



# Addressing Security and Architecture Through Proposing Innovative Conceptual Idea on Landed Housing Windows

Khairul Asyraf Mohd Rodzi<sup>1\*</sup>, Mohd Soffian Osman<sup>2</sup>, Suhailah M. Mohd Siraj<sup>1</sup>

<sup>1</sup>Department of Architecture, Faculty of Civil Engineering and Built Environment, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Johor, MALAYSIA

<sup>2</sup>Safety Management Academy (Rafflesia Group of Companies), 83000 Batu Pahat, Johor, MALAYSIA

\*Corresponding Author

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**Abstract:** Metal grill for housing windows that is fixed to the wall is commonly used in most of the residential houses in Malaysia. Due to high numbers of burglary cases reported across the country in a year, the feature seems desperately needed. However, the window grill creates a dispute, especially on the emergency exit, building façade, and opportunity to view surrounding outside. Through survey and input from the respondents, the purpose of the research is to propose an innovative idea on housing window that able to address both security and architecture aspects. Understanding behavior of typical housing residents, residents' perception on window grill, and modus operandi of a burglar are important to ensure the innovation able to minimize the burglary ideation, without compromising the feature's purpose as a housing window. Inspired by French windows of a traditional Malay kampong house, the design is improvised to correlate with the current context. In this research, the housing typology that is focused on is landed house, which may include bungalow, terrace, semi-detached, and townhouse.

**Keywords:** Window grill, security measure, innovative window, emergency exit, residential

## 1. Introduction

A residential house is a shelter device that provides security and sense of privacy to individuals. People spend a significant number of hours in a day inside the house and the emergence of Covid-19 Pandemic has directly forced the residents to reside more. It is important to ensure lives and things inside of the house are safe from external threat. It is a tradition in Malaysia where almost all the residents put a window grill and door grill for the security purpose [1]. Even though the grill is believed can provides security to the inhabitants and increases the users' confident level towards the aspect, there is a dispute associated with the method especially on the emergency exit, building façade, and opportunity to view surrounding outside. The paper is written to address the security issue through design and architecture perspective, where the objective is to propose an innovative conceptual idea on housing window, which could be a substitute or as a replacement to the existing glazing window and bolted window grill.

## 2. Methodology

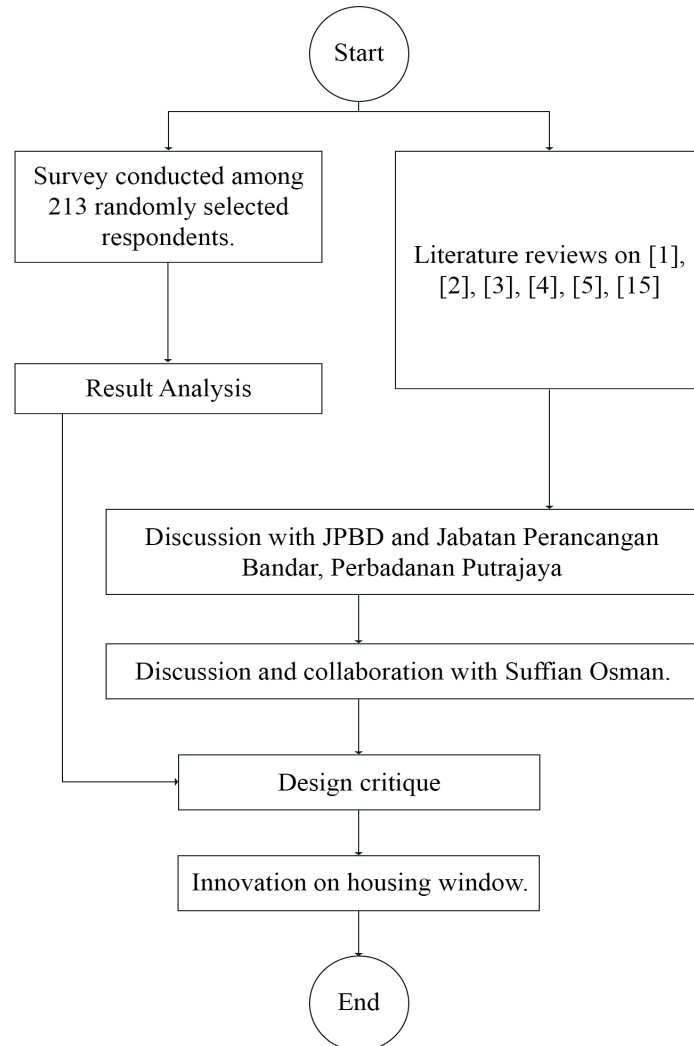
Research methodology is a practice to systematically solve research problems. Before proposing the innovative idea on the housing window, the author has conducted a survey to 213 random housing residents around Malaysia who own or rent a property to understand the context, reasons, and their perspectives on the window grills. From the survey, the data was collected and analyzed to determine the justification of the innovation. The data also provides guidance for the design process of the housing innovative window. Literature reviews on Muhamad Azani et al. [1] and Abd Malek et al. [2] were also conducted to understand the Malaysians' perceptions on the feature as well as behavior of the

\*Corresponding author: [asyrafr@uthm.edu.my](mailto:asyrafr@uthm.edu.my)

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burglar. The author had conducted a meeting with The Fire Safety Department (BOMBA) and Bahagian Senibina dan Inspektorat Bangunan, Jabatan Perancangan Bandar, Perbadanan Putrajaya to discuss this topic. Perbadanan Putrajaya (PPj) was selected as the representative of the local authority due to its higher demand and focus on aesthetic and passive design strategies compared to other local authorities. A series of discussions with Mohd Soffian Osman, a representative from the Safety Management Academy was also conducted before finalizing the housing window innovation. Fig. 1 shows the summary of the progress for the research.



**Fig. 1 - Methodology progress throughout the research**

## 2.1 Literature Reviews

Abd Malek et al. [2] emphasized the factors that need to be highly considered to prevent burglary from happening. There are three (3) methods explained: (i) improving security level including street lighting, CCTV installation, urban design and planning, and signboards, (ii) increasing monitoring activity from the Royal Malaysia Police (PDRM) and *Rukun Tetangga*, (iii) understanding behavior of a burglar including keeping away visibility towards valuable things inside of the house and avoiding unlimited space design of the urban planning [2]. On the other hand, Muhamad Azani et al. [1] are focusing on the perception of respondents towards window grill application. The study shows that 85% of the respondents agree that the grill installation is important for security reasons. However, the researchers also believe the feature also increases safety risk of the house, especially during emergency [1]. Waziri [3] also believes the installation of the window and door grill has disturbed the residents during emergency exit. The researcher suggested other methods that could be used as a replacement of a window grill: (i) upgrade window and door locks, (ii) lock any equipment that could be used by burglar to break into your house, (ii) make sure your house is visible from the street, (iv) stay alert, (v) make your home appear occupied, and (vi) keep property hidden from view [3].

Mat Yusof et al. [4] have also proposed an innovation of a window grille, derived from the same concern - security and aesthetic features of a house. The researchers experimented with two prototypes: the law of magnetism and keyless push-up locking system. It was concluded that the later system has potential as an alternative to the existing window

grille [4]. Furthermore, Ahmad Tarmizi et al. [5] also proposed a grille innovation for emergency exit purposes. The grille design was designed with a quick release locking system mechanism where the plunger can be pulled to open the grille [5]. The security elements that could be identified here are: (i) locked door cannot be opened from the outside, (ii) The door can be opened by activating panic mechanism, (iii) can be opened quickly.

### 3. Background

Security aspect has become a priority for consultants and authorities. Regulations and guidelines are outlined and progressively updated to ensure the buildings inhabited are safe to use. However, the regulated buildings designed are not completely safe from external factors such as burglary. Based on a report by the Royal Malaysia Police (PDRM), there were 15,742 cases recorded on burglary in 2018 [6]. The statistic rises a concern among Malaysians on the lives and property safety in a house. Abd Malek et al. [2] mentioned that lower security control is one of the main factors that contribute to high burglary cases in a residential area. Even though the installation of devices such as CCTV, security alarm device, fence, and window grill are believed to increase house security control from burglary [2], the window grille installation was perceived as a security measure among low-income residents because other measures are considered expensive and unaffordable [3]. Furthermore, based on the survey conducted by the author, 193 respondents, which equivalent to 91% have installed the grill on the windows or at least their landlords have already installed it. Based on Table 1 below, 98.5% of the respondents mentioned that the purpose of the grill installation was for security reasons.

**Table 1 - Reasons for grille installation from the respondents**

Reasons	Number of Respondents	Percentage
Security purpose	202	98.5
Aesthetic and look purpose	1	0.5
Following the local surrounding trend	0	0
Advice from the public, neighbors, or parents	0	0
No specific reasons	2	1

The respondents believe that the grille installation is the most effective way to prevent burglary, but more importantly, the feature can provide sense of assurance to them that lives and property inside of the house are secured from external threat whenever they are away from the house. However, the feature also creates an argument, especially on the emergency exit, building aesthetic, and opportunity to view surrounding outside.

On 14 September 2017, a fire broke out in Pusat Tahfiz Darul Quran Ittifaqiyah, killing 23 students [7]. From Fig. 2, the students were trapped throughout the incident since the fire blocked the exit and the windows were fitted with bolted grilles [8]. Malaysians have paid close attention to the event, and the grille's practicality has been brought into question. Other than that, the window grille installation also has directly changed the exterior façade of a house and a building [8]. Traditionally, the window possessed a role to determine the character of a building. The feature may symbolize workmanship of the builder, dwellers' intention, status, and resources [8].



**Fig. 2 - Darul Quran Ittifaqiyah building (a) view of the building from Jalan Keramat Hujung [10], and; (b) Bolted metal grille window [11]**

Even though aesthetic aspect is a subjective topic, and everyone has different perspectives on look and beauty, most of Malaysians never consider window grille as a feature to enhance the building façade. However, in contemporary context, many Malaysians considering a decorative grille design to enhance the look of the property [4]. The grille design may evolve over time depending on the current trend and influence. Fig. 3 shows the changes in

window types and design in a building throughout the English history. Besides, the grille will also reduce the opportunity for inhabitants to view the surroundings. The steel bars that bolted on the window frame will partially block the view and hence, reduce the opportunity to enjoy the surroundings. Even though the aspect was considered less important, this issue can affect human health. According to Tutton & Hirst [8] and Mardaljevic [9], there several factors on why inhabitants are preferring large window in their property: (i) acquiring continuous daylighting or spectrum of illumination, and (ii) obtaining sufficient ventilation, and (iii) ‘connection’ to the outdoors through the information provided by the view [8], [9].

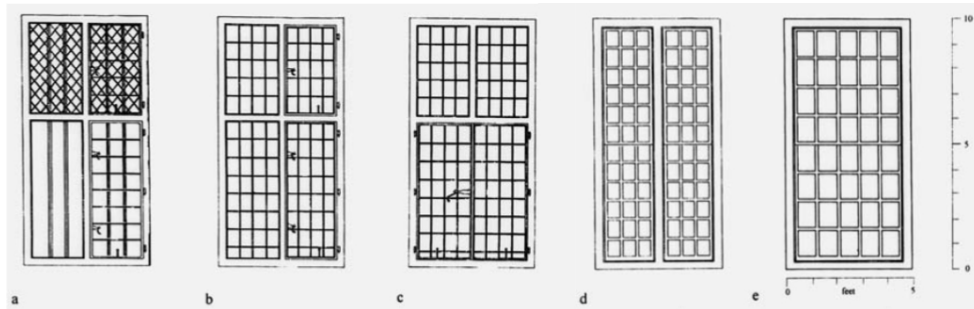


Fig. 3 - Different types of windows used in 1660 - 1685 [8]

#### 4. Results and Discussion

The survey form which consists of 8 questions was distributed to 213 random residents throughout Malaysia and the survey took place in approximately two months’ period. The research was not narrowing the scope only to the homeowners, but to every individual who lives in a house. Window type (either grilled or not) and their perception on the window are the items that were assessed. The survey consists of three components, the first of which focuses on the demographics of the respondents, including their gender and age. The second section concentrates on the specifics of their properties, while the final section examines their perspective on window grille installation. Variable that is fixed is the location of the house because an index crime ratio per 100,000 populations by state shows that every state in Malaysia recorded relatively similar number in burglary case, except for Wilayah Persekutuan Kuala Lumpur, Sabah, and Terengganu which recorded a lower numbers compared to other places [6]. The finding of the survey in Fig. 4 shows that 122 of the 213 respondents have provided reasons of Malaysians refusing to install window grilles in their houses. 36.9% of the respondents mentioned that the opportunity to enjoy outside scenery is the reason for not installing the window grille.

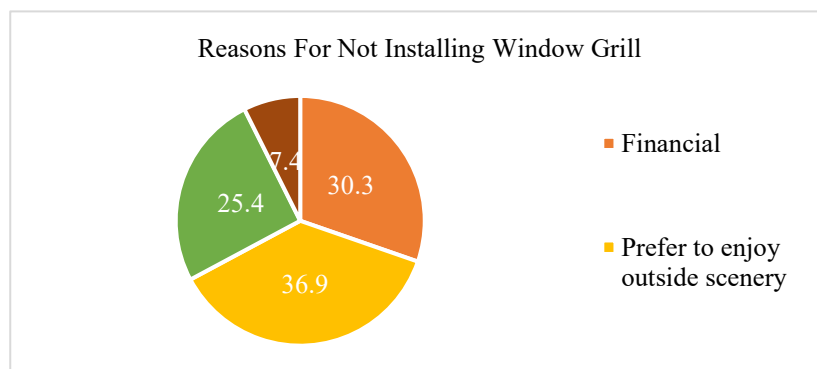


Fig. 4 - Survey results on the reasons for not installing window grill (N = 213)

The result of the survey also indicates that housing typology and whether the house is guarded or not are not influencing the decision of the residents or the landlord to install the grille. From the survey conducted, 83 residents are living in a guarded area which means the entry of the residential area is protected by a security guard. Even though the area is considered ‘secured’, there are only 11 residents (13.25%) from the 83 residents who are not installing the window grille in their properties, and this creates another debate on necessity of a security guard in a residential area. However, housing typology criteria possesses a more complex issue where even though high-rise developments such as flats, apartment and condominium are considered ‘immune’ from burglary, safety issues involving kids and toddlers arises [12]. Based on a recent case occurred in Gombak, Selangor where a 5-year-old child was found death after fall from Level 16 of a condominium. A report mentioned that the child climbed a bed next to a window which was not fitted with a grille, before accidentally falling to the ground [13]. It was suggested that window grille installation is

required in high-rise buildings for safety purposes. Other than that, application of window stop also could be considered which limiting the openness of the window to avoid children to fall [14]. From the survey, respondents that reside in a high-rise building also raise the same concern where the window grille installation is necessary to avoid children falling. Terminology understanding between safety and security is important to execute the innovation. Window grille is perceived differently between high-rise building dwellers and landed building dwellers. Security of occupants and things inside of the house is the main concern among landed building inhabitants.

## 5. Innovation

The purpose of the innovation is to critique the conventional window grille that has been practiced by Malaysians for many years. Even though the security aspect from the method has been proven, the dispute arises from the method also cannot be ignored. Before proposing the innovation strategy, the author needs to understand safety grille design guidelines and key factors that contribute to burglary. Based on *Garis Panduan Pemasangan Jeriji di Rumah Kediaman* by BOMBA (2019), there are 3 suggestions provided [15]:

- A keyless opening procedure and can be easily opened from inside of the premises during emergency events.
- Grille opening procedure can be done by all age groups.
- Affordable installation and maintenance costs.

Fundamentally, the application of the innovation should consider an easy application: opening procedure during emergency.

On the other hand, Bahagian Senibina dan Inspektorat Bangunan, Jabatan Perancangan Bandar, Perbadanan Putrajaya has no issue with the innovation as long as the innovation complies with natural daylighting and ventilation as well as unobstructed air path (UPA) for residential and commercial outlined in the Calculation Standard under MB206 - Approval Form to Construct a Small-scale Building (MB). Thus, it is important to ensure the innovative conceptual design is complying with the regulation and manages to serve its purpose as a window [16].

To combat against burglary, there are 7 security tips outlined by Waziri [3]. (i) installing an alarm system, (ii) keep property out of sight, (iii) lock any equipment that could be used to break into a house, (iv) controlling entry way to the property, (v) make sure the property is visible to the neighbors, (vi) ensuring window and doors are locked all the time, and (vii) make the property looks occupied. On the other hand, Abd Malek et al. [2] mentioned that a space which provides a clear opportunity to steal, and escape will be the main target for the burglary. Before the robbery happens, the burglar will scan and analyze the house and space around it to ensure the modus operandi is worth and smoothly run. Thus, it is important to ensure things inside the house are not exposed and noticed easily. The understanding of the mechanism leads to new terminology which is preventing 'burglary ideation'. In this research context, a 'good housing window' is obtained when the feature manages to minimize exposure of the interior of the house to the outside. Thus, taking an inspiration from traditional Malay kampung house, the design of a French window is adopted, altered, and juxtaposed to the current residential house.

In general, French windowpanes in the traditional kampung houses were designed with wood and translucent glass panes. Referring to Fig. 5, the window was designed with typical height of 2.1 meters from the floor level and was equipped with typical 0.9 meters' height of steel or wood railing to prevent inhabitants to fall to the ground as the floor level of the traditional kampung house was designed with approximately 2 meters' height from the ground level. The design was reflected to the previous context where the house was elevated to minimize damage due to flash flood as well as avoiding threat from wild animals [17]. The traditional windowpane also promotes a higher privacy level to the inhabitants due to its higher location from the ground, as well as providing sufficient natural ventilation through the louvres and decorative window panels. Higher privacy level can promote higher security level to the inhabitants through less exposure of things inside of the house from the view of the outsiders [18]. Fig. 6 shows the design of the innovative window suggested.

Based on Fig. 7, there are several components involved in the proposal: (i) window frame, (ii) hinges to allow sub-frame to fold, (iii) foldable sub-frame, (iv) louvres and frame, (v) lever lock to adjust the opening of the louvre plates, (vi) cylindrical grille to increase the level of security, (vii) latch to lock the entire louvre window. The proposal suggested a folded louvre frame without glass installation. The installation of glass as a window in a residential house should be reconsidered especially in response to security aspect. The purpose of the glass is to allow daylighting and ventilation to take place inside of a space as well as allowing inhabitants to view scenery outside. However, the material itself has created exposure from the outside and the opportunity for burglars to break into a house. There are four principles under tangible criteria outlined by Ismail et al. [19] and two of them are access control and target hardening. Access control principle focuses on reducing opportunities for burglars to approach potential targets. The application of the opaque louvres which reduce view from the outside can reduce burglary ideation. The cylindrical grille and non-glazing material used in the innovation also can improve the strength of the innovation. The innovation also could resist force and pressure from the outside, especially from burglars. The window was designed with folded to the outside and with possible materials such as steel or wood, an attempt to break into the house through the window could be minimized.

Responding to the aesthetic issue, the innovation could provide a better treatment to a housing façade. The louvres and the foldable frame could create a reminiscence of the traditional Malay kampung house. Different materials could be applied on the innovation to enhance the feature on the building façade. To ensure the innovation serves the purpose - provide sufficient daylighting and ventilation, operable louvres are provided in the innovation. Furthermore, the window can be folded, not just to provide maximum opportunity for inhabitants to view the surroundings outside of the house, but also as a means of emergency escape, especially during a fire outbreak. It was suggested that housing dwellers prefer adjustable shading strategies that allow desirable option, both in maximizing daylight utilization and minimizing energy demand [20], [21].

In response to Abd Malek et al. [2], it is important to ensure things inside the house are not visible from the outside. If the inhabitants are away from the house, the window and the louvres can be completely closed to avoid any burglary ideation. Furthermore, it has become a culture in Malaysia where, window will be shut, locked and curtain will be closed during the night because light illuminated from the inside can be visible from the outside and thus, create a threat for burglary to occur. However, with the innovation, the closed window can block any visibility without the need for curtain installation. Fig. 8 explains the multiple operation of the innovation which able to provide multiple modes, in relation to difference in human inhabitancy in a house.

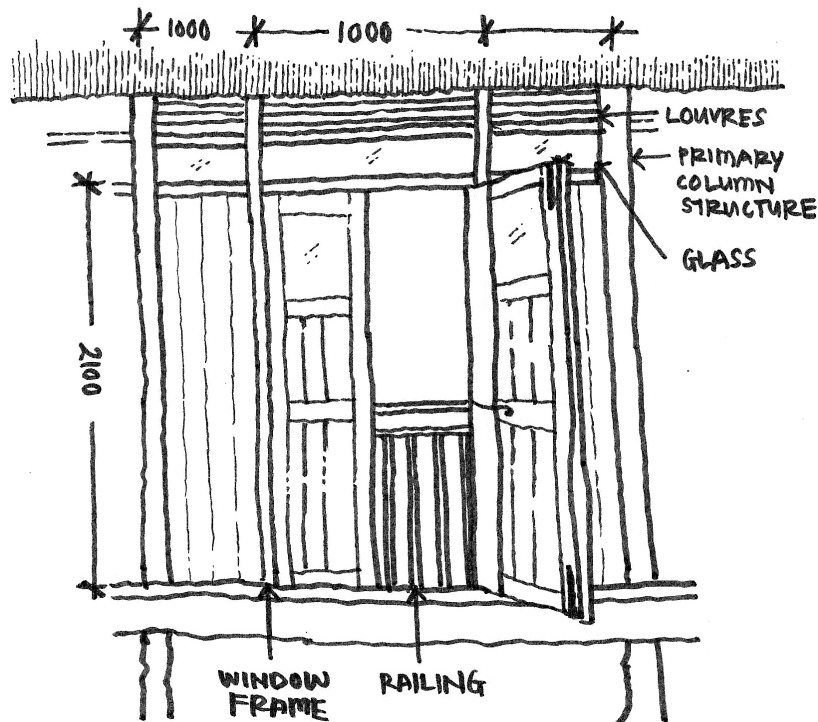
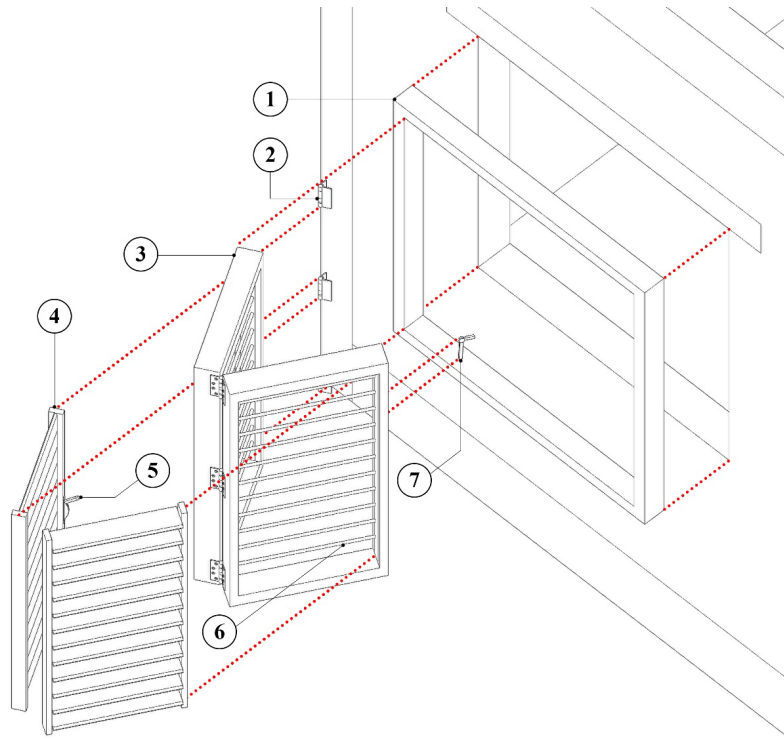


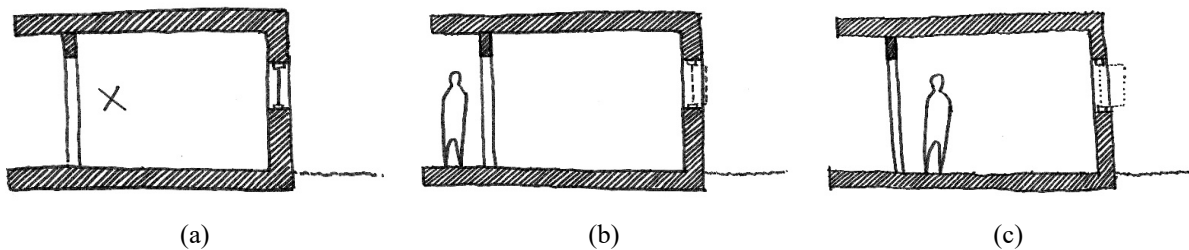
Fig. 5 - Diagram of a typical French window that can be seen on traditional Malay kampung houses



Fig. 6 - Perspectives of the innovation (a) view from the inside, and; (b) view from the outside



**Fig. 7 - Components included in the proposal**



**Fig. 8 - Different window operations from different modes of inhabitancy (a) window could be completely closed when the resident is absent; (b) window could be closed while the louvres are open when the resident is outside of the room, and; (c) window could be completely opened when the resident is inside the room**

## 6. Conclusion

Removing grilles from the housing window can provide a means of escape during emergency events. However, the practice can increase the risk of burglary. In general, there are many factors causing burglary to occur: no installation of CCTV, security alarm and streetlamp, minimum communication among residents in the neighborhood, and lack of patrol from the police and enforcement bodies [2]. However, the most important aspect that needs to be considered is preventing any burglary ideation. The idea arises when the burglar knows there are valuable things inside of a house, space, and a route to escape. The main concept of the innovation is minimizing the visibility from the outside without compromising the main purpose of the feature as a window. However, it is also important to assess the performance of the innovation especially towards daylighting and ventilation. A quantitative approach could be carried out to justify the ability of the innovation to provide sufficient daylighting and ventilation to inhabitants inside of a house. Furthermore, financial assessment and value engineering can be carried out to identify practicality of the design as well as justifying the need of the innovation to the housing residents.

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