

# INTRODUCING SMART LOCK

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## What is smart lock

New and secure way to use keys.

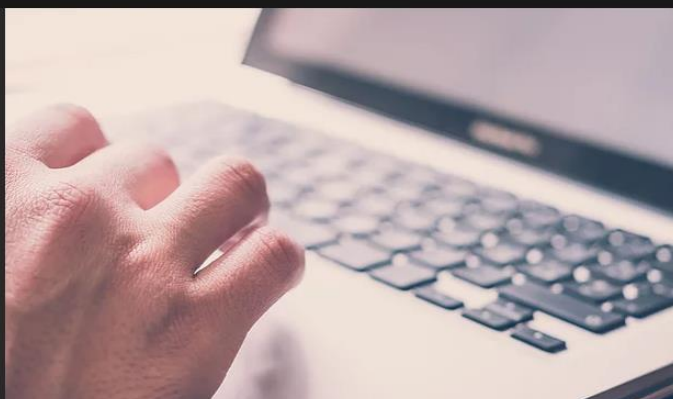
Introducing a new way to keep your keys - on your phone!  
All you need is to scan a QR code you got with the lock and you are all set up.

Leave your home without anything besides your phone!  
The end of physical keys is just that simple!

## Our Technologies

Discover the technologies we used

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# The Hardware

## CC1350-4 Launchpad

The SimpleLink™ CC1350 wireless microcontroller (MCU) LaunchPad™ development kit combines a Sub-1 GHz with a Bluetooth® low energy radio for the ultimate combination of easy mobile phone integration with long-range connectivity including a 32-bit ARM® Cortex®-M3 processor on a single chip.

The CC1350 device is a wireless MCU targeting low power, long range wireless applications with Bluetooth low energy implementations. The CC1350 wireless MCU contains a 32-bit ARM® Cortex®-M3 processor that runs at 48 MHz as the main processor and a rich peripheral feature set that includes a unique ultra-low power sensor controller.



## MG995 Tower Pro

This is the most famous servo made by TowerPro. We used the servo as a lock cylinder that is being controlled from the cc1350 launchpad. The change in degree of the servo is made with PWM (Pulse-width modulation) from the cc1350 which opens and closes the lock. We 3D printed an extension for the servo that will be used as the cylinder itself. (you can see it in the demonstration)



## QR Code

We used the capability of QR scanning in order to get the matching key of the lock into the app easily and efficiently.



### Connection Technology

We wrote the app for Android devices in Android Studio.  
We use Bluetooth low energy to connect the phone to the Smart Lock and send a command of either lock or open



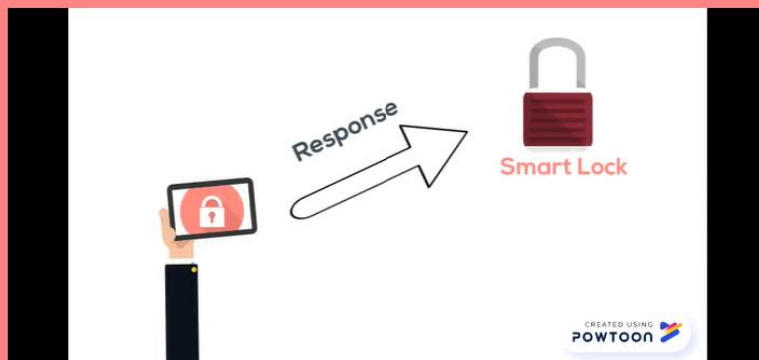
### How it is secured?

Each and every Smart Lock comes with a unique QR code which contains the security key set in the lock. Only whoever scanned the QR code will be able to open this specific Smart Lock. Authentication protocol is based on the concept of challenge response using the security key and sha256 to make it the safest.



### How it is done?

The phone initiate a connection to the lock and sends a command of lock or unlock.  
In order for the lock to be sure that this phone is authorized to open the lock it sends the phone a "challenge" which is a random string generated uniquely for this connection, the phone takes the challenge and generate a sha256 response containing both the challenges and the key scanned by the QR code and sends the response to the lock. After the lock receives the response it creates the wanted response with the compatible key it has and compares the wanted response with the one he got from the phone. Only if they are the same the lock will open.



Link to demo: <https://www.youtube.com/watch?v=uj-0CWfBkeQ>



# How Does It Work

Get A Closer Look

See a live demonstration of the Smart Lock and the app all working together.



Link to demo: <https://www.youtube.com/watch?v=aS7Yi2gfumk>