Department of Electrical Engineering and Computer Science

University of Central Florida

Dr. Lei Wei

Guard Mat

Initial Project Document and Group Identification

Divide and Conquer

Group 19

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Project Narrative

Home invasions are not an experience any family should ever have to go through but with crime on the rise, families should be prepared for the ultimate worse, the unexpected. According to the Bureau of Justice Statistics, an average of 3.7 million household burglaries occurred from the year 2003 to 2007, 7% of which a member of the household was subjected to a violent encounter. And with the current confliction regarding firearms, how will homeowners truly protect themselves, what alternative will they have. The Guard Mat is the latest security system that will put homeowner's minds at ease. The guard mat is an affordable and compact option available to homeowners that notifies them of any possible presence at their door whether a loving, welcome guest or a unwelcome intruder.

The goal for security system, Guard Mat, is to provide homeowners an affordable and reliable alternative solution to modern security systems which can be quite expensive and complicated to configure. As well as being affordable, the Mat is incredibly durable, able to sustain heavy loads as well as being resistant to volatile climate changes.

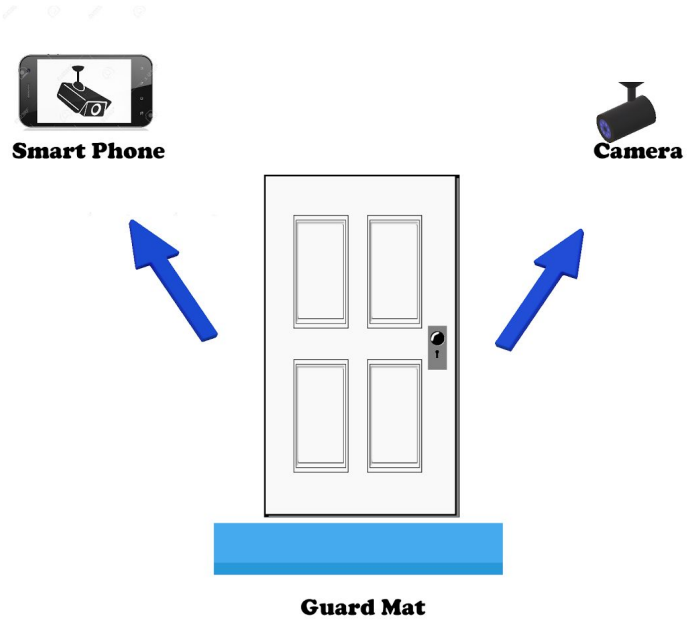
The Guard Mat is designed as a security system for homeowners to alert them of any presence at their door but how does it work? The Guard Mat is a system that includes a mat connected directly to a 720pi camera with website available to the users to check the live feed from the camera. Within the mat are pressure sensors, when the sensors detect pressure, the 720pi camera is activated, commencing video recording. Once the camera is activated, an SMS message is sent to the user notifying of a guest or possible intruder at his home location. The SMS message will contain a link that will direct the user to the video in real time with the option of storing the videos as possible evidence as well as for identification purposes. In case of scenarios when the camera is activated during night time, when the camera is activated LEDs will be activated as well to provide clarity for the feed. The Guard Mat is not a offensive measure but rather a defensive option that serves in keeping constant updates any guest visits their home.

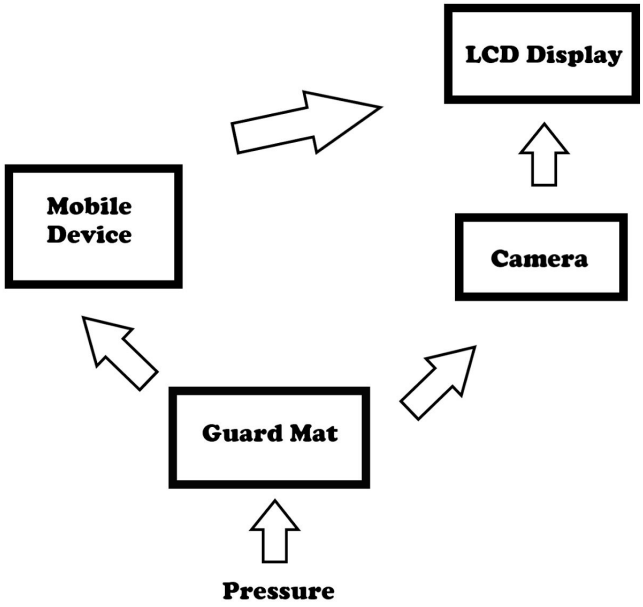
Although there are other security system in the market, some are as simple in functionality as they are in design. One in particular, the Smart Mat, is a mat that has the capability of detecting when guest or packages have arrived and then notifying the user via text messages through wifi. The Guard Mat has the same functionality but offers better feedback. Not only does the Guard Mat notify users of guest, the security system also sends users a live feed of the guest at the door providing identification for anyone whether a guest or intruder.

Milestone

Number	Task	Due Date	Status	Responsible
1	Ideas	Aug. 25, 2017	Complete	Group 19
2	Initial Project Documentation	Sept. 22, 2017	Complete	Group 19
	Project Research			
3	Pressure Sensor	Sept. 29, 2017	In Progress	Group 19
4	PCB Layout	Sept. 29, 2017	In Progress	Group 19
5	Camera	Sept. 29, 2017	In Progress	Group 19
6	LED Light	Sept. 29, 2017	In Progress	Group 19
7	Wifi Connectivity	Sept. 29, 2017	In Progress	Group 19
8	SMS Connectivity	Sept. 29, 2017	In Progress	Group 19
9	Update Divide and Conquer	Oct. 6, 2017	In Progress	Group 19
10	Design Standards	Oct. 20, 2017	In Progress	Group 19
11	60 Page Draft Document	Nov. 3, 2017	In Progress	Group 19
12	100 Page Submission	Nov. 17, 2017	In Progress	Group 19
13	Final Document	Dec 4, 2017	In Progress	Group 19
Senior Design II				
14	CDR Presentation	TBD	Spring 2018	Group 19
15	Conference Paper	TBD	Spring 2018	Group 19
16	Middle Term Demo	TBD	Spring 2018	Group 19
17	Final Presentation	TBD	Spring 2018	Group 19
18	SD Day	TBD	Spring 2018	Group 19

Block Diagram





House of Quality					
		Engineering requirements			
Marketing requirements		Dimensions	Sensitivity	Response Time	Cost
		+	+	-	-
Cost	-	<<	<<	>>	>>
Duribility	+	>	<<		>
Intergratibility	+	>>	>	>>	>>
Video Quality	+		>	>	>>
Negative Correlation: <					
Positive Correlation: >		~33in x 44in x 2cm	ohms/cm^2	~8 seconds	~75W / $500

Marketing Requirements

Cost

- Total cost for components under $500

Durability

- Withstand heavy weight
- Moisture Resistant

Intergratibility

- Easily accessible with any mobile device
- Plugs into any outlet; no changing of batteries

Video Quality

- 720pi
- Allowing owner or authorities to easily see package or person

Engineering Requirements

Dimensions

- Mat (33 x 44) in x 2cm

Sensitivity

- Mat triggered with any pressure which changes resistivity (Ohms/(cm^2)
- Can detect all human weights (kg)

Response Time

- Time from mat triggered to SMS message sent to phone
- ~ 8 - 10 seconds

Cost

- Power consumption 50 - 75 W

Budget

Item	Vendor	Price	Amount
1. Pressure Sensitive Conductive Sheet	Ada-fruit	$3.95	4
2. Fisheye Wide Angle Camera	Raspberry Pi	$30-60	1
3. Outdoor/ Indoor Mat	Amazon	$10-15	1
4. LCD Display Screen	Raspberry Pi	$40-60	1
5. Wifi Microcontroller	Arduino	$20-40	1
6. PCB Boards	N/A	$20-30	1
Total Proposed Budget		**$135-210**	

Number of Team Members	4
Amount per Member	$100
Total Project Funds	$400

Above are the estimated total proposed budget of $135-210. All the members of the group agreed to put in $100 each for the project fund. The remaining funds will be used for unseen finance of the project which is not included into the proposed budget such as wires, batteries, etc. Pressure sensitive conductive sheet is budgeted for $3.95 each according to Ada-fruit's website. Most of the proposed budget is an estimate with accordance to the prices in various websites. After the project research, our team will have a better understanding of the items that needs to be purchased and will have a specific part numbers for the project to better estimate the budget.

Specifications

This system includes:

- Pressure Sensitive Conductive Mat
    - Sends signal to camera when person steps onto pressure mat.
    - Possible pressure mat on door to activate camera when knocking on door.
- Doorbell Switch
    - Sends signal to camera when doorbell is pressed.
- Peep-hole Camera
    - Activated by pressure sensor or doorbell, also can be remotely activated.
- Remote Access
    - Ability to view camera when not switched on by sensor.
- Wireless Communication
    - Send picture with time stamp to homeowner.
    - Send real time video to homeowner.

Pressure Sensitive Conductive Mat:

- 11” x 11” x 4 mil (single mat)
- 9 mats interconnected to make large enough surface area for effective doormat size.

Doorbell Switch

- Activate doorbell and activate camera

Peep-hole Camera

- Wired LCD screen
- Wireless capability