent items from leaving secure areas by providing an "invisible wall" to alert employees that unauthorized items are leaving the location
- QR codes allow for unique identifiers for items and allow the scanned RFID's to safely pass through the "invisible walls"
- Allows for security, tracking, and accountability



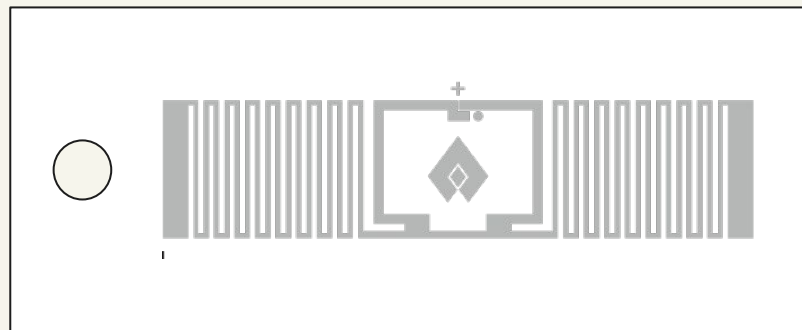
# Proposed Key Fob

- Process for stocking in cars would not change, the final part would be to add the QR Code/RFID as an additional tag on the key ring

## FRONT QR CODE



## BACK RFID





# Check In/Check Out Process, Just 2 Beeps!

1. Employee scans their Personal QR Code ID  
(Can be a picture on their phone sent via email)
2. Scan the QR code on the key on the same scanner, this checks out the key to that employee
3. Now the key is safely able to pass through the RFID Scanners
4. Additional Security measure: Key will reactivate by EOD or after a set time TBD so that it must continue to be tracked



Employee QR Code ID



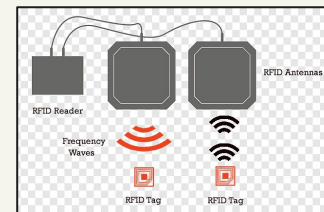
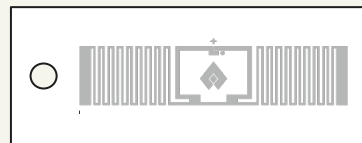
QR Scanner Linked to Secure Database



Key QR Code ID



Same Scanner, two scans, and safely checked out to Employee

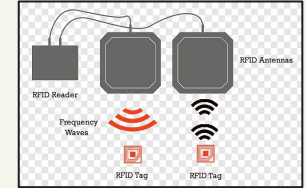


Key Safely passes through RFID Scanners

# Proposed System Map For Buick GMC

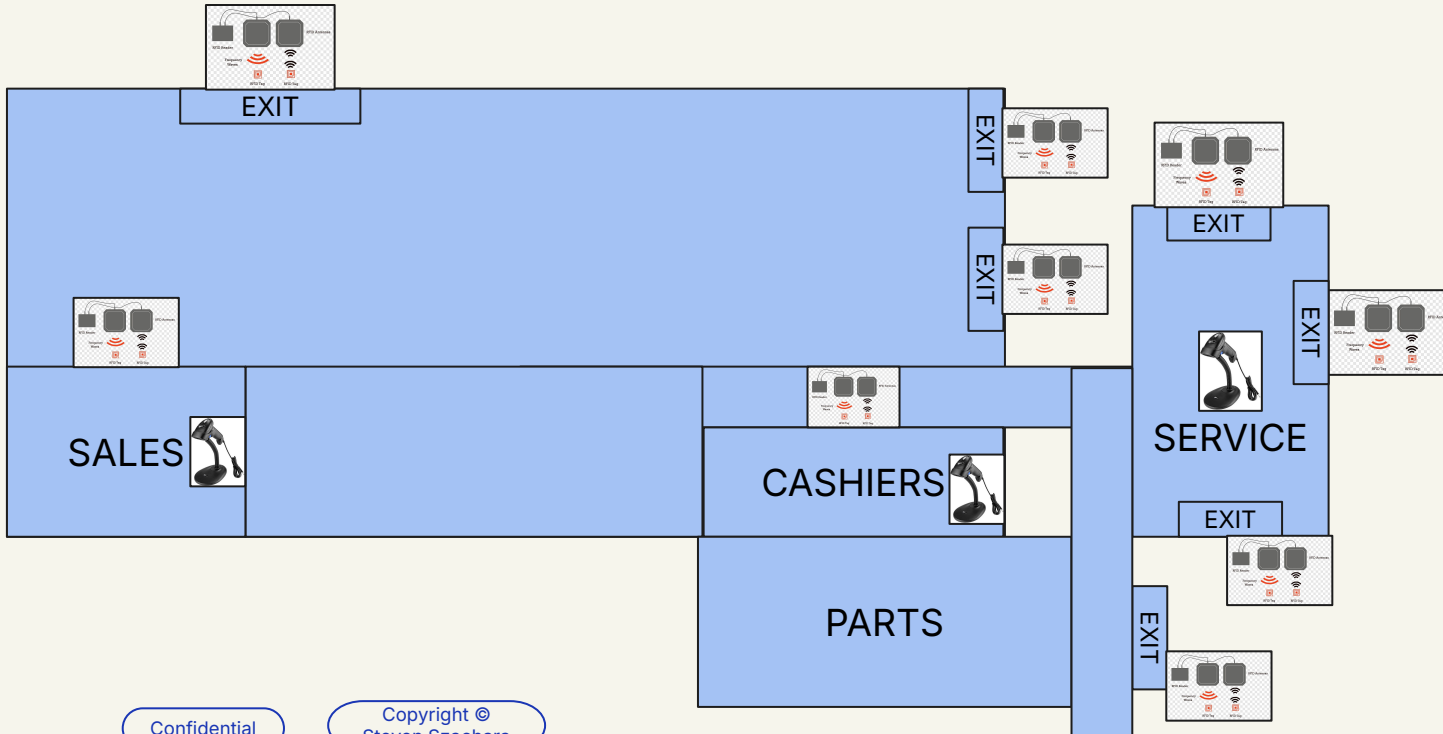
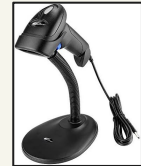
## RFID Security Scanners (9):

- Cashier Office
- Key Rack/Sales
- Service
- Exit Doors



## QR Scanners (3):

- Key Rack
- Service
- Cashier Office



# Savings, Security, Efficiency

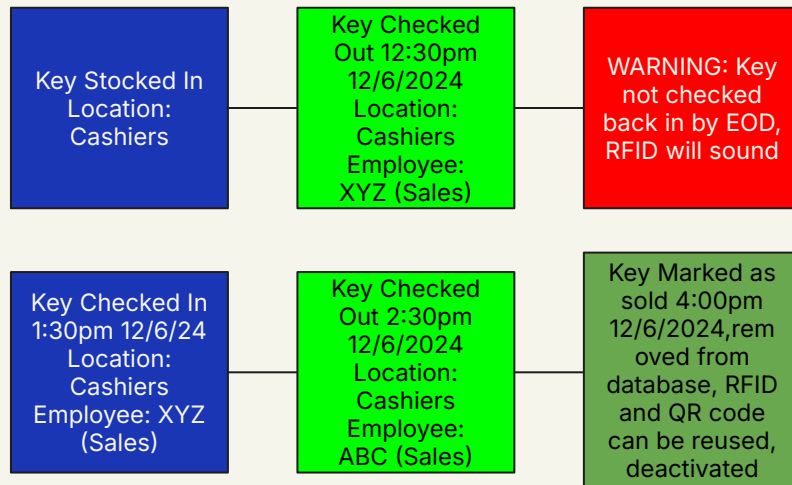
Where's the key? We have a path to it. If after a certain time, a key is not checked in, the alarms will go off

Reduced purchases of second keys month to month

- If replacement keys cost \$10,000 a month, with the system, even a reduction of 25% would save over \$30,000 year over year

Owning the system means implementation across all dealerships, cheaper, easier, and in-house

# Tracking the Key Path



# Project Timeline

**JAN 2025**

**Prototype**

Single prototype to prove capability, software implemented, scheduled demo

Cost:

-Negotiable price for single prototype materials + Labor

**FEB 2025**

**Initial Tests**

Start with test employees and test keys, limited to cashiers office, monitor system performance, implement improvements/fix bugs

Cost:

-Any additional materials authorized to upgrade + Labor

**MAR-APR 2025**

**Scale Test/Training**

Implement more keys, train staff, and expand system to service, sales key storage, and all exits needed

Cost:

-Scaling materials  
-Labor

**MAY 2025**

**System Ready**

System is fully operational at Buick GMC

Any additional requirements on my part on a consulting capacity for as long as you need me

# Recap

## Efficiency, Security, Savings

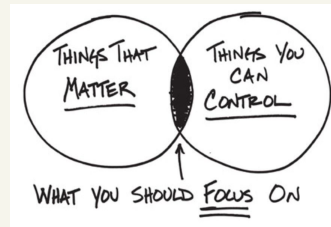
-Can be done step by step on timeline, to see if the system is worth pursuing in full

-Customizable to your needs, total control over the things you need, own the system and answer to no one, save money in the long run, increased security, and accountability

-I'm in house, know staff and systems in place already, and can work quickly with the needs of everyone I already work with



Custom



Total Control



Ownership



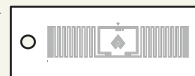
Cost Savings



Security



Accountability



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