Evaluating Safety Buttons on Mobile Devices: Technological Interventions, Personal Safety, and Women's Agency

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Much technological innovation for women is aimed at addressing violence against women. One such ubiquitous intervention is mobile device-based safety applications, also known as emergency applications. Several police departments in India, public transport services, and commercial services such as taxi-hailing apps deploy a mobile device-based "panic button" for the safety of citizens or customers, especially women. India witnessed an avalanche of such apps after the rape and murder of a young student on board a bus in New Delhi in 2012[1]. However, the proliferation of safety apps through both public and private players raises several concerns, which we would study through this project:

1. What are the technical concerns (including those of accessibility and literacy) with user experience of these safety button applications being developed and deployed by both government and private agencies, especially at a moment of crisis?
2. How well do the widely used safety button applications in India protect the data shared by the user and the user's privacy?
3. What technical and other solutions can be implemented to ensure more effective, accessible, secure, and responsible modes of communication in such a context?

What is the current scenario of safety apps in India?

There is currently a deluge of mobile safety apps in India: Apps run or supported by police departments, apps run by public transport services, apps endorsed by celebrities and politicians, an app developed by an entertainment television channel, and apps by NGOs and private developers. Through a public notification made in April 2016, the Ministry of Women and Child Development in India announced that every phone sold in the country from January 2017 should come equipped with a physical panic button and a GPS module[2]. An international innovation award for USD 1 million was instituted in late 2016 for innovators to build an emergency alert app[3].

What does this problem of plenty lead to?

Preliminary user-testing conducted by us shows that many of these apps lack in technical quality and are prone to failure of one kind or another. There are no defined policies of privacy or terms of use, which could lead to possible data and identity theft and egregious surveillance of users.

How will we evaluate the safety apps?

- Study of 26 different apps operational in India, the permissions they use, the privacy policies and end user agreements on their websites, and analysis of the results.
- Qualitative case studies of the use and deployment of some apps.

[1] https://en.wikipedia.org/wiki/2012_Delhi_gang_rape

[2] http://www.bbc.com/news/technology-36139985

[3] http://www.thehindu.com/news/cities/mumbai/Women-and-water-grand-challenges-for-innovators/article16081392.ece

Permissions used by safety applications

S.No.	Permissions	Applications																								
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	
1	Identity					🟥	🟥	🟥	🟥			🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥					🟥	14
2	Contacts	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	24
3	Location	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	24
4	SMS	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	23
5	Phone	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	23
6	Photos/Media/Files	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	22
7	Storage	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥		🟥	🟥		🟥	21
8	Camera	🟥	🟥	🟥	🟥					🟥	🟥	🟥	🟥	🟥	🟥			🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	18
9	Microphone	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥		🟥	🟥		🟥	21
10	Wi-Fi connection information	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥		🟥									🟥	15
11	Device ID & call information	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	24
12	View network connections	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	24
13	Full network access	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥		24
14	Modify system settings	🟥															🟥									🟥	3
15	Control vibration		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	22
16	Prevent device from sleeping		🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥	🟥				🟥	20
17	Install shortcuts		🟥	🟥			🟥							🟥									🟥				5
18	Receive data from Internet				🟥	🟥	🟥	🟥	🟥	🟥	🟥		🟥	🟥	🟥			🟥	🟥	🟥	🟥	🟥					15
19	Read Google service configuration				🟥			🟥	🟥			🟥	🟥	🟥	🟥		🟥	🟥	🟥	🟥	🟥		🟥				13
20	Pair with Bluetooth devices					🟥																				🟥	2
21	Change your audio settings					🟥			🟥																🟥	🟥	4
22	Run at startup					🟥		🟥	🟥				🟥	🟥			🟥	🟥	🟥	🟥	🟥		🟥	🟥		🟥	13
23	Uninstall shortcuts						🟥																🟥				2
24	Device & app history							🟥					🟥					🟥	🟥	🟥	🟥					🟥	7
25	Power device on or off							🟥																		🟥	2
26	Read sync statistics							🟥																		🟥	2
27	Create accounts and set passwords							🟥																		🟥	2
28	Read battery statistics							🟥					🟥					🟥	🟥	🟥	🟥				🟥	🟥	8
29	Pair with Bluetooth devices							🟥					🟥													🟥	3
30	Access Bluetooth settings							🟥					🟥													🟥	3
31	Send sticky broadcast							🟥					🟥													🟥	3
32	Disable your screen lock							🟥						🟥			🟥	🟥	🟥	🟥	🟥					🟥	8
33	Read sync settings							🟥																		🟥	2
34	Toggle sync on and off							🟥																🟥		🟥	3
35	Use accounts on the device						🟥		🟥																	🟥	3
36	Connect and disconnect from Wi-Fi				🟥								🟥	🟥	🟥		🟥									🟥	6
37	In-app purchases												🟥					🟥	🟥	🟥	🟥						5
38	Change network connectivity													🟥				🟥	🟥	🟥	🟥					🟥	6
39	Calendar												🟥													🟥	2
40	Control Near Field Communication												🟥													🟥	2
41	Draw over other apps													🟥										🟥		🟥	3
42	Modify secure system settings																🟥									🟥	2
43	Cellular data settings																									🟥	1
44	Access SurfaceFlinger																									🟥	1
45	Choose widgets																									🟥	1
46	Interact with a device admin																									🟥	1
47	Bind to an input method																									🟥	1
48	Bind to a widget service																									🟥	1
49	Bind to a wallpaper																									🟥	1
50	Permanently disable device																									🟥	1
51	Send package removed broadcast																									🟥	1
52	Send SMS-received broadcast																									🟥	1
53	Send WAP-PUSH-received broadcast																									🟥	1
54	Enable or disable app components																									🟥	1
55	Delete other apps' data																									🟥	1
56	Control location update notifications																									🟥	1
57	Delete other apps' caches																									🟥	1
58	Delete apps																									🟥	1
59	Read/write to resources owned by diag																									🟥	1
60	Run in factory test mode																									🟥	1
61	Force app to close																									🟥	1
62	Test hardware																									🟥	1
63	Press keys and control buttons																									🟥	1
64	Permission to install a location provider																									🟥	1
65	Directly install apps																									🟥	1
66	Display unauthorized windows																									🟥	1
67	Manage app tokens																									🟥	1
68	Reset system to factory defaults																									🟥	1
69	Read frame buffer																									🟥	1
70	Record what you type and actions you take																									🟥	1
71	Force device reboot																									🟥	1
72	Close other apps																									🟥	1
73	Monitor and control all app launching																									🟥	1
74	Change screen orientation																									🟥	1
75	Change pointer speed																									🟥	1
76	Set time																									🟥	1
77	Adjust your wallpaper size																									🟥	1
78	Disable or modify status bar																									🟥	1
79	Read subscribed feeds																									🟥	1
80	Write subscribed feeds																									🟥	1
81	Modify battery statistics																									🟥	1
82	Modify the Google services map																									🟥	1
83	Mock location sources for testing																									🟥	1
84	Act as the AccountManagerService																									🟥	1
85	Change system display settings																									🟥	1
86	Allow Wi-Fi Multicast reception																									🟥	1
87	Delete all app cache data																									🟥	1
88	Expand/collapse status bar																									🟥	1
89	Control flashlight																									🟥	1
90	Measure app storage space																									🟥	1
91	Full network access																									🟥	1
92	Close other apps																									🟥	1
93	Make app always run																									🟥	1
94	Reorder running apps																									🟥	1
95	Force background apps to close																									🟥	1
96	Modify global animation speed																									🟥	1
97	Enable app debugging																									🟥	1
98	Set preferred apps																									🟥	1
99	Limit number of running processes																									🟥	1
100	Set time zone																									🟥	1
101	Set wallpaper																									🟥	1
102	Send Linux signals to apps																									🟥	1
103	Use accounts on the device																									🟥	1
104	Make/receive SIP calls																									🟥	1
105	Write web bookmarks and history																									🟥	1
		13	15	14	17	18	18	28	13	15	15	16	27	23	17	3	20	22	22	22	22	10	16	15	11	99	

🟥 Permission used by an app

99

Maximum number of permissions an app uses

The curious case of overarching permissions

Permissions used by app ‘G’

PERMISSIONS USED

✓	Identity	
✓	Contacts	
✓	Location	
✓	SMS	
✓	Phone	
✓	Photos/Media/Files	▨
✓	Storage	
✓	Microphone	
✓	Wi-Fi connection information	
✓	Device ID & call information	
✓	View network connections	
✓	Full network access	
✓	Control vibration	
✓	Prevent device from sleeping	▨
✓	Receive data from Internet	
✓	Read Google service configuration	
✓	Run at startup	
✓	Device & app history	
✓	Power device on or off	▨
✓	Read sync statistics	▨
✓	Create accounts and set passwords	▨
✓	Read battery statistics	
✓	Pair with Bluetooth devices	▨
✓	Access Bluetooth settings	▨
✓	Send sticky broadcast	▨
✓	Disable your screen lock	▨
✓	Read sync settings	▨
✓	Toggle sync on and off	▨

Permissions used by app ‘D’

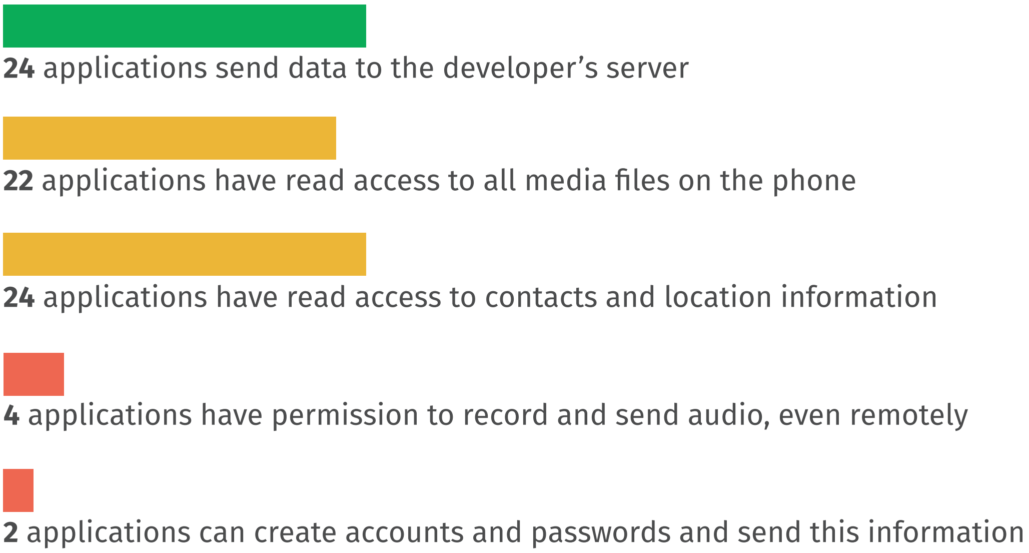
The link to the privacy policy of the app leads to a “page not found” error. The description reads that the app will enable women to make a distress call to their friends or family and to the police control room in the case of an emergency.

PERMISSIONS USED

✓	Identity	
✓	Contacts	▨
✓	Location	
✓	SMS	
✓	Phone	
✓	Photos/Media/Files	▨
✓	Storage	▨
✓	Camera	▨
✓	Microphone	▨
✓	Wi-Fi connection information	
✓	Device ID & call information	▨
✓	View network connections	
✓	Full network access	
✓	Modify system settings	
✓	Control vibration	
✓	Prevent device from sleeping	▨
✓	Install shortcuts	
✓	Receive data from Internet	
✓	Read Google service configuration	
✓	Connect and disconnect from Wi-Fi	

▨ **Unnecessary Permissions**

What data does a typical safety app control?



24 applications send data to the developer’s server

22 applications have read access to all media files on the phone

24 applications have read access to contacts and location information

4 applications have permission to record and send audio, even remotely

2 applications can create accounts and passwords and send this information

What will we do with the results?

- Technical and policy recommendations on
  What makes a good safety app
  When is an app not an optimal solution
  Good practices for building an emergency response system
  Data protection and sharing standards for safety apps
- Knowledge sharing and capacity-building with various stakeholders in the government (such as law enforcement) and with civil rights groups