

# Participation P4

(Software Engineering CS487)

## 1. Describe the authentication protocol for an ATM

❖ **ATM Authentication Protocol:** The present ATM authentication protocol is based on two fundamental factors:

- **Card:** A magnetic stripe or chip with account information and security features.
- **PIN:** Personal Identification Number entered by the user into the ATM keypad.

### – Why it is less than perfectly secure?

- **Card vulnerabilities:** Skimming devices may gather card data, while counterfeit cards can avoid magnetic stripe checks.
- **PIN weaknesses:** Shoulder surfing, hidden cameras, and social engineering can compromise PIN security.
- **Card Theft:** If a physical card is stolen, the thief may be able to use it at an ATM, particularly if they know the PIN associated with it.

### – And why it is less than perfectly easy to use?

- **Remembering PINs:** It might be difficult for users to recall their PINs, particularly if they have several cards or if the PIN is complicated.
- **Physical limitations:** Disabled users may have difficulty using the keypad.

### – And why it is OK for both to be true?

- **Cost-benefit analysis:** Implementing more comprehensive security measures frequently results in greater costs, which may not be justified for all transactions or regions.
- **Risk avoidance:** Layered security, which includes physical security and fraud detection technologies, can compensate for individual flaws.
- **Evolution and adaptation:** As technology advances, new threats and weaknesses emerge, requiring the ongoing refinement of security protocols.

### – Describe a mechanism for the ATM to assess the awareness of the human user during authentication.

- **Biometric Authentication:** ATMs may include biometric features such as fingerprint or facial recognition to confirm that the individual using the ATM is the actual cardholder.
- **Behavioral analysis:** Analyzing keystroke dynamics, touch patterns, or even facial expressions using cameras might reveal abnormalities that signal a lack of awareness.
- **Challenge-Response Mechanism:** The ATM may randomly prompt the user to answer a dynamic question or complete a specific task to ensure their attentiveness and attention during the transaction.

## 2. Describe the role of automated awareness in engineering acceptable safety for a fully self-driving car.

### – Explain the role of this awareness in managing exceptions.

- ❖ Automated awareness is essential for obtaining acceptable safety levels in fully self-driving automobiles. It refers to a car's ability to observe and understand its surroundings, which include other vehicles, pedestrians, road conditions, and even weather variations. This enables the Self Driving Cars to:
  - **Navigate safely:** Adapt to changing conditions, anticipate potential threats, and make judgments in real-time.
  - **Prepare for exceptions:** Anticipate changes from expected scenarios and respond appropriately, such as avoiding dangers or responding to emergencies.

### – Explain why it is less than perfectly safe.

- **Imperfect Sensor Accuracy:** Sensors might be limited in some conditions, such as bad weather or low visibility, resulting in potential misinterpretation of the surroundings.
- **Unforeseen Scenarios:** The actual world is full of unexpected scenarios that may not have been observed during testing, making it hard to anticipate and account for every possibility.
- **Cybersecurity Risks:** Self-driving cars are vulnerable to cyber-attacks, in which criminals exploit flaws in the vehicle's software or communication systems, resulting in safety issues.

### – Use risk assessment to justify the imperfect design.

- **Identifying risks:** Identifying risks involves evaluating potential dangers and their likelihood of occurrence.
- **Implementing mitigation:** Implementing mitigation involves prioritizing and implementing strategies to lower the likelihood or severity of risks.
- **Continuous improvement:** Continuous improvement involves consistently evaluating and optimizing safety measures based on real-world data and experience.

### – Describe a strategy for safely testing the car design's effectiveness.

- ❖ Thorough testing is essential for determining the effectiveness of a Self-Driving Car autonomous awareness and ensuring appropriate safety. This involves:
  1. **Simulation testing:** Using virtual settings to expose the vehicle to a variety of scenarios and edge cases.
  2. **Closed-course testing:** This involves conducting controlled tests on private tracks to assess real-world performance and identify potential problems.
  3. **Public road testing:** Carefully planned and controlled tests on public roadways under human supervision, steadily increasing complexity and scope.
  4. **Data-driven analysis:** It involves continuous gathering and evaluating data from test drives to detect and fix reoccurring issues.