**Smart doorbell**

User story:

|  | Story name | As a… | I want… | So that… |
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| 1 | Doorbell functionality | Visitor | To press a button to ring the doorbell physically and on the app .  hardware : max98357 audio amplifier , button | The owner know that there is someone is on there door.  reference :  https://technionmail-my.sharepoint.com/:p:/g/personal/tom\_sofer\_technion\_ac\_il/EdAqu52FMs9Fs\_-dvlDEQY4BVWuEfpvZInjdCKm26iLQhw |
| 2 | Multi-User Access Control | Homeowner | grant permanent access permissions to family members to the application.  only the homeowner can change the only password and add/remove users to the app .  we assume that the lock has only one main password .  hardware : PID3844  4X4 and 4X3 matrix keypad. | The home owner can control the password from the application . and only him can change the only password , and add other homeowners.   reference:  https://www.youtube.com/watch?v=1rfrvOTxtrg&ab\_channel=Robojax |
| 3 | One-Time Code Access | Homeowner | generate a one-time entry code using the app, for visitors.  so the next time someone uses this password it wont work . | Trusted visitors can access my home securely without needing a physical key and without knowing the main password .  https://github.com/ICST-Technion/S24\_Smart-Intercom-doorbell?tab=readme-ov-file |
| 4 | Real time audio communication  THIS FEATURE CANCELLED  Cancel report is bellow. | All | With the homeowner permission the visitor and the homeowner can talk to each other.  hardware : INMP441 I2S microphone , max98357 audio amplifier | Enable the homeowner the ability to verify and chat with whoever is on the doorsteps.  reference :  https://technionmail-my.sharepoint.com/:p:/g/personal/tom\_sofer\_technion\_ac\_il/EdAqu52FMs9Fs\_-dvlDEQY4BVWuEfpvZInjdCKm26iLQhw |
| 5 | dynamic password | Homeowner | Enable the homeowner to change his password using the app . | For security purposes, the homeowner can change his password. |
| 6 | remote control | homeowner | The homeowner to be able to open the door remotely using the app. | He won’t need to open the door physically , he can use the app to lock/unlock the door . |
| 7 | Visitor Video recording | homeowner | The homeowner to be able to see through the application his front door and to record the video.  hardware : OV2640 | For security purposes he can see whenever he wants who is on the door, and to record if needed. |
| 8 | Offline Code Functionality | Homeowner | The one-time code feature to function during internet outages. | Visitors and homeowners can still gain access even when the network is down. the doorbell keeps a buffer of all the existing passwords so when someone enters a code it will be able to check the “local database” for permissions. |
| 9 | motion detection | The system | The system to detect any motion, and report back to the homeowner.  hardware : HC-04 ultrasonic sensor distance sensor . | The homeowner know if someone is on his front door. maybe if the visitor is there for 1 minute without interacting with the doorbel . the homeowner gets a notification to his phone that someone is on the door.  [ESP32 with HC SR04 Ultrasonic Sensor](https://www.youtube.com/watch?v=fMWoIW65B3c&ab_channel=winson-DIY) |
| 10 | **Silent Mode** | Homeowner | sThe homeowner to be able to mute the bell if needed | If the homeowner does not want to be bothered. |
| 11 | **LED Indicator Lights**: | All | The person to know if the password is correct or not | The person can know if the door is closed/open. |
| 12 | **Package Detection** | Visitor | The visitor to be able to notify the homeowner that a package is waiting on the front door without permission to enter.  hardware : button | The homeowner does not need to allow delivery workers entering his house/apartment if not necessary. so when the delivery man clicks on a special button , the homeowner gets notified on his phone. |
| 13 | **Tamper Detection** | Homeowner | The homeowner to know if someone is trying to remove the doorbell.  hardware : button | For security reasons, to be notified when anyone trying to break in.  We implement this feature, by using a simple button to simulate the attempt to tamper with the doorbell |
| 14 | **Digital Post-It Notes** | Visitor | The visitor read any messages the homeowner to leave.  hardware : display (0.96 inch OLED display SSD1306  ) | Make communication between them easier.  https://github.com/ICST-Technion/S24\_Smart-Intercom-doorbell?tab=readme-ov-file |
| 15 | timed unlock | all | When the door is unlocked, it remains open for a predefined period before automatically locking again. | The door won’t be opened all the time.  we are not sure if there will be configuration screen set the duration , or we set it using the app . |
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Real Time Audio Feature Cancellation Report:

We canceled the Real-Time Audio Communication feature due to challenges in synchronizing video and audio while using Firebase for live streaming. Firebase is not optimized for low-latency multimedia streaming, leading to significant delays in audio transmission and making real-time conversation impractical.

Since Firebase primarily supports asynchronous data handling, it lacks the real-time capabilities needed for continuous video and audio streaming.

Alternative solutions is using other cloud platform that supports real-time communication.