ADVANCED MECHATRONICS (ROB-GY 6103)

PROJECT PROPOSAL- Term Project

Team: *Andrew Devadhason, Devika Kodi, Shagun Majotra, Vineela Reddy*

PROJECT DESCRIPTION:

Our project idea is to build and develop a Safe based on a 2-factor authentication system. The first stage incorporates RFID technology to verify user credentials, followed by the second stage utilizing facial recognition for a secondary authentication which unlocks the safe. This dual-layered approach synergistically enhances overall security, mitigating the risk of unauthorized access or impersonation scenarios, thus safeguarding physical assets effectively.

WORKING SEQUENCE:

- Upon user interaction, the RF code is tapped for initial stage validation, confirming user credentials. Upon successful validation, indicated by a green light and a specific buzzer sound, the user is granted access. In the event of validation failure, signified by a red light and distinct buzzer sound, access is denied.
- Subsequently, if the RF identification is validated successfully, the user proceeds to undergo facial recognition for the second authentication process where the Raspberry Pi and camera-based system is used to recognize the face of the person based on user-specific pre-trained data.
- Upon successful facial authentication, denoted by a green light, a custom-designed safe lock using servo motors will unlock the door. Conversely, if facial authentication fails, indicated by a red light, access is restricted.

HARDWARE MODEL:

- ARDUINO:
  - Interfacing with RC522 RFID reader through SPI communication.
  - Interfacing servo/servos for unlocking the Safe.
- RASPBERRY PI 4:
  - Interfacing the Raspberry Pi camera and using it for facial recognition
  - Connection to Arduino through I2C.
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- The SAFE:
  - Custom Designed and 3D printed safe with housing for a servo-based lock for unlocking.