

# Virtual Lock

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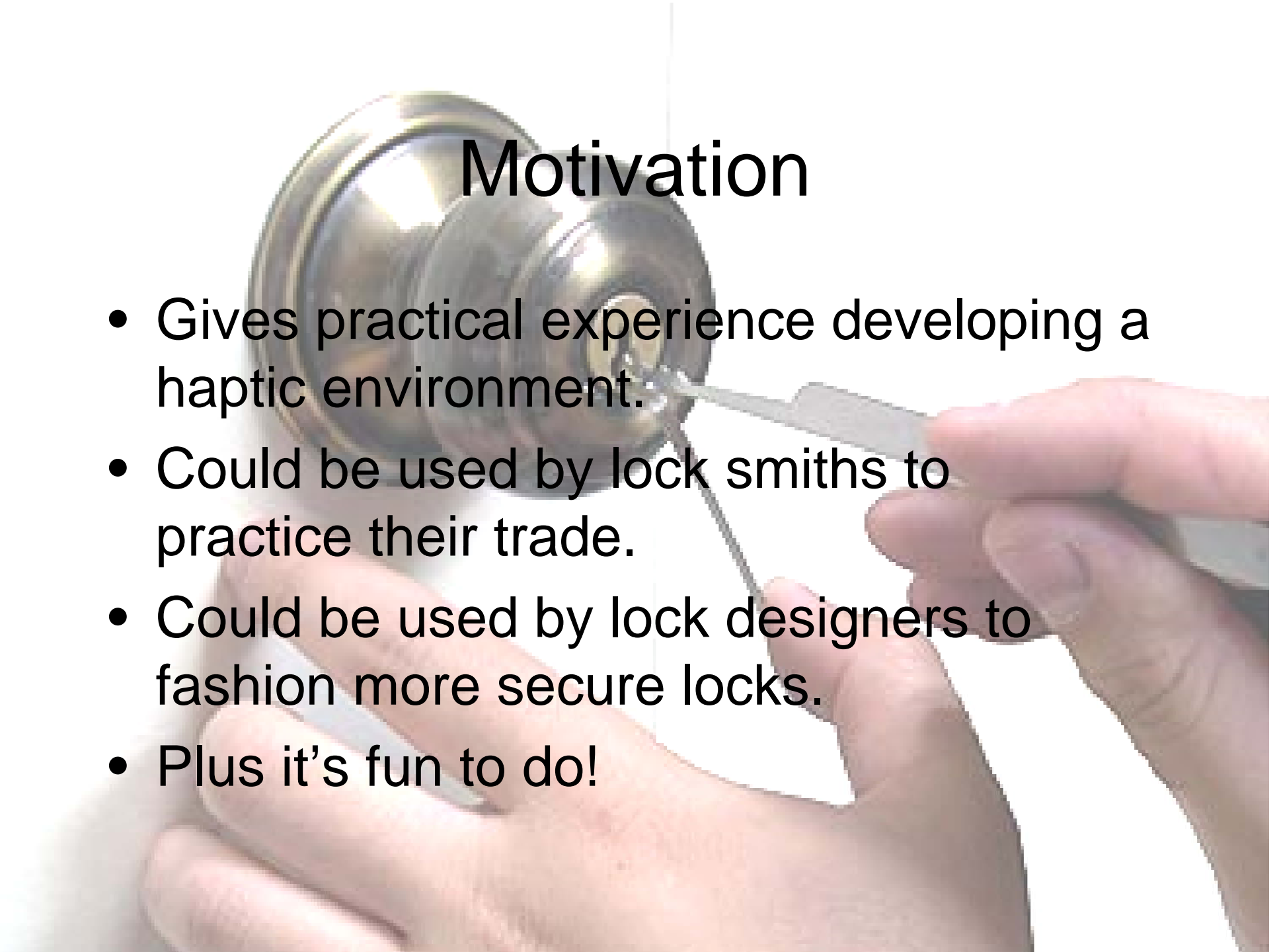
A close-up photograph of a hand using a thin metal lock-picking tool to interact with a brass door handle. The handle is mounted on a white door. The hand is positioned on the right side of the frame, with the thumb and index finger holding the tool. The tool is inserted into the keyhole of the handle. The background is a plain white wall.

# Project Statement

Design a lock picking simulator that provides the necessary haptic cues to mimic the experience of picking a lock.

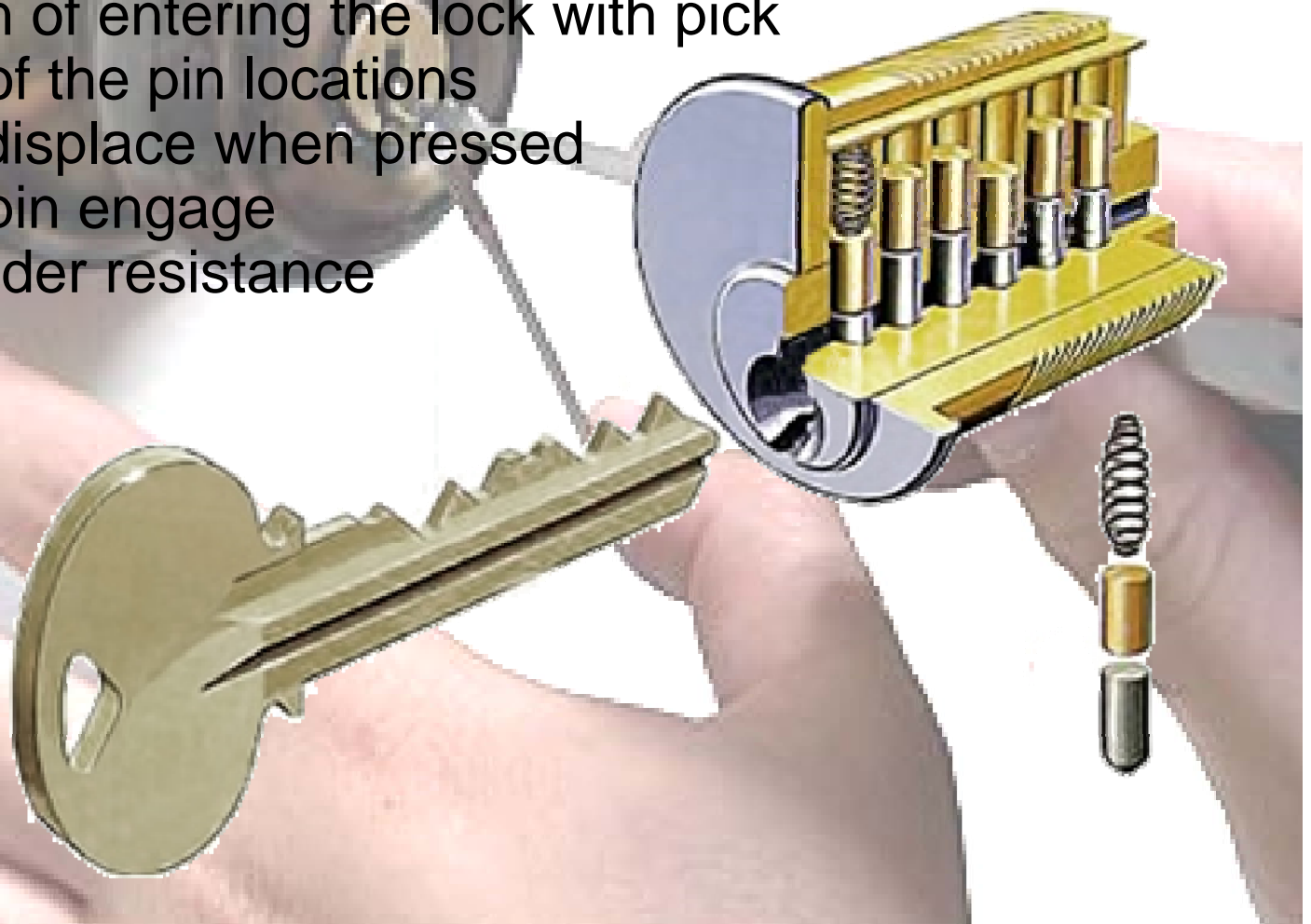
# Motivation

- Gives practical experience developing a haptic environment.
- Could be used by lock smiths to practice their trade.
- Could be used by lock designers to fashion more secure locks.
- Plus it's fun to do!



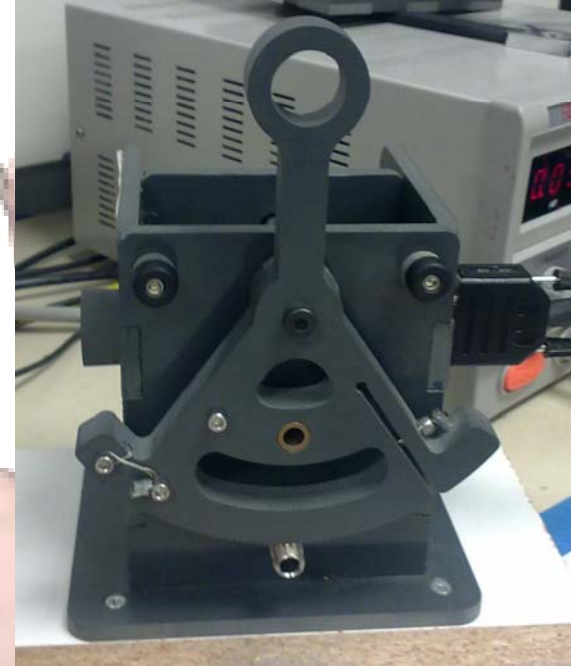
# Simulation will include:

- Sensation of entering the lock with pick
- The feel of the pin locations
- Feel pin displace when pressed
- Feel the pin engage
- Feel cylinder resistance



# Haptic Devices

- Phantom Omni
  - Pick sensation
  - Key entry
- Haptic Paddle
  - Wrench sensation
  - Cylinder motion



# 1st Check Point

- ✓ Render haptic paddle interface
- ✓ Program vibration for tripping each pin
- ✓ Program 5 pin stopping points
- ✓ Program resistive force to simulate spring loaded lock

## 2nd Check Point

- Create cylinder lock model with five spring loaded pins
- Render lock and wrench graphics
- Use collision detection for interactions



## 3rd Check Point

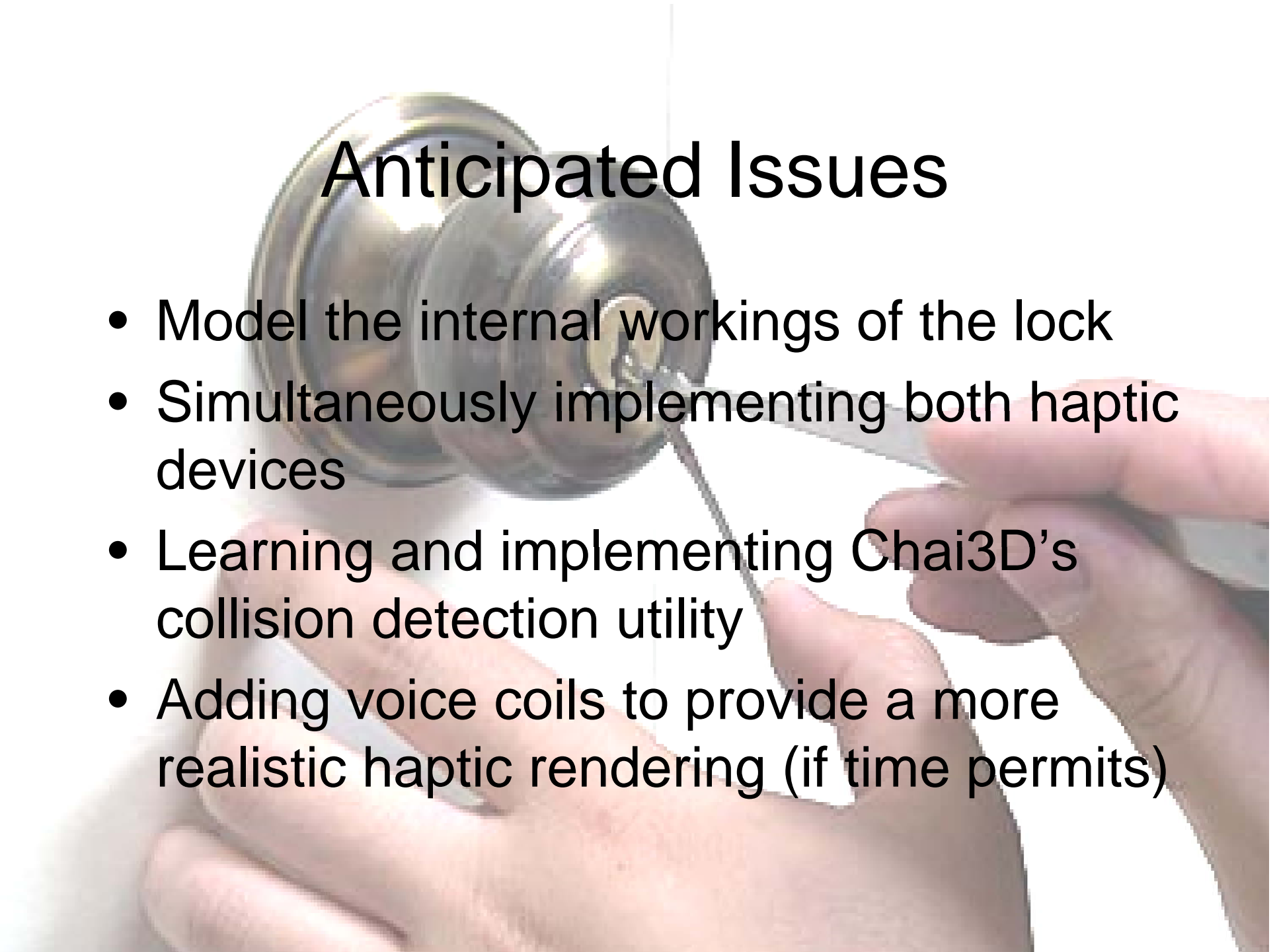
- Program dynamics of internal parts including pin and pick frictions
- Render forces
- Mimic real world vibrations to make the simulation more realistic (as time permits)





# Anticipated Issues

- Model the internal workings of the lock
- Simultaneously implementing both haptic devices
- Learning and implementing Chai3D's collision detection utility
- Adding voice coils to provide a more realistic haptic rendering (if time permits)



Questions?

