

# Disaster Warning and Management System

## HCI Project Report

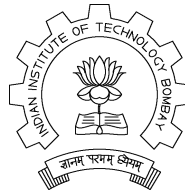
by

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# 1 Abstract

Disasters can occur anytime, anywhere and these take their toll on human lives and property leading to many losses. Most lives are lost mainly due to poor communication and delay in help arriving at scene of the disaster. Relief and salvage operations need to be initiated in response to the disaster as soon as possible in order to save more lives. Lives can be saved if there is a system in place that can inform people, the officials and prepare them to bear the disaster much ahead in hand (in terms of evacuation, salvage and relief operations). We have designed an efficient system which will warn about upcoming disasters and manage their occurrence, saving countless lives.

## 2 Introduction to our System

Our system basically will operate in following stages:

### 2.1 Detection

By making use of various means such as smoke detectors, tsunami warning System, seismic detectors, weather forecast, satellite imagery we can detect the disasters. Local (small scale) as well as global (affecting an entire city / large area) disasters are handled appropriately. Proposed system is a 3-tier architecture. At the top level is a Central Disaster Management Room (CDMR), having sophisticated sensors, reliable communication infrastructure and trained personnel. This is one per city. The second tier is a network of Disaster management points (DMPs),strategically spread across the city. These are typically police stations, hospitals, fire stations, etc. which are manned 24 hours by specialised people. Next is Disaster information boxes (DIBs), which are essentially modifications to the regular PCO box. In addition they include a loud speaker and hotline connections to nearest DMPs.

### 2.2 Informing Authorities

At the incidence of a disaster, a passerby can quickly inform the DMP through a nearby DIB, giving location and other details of the disaster. Depending on the intensity, the DMP may take an action themselves or notify other neighbouring DMPs or CDMR. Alternatively, the CDMR may detect certain problems and quickly inform DMPs.

### 2.3 Informing People

At the same time, DIBs in the affected area start announcing the nature of the problem and precautions to be taken. Other ways of informing people such as mobile sms, radio, etc. can be used. As precise guidance is made available instantly, panic and rumours among people can be controlled.

### 2.4 Preparing for evacuation

In case of an event where people have to relocated to safer places, the system can help in the following ways:

- Get the city/aread maps
- Informing bus service/train/auto/taxi etc
- Block access to danger areas

- Inform people about transport facility, safe routes, etc. through DIBs
- Backup cities-eg: Pune to help Mumbai and vice versa

The idea is that the authorities know exactly about the problem through feedback of people and vice versa. This cooperation can help in fast dissemination of knowledge about the disaster and precautionary measures.

## **2.5 Reliable communication System**

This involves

- Having extra mobile towers in vans
- Using ham radio
- Special protected telephone lines
- Special network to connect disaster management points

## **2.6 Medical Aid**

This is usually available, except now that people can locate such places faster in the event.

- All clinics/hospitals/govt offices can provide assistance
- Supplies can be stocked in these places
- Can be supplied through airplanes using parachutes

## **2.7 Central Disaster Management Room(CDMR)**

It is equipped with reliable communication devices and sophisticated sensors. It consist of people capable directing thousands of afflicted people. It will conduct regular training sessions for security personnel, safety officers, etc in the city. It will also provide facility to store important documents/data/equipment etc. which can be a paid service.

## 3 User Study

We conducted the user study of the following persons

1. Sanjeeth Khaitan, Student
2. Mahesh Choudhary, Auto Driver
3. Nikhil Chopra, Employee
4. B.B. Thapa, Security Officer
5. Small Shopping mall
6. Residential Society

## 4 Persona

From the user study we came up with the following persona

Name: Dinesh Kumar

Age: 34

Sex: M

Occupation: Businessman, runs a small hotel at Bandra

Family: Wife, two kids, mother

Residence: 5, Seva Sadan, Tilak Nagar, Kherwadi, Bandra (E)

Financial status: Middle class

Education: Graduate

Responsibility: kid's schooling, mother's medicines, personal savings

Wake up at 6.30am, drop kids to school at 7.30am, make the day's plans, bank transactions at 9.00am, open the hotel at 9.30am, close at 10.00pm, spend some time with kids, bed at 11.00pm.

Work timing: 9.30am - 10.00pm

Loves talking to people, watching cricket (has a TV set in the hotel), wants to experiment cooking new items, in free time debates over national politics and sports affairs

Attitude towards technology: Conservative, but ready to use if proved to be effective in his day-to-day affairs

## 5 Intermediate Product Description

- The Product called Disaster information Box (DIB) was designed.
- Included buttons for informing about disaster, camera, speaker
- Cost of Rs.2000 approximately

## 6 Refinements based on User and Heuristic Evaluation

- Included Symbols representing type of local disaster instead of names
- Made camera as a optional part of the gadget as it might lead to misuse and affect privacy of people
- Saw to it that the DIB can be easily combined with a normal PCO box
- Reduced the cost of DIB to less than Rs.500
- Made hotline connections available from DIBs to DMPs

## 7 Features of Final Product

This will be a small gadget - "Disaster Information Box (DIB)" - located at strategic points throughout the city, such as railway stations, bus stops, police stations, hospitals, market places, malls, educational institutes, societies, etc.It will have following features:

- Buttons to indicate type of disaster (eg. fire, explosion, accident,)
- A high-volume speaker
- A camera(optional)
- A microphone
- A communication line, which can work in all worst cases.

These DIBs are connected to the Disaster Management Points (DMPs), which is also connected through the same network to the Central Disaster Management Room (CDMR).



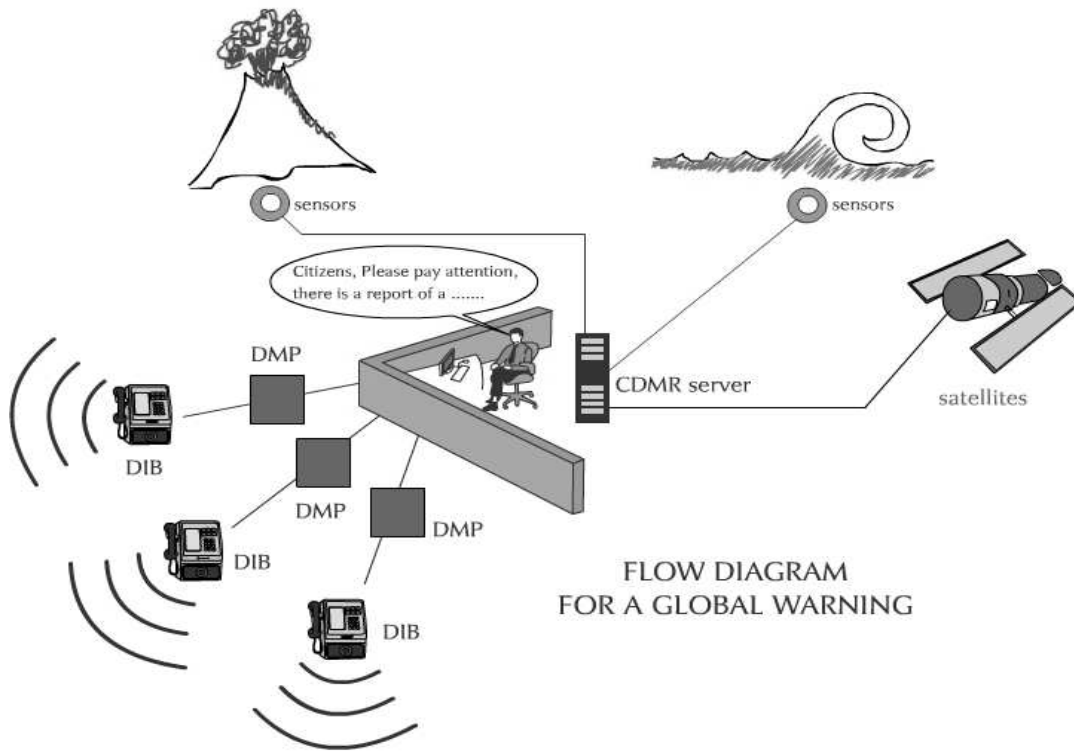


## **7.1 Working for local disasters**

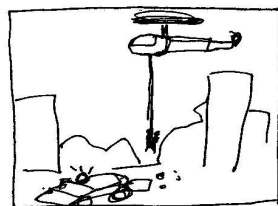
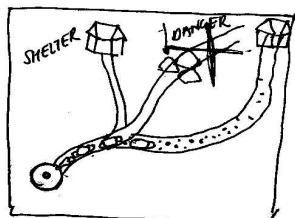
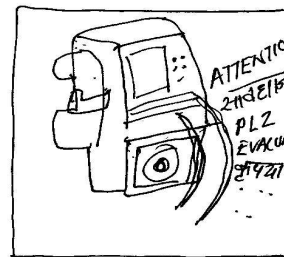
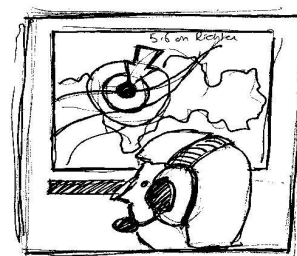
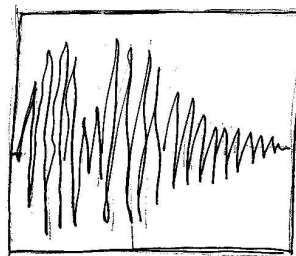
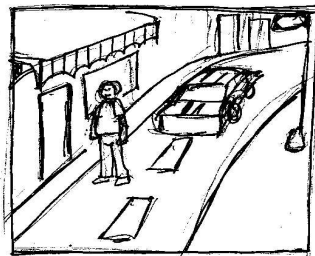
User/passersby/persona notices a problem like fire, explosion or any sort of local disaster, goes to the nearest DIB, pushes appropriate buttons and informs the DMP about the location and current scale of the problem, eg. fire. Person at the DMP hears the problem and takes appropriate action such as giving directions, making announcements, informing fire brigade, police, etc. Also, DMP announces details of the disaster and necessary measures to be taken throughout its area through the DIBs. Any person in the area can communicate to the DMP through the DIBs for further information.

## **7.2 Working for Global Disaster**

Disasters such as tsunami, earthquake, volcano, thunderstorms, floods, etc. will be detected through specialised sensors and will be immediately known to the CDMR. Scale of the disaster will be assessed and CDMR can start communicating to DMPs and people (via the DIB speaker), informing the masses. This way, authorised information can be delivered to a mass of people without confusion. The CDMR will also work through sending sms on mobiles, emails, uploading data to popular websites, media (newspapers and TV channels) and coordinating with public transport systems.



FLOW DIAGRAM  
FOR A GLOBAL WARNING



## 8 Conclusion

Owing to quick response and help, countless lives can be saved. Such a pro-active system can help in mitigating mass hysteria and help relief agencies in their efforts. As far as cost is concerned, the DIB, combined with a PCO, costs less than Rs. 500/-. Other infrastructure is more or less in place. Additional sophisticated infrastructure is a one-time cost and is part of public property.