House Flooding Early Detection

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Course: NES440 - Wirelsee Networks

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Contents

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Introduction

There are many homes that suffer from the occurrence of flooding in the home, especially in the winter.

The idea of this project is to help people through warning them before the occurrence of the flood disaster

Through this project, the homeowner can rescue himself and his family from drowning due to flooding; also, He can save some important files before it's too late! For example like passport and textbooks.

We believe that through this project we can cooperate with the civil defense, to inform them that a specific house is currently suffering from the flood, in order to help it as soon as possible.

This part of the cooperation will improve of the civil defense service, as we know that in winter the flooding is increased and it is causing busy phone lines often, so it is difficult to inform the civil defense about the flooding.

Problem statement

Upon the occurrence of the flood, the water flowing is very fast and cannot control it.

When the flood is happen it cause big damage to the house; walls falling down, furniture getting destroyed and Electric Machineries get crashed.
Not only that, some people might lose their lives.

And in some cases, the residents might be outside the home or sleeping at home and not aware of the flood in their house.

Therefore, the main objective of this project is to inform the person about the occurrence of flooding as soon as possible in order to take appropriate action quickly.

Background

In winter 2015, at Jordan especially Amman there was an accident happened while the rainfall the percent of water increased because of rains.

At civil defense statistics, there are four persons died and 350 houses flooded of water. So to decrease this problem we thought how to make a project rectify what will happen before.

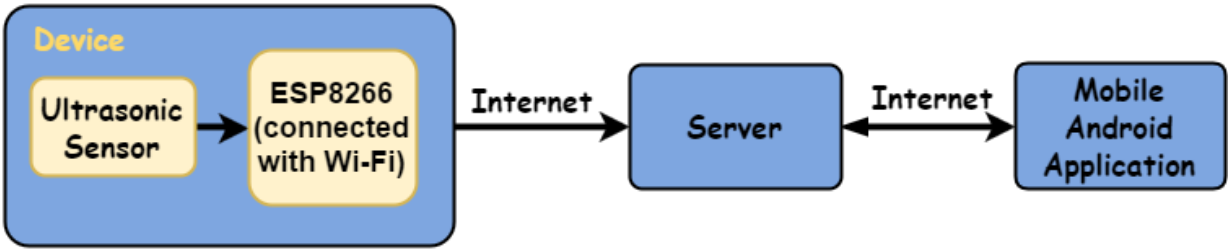
How to perform the project?
The idea of this project depends on a device will be available at home and this device will be connected with owner's mobile phone through Android application help him in check the state of his house to take the correct response.

The desired outcomes are:

- Reduce rate of the damage in the houses (ex. furniture and Electric Machinery).
- Increase the number of people that will be saved.
- Predict the flood before it occurs completely (especially at night).

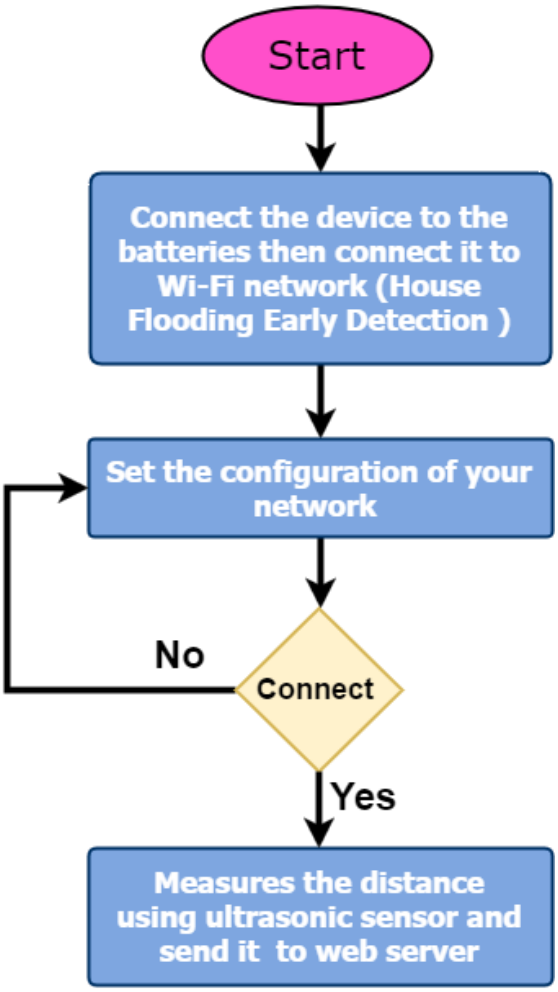
Solution design

Block diagram

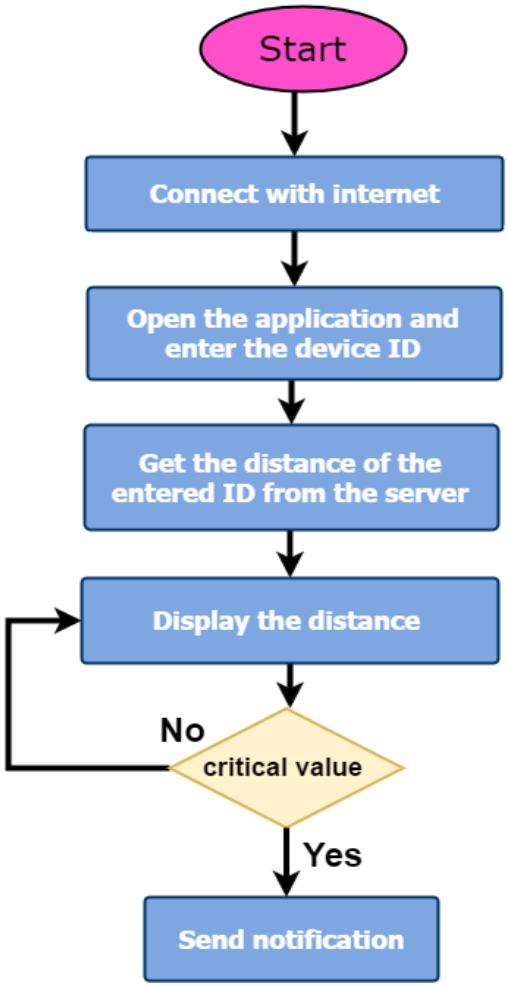


Flowchart

Flowchart for the device (Hardware).



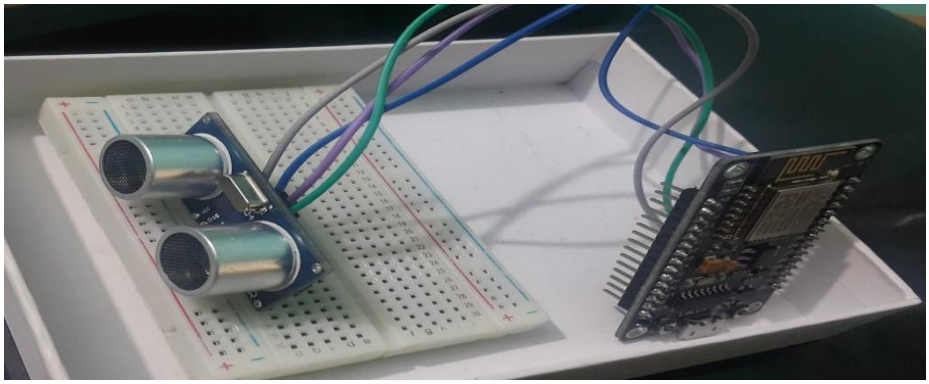
Flowchart for the Android application (Software).



Hardware

We have built a device that calculates the height of the water from the house surface, and then sends these measurements to the web server in order to save it and use it by the android application.

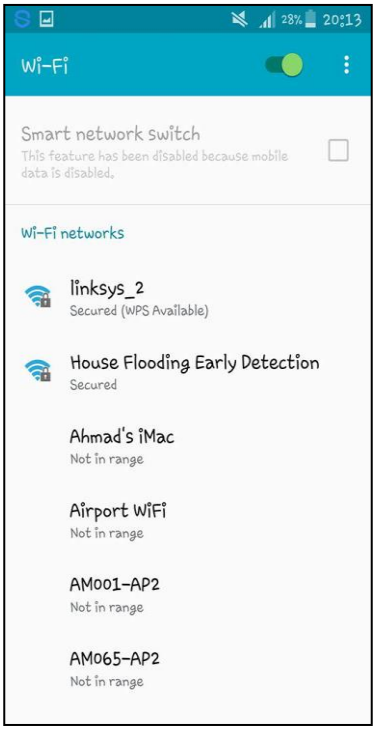
The device consists of an ESP8266 in order to connect on the Internet and an ultrasonic sensor which measures the distance from the water's surface using echo waves.

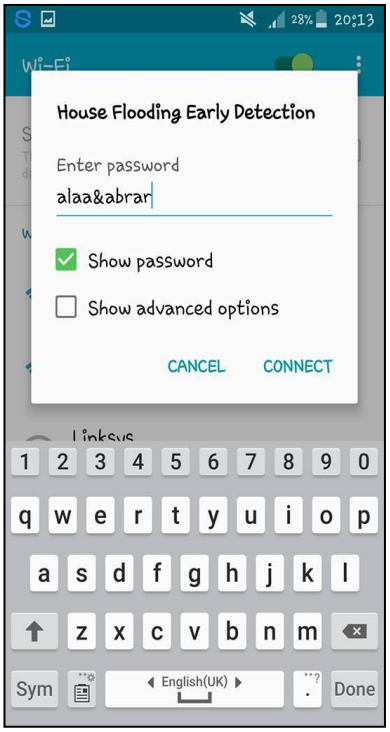


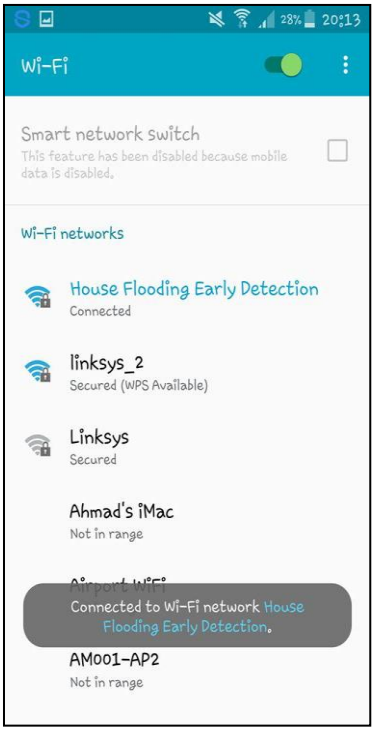
How to use it?

In the beginning we connect the device to the batteries.
The device will work as an access point, so you have to connect with it.

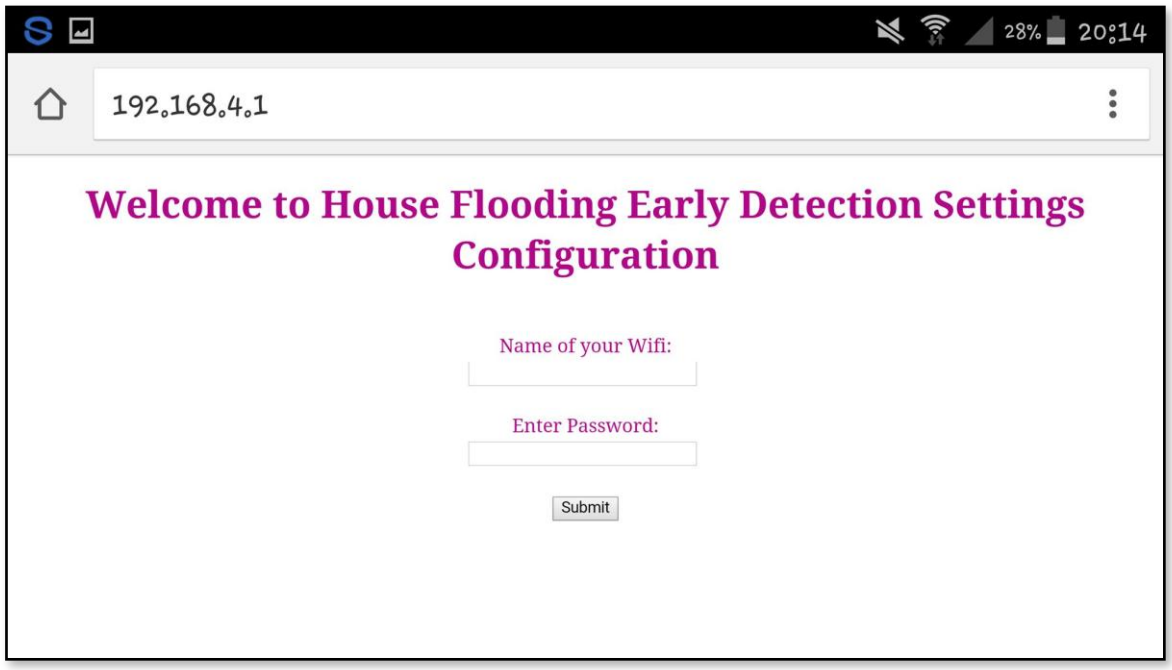
- Wi-Fi network name : House Flooding Early Detection
- Password : alaa&abrar







You have to request the IP address (192.168.4.1) on any browser in order to set the configuration of your network that the device will use it to connect to the internet.



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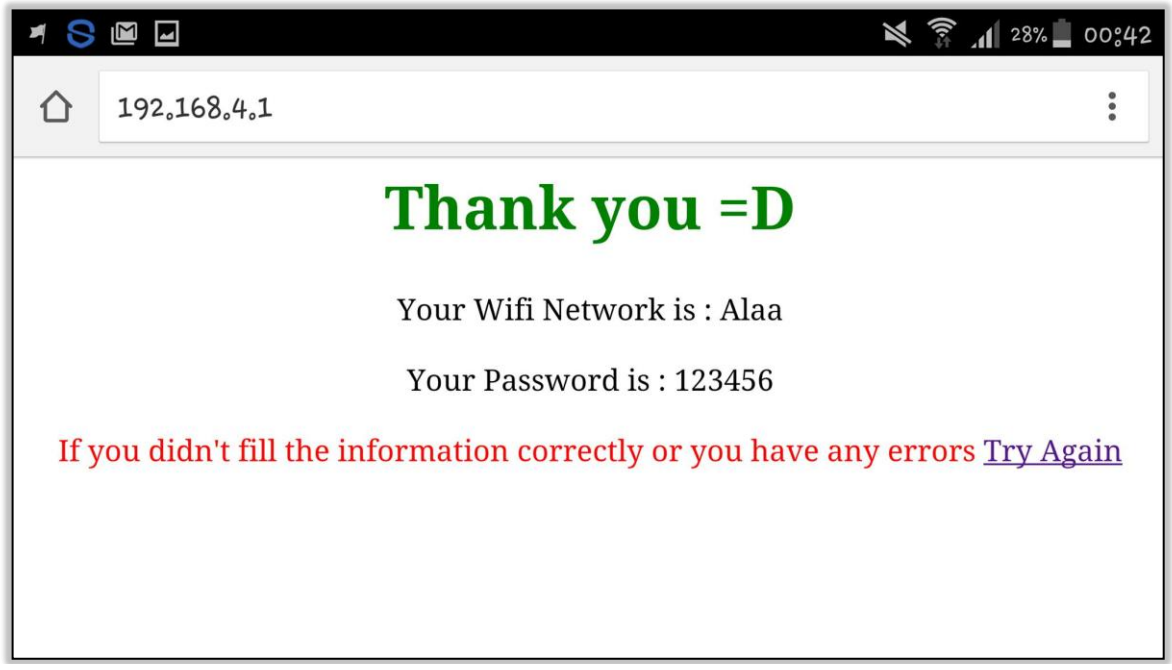
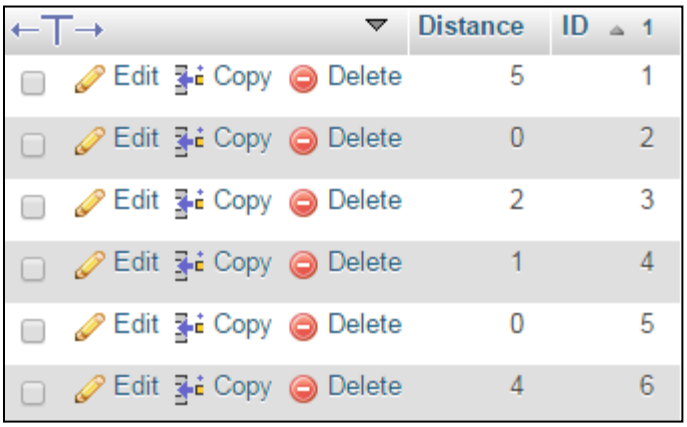
If you enter the information successfully, the device will be connected on the Internet, so that he can send the measurements to the web server .



Software

There are two parts in software design:

1. Web Server
   - We have created the web server in order to use it as a link between the device and the Android application.
   - The link of web server http://alaaandabrar.co.nf/a.php.
   - This web server has the database which includes ID and the current distaste for the water in a specified house.
   - We have used phpmyadmin to create the database.



	Distance	ID
Edit Copy Delete	5	1
Edit Copy Delete	0	2
Edit Copy Delete	2	3
Edit Copy Delete	1	4
Edit Copy Delete	0	5
Edit Copy Delete	4	6

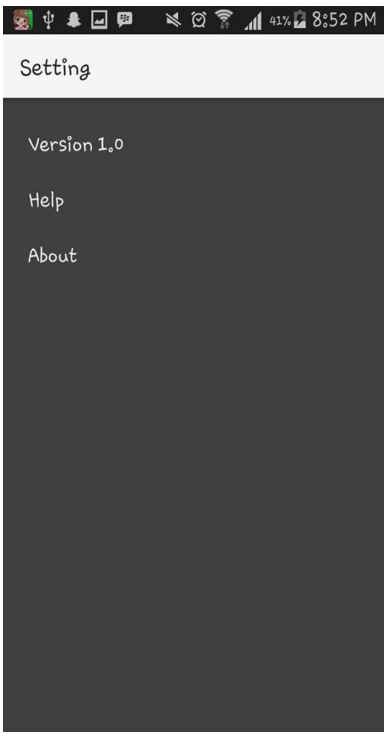
2. Android Application
   - We have built this application, it required insert the ID which found on device to get the distance between the hardware device and water surface to give the house owner some permission to check his house state when he is out. If the distance greater than 3 cm the application will send notification as warning.

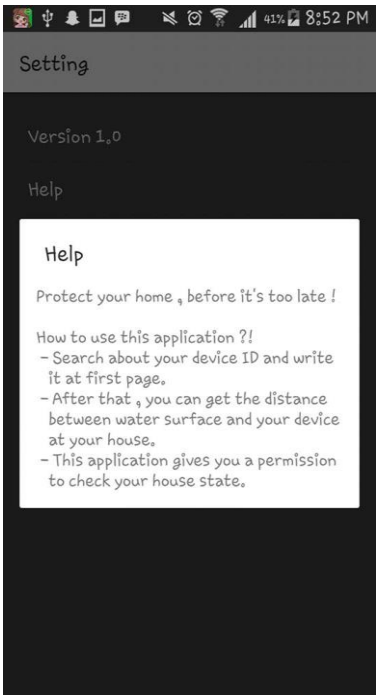
How it works?

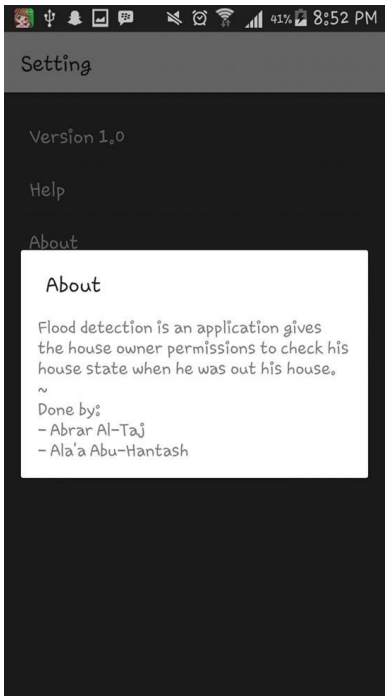
- When you open the Application for first time, you must enter the ID which post at device. This ID will be saved permanently.
- The ID which you entered will send to special server and saved in it to associate between this ID and it is distance which the device sent to same server.
- Later time when you open the application, it will send the request to server. This request include the ID which entered at first time.
- After that it will get it is own distance and display it on Application.
- At same time it will checked this value to decide what is next.
  - If the distance greater than 3 cm the application will give alert to user to make him taking appropriate action. Also display the value on screen.
  - If the distance less than 3 cm, there is nothing will happen. Just display the value.


12% 1:17 AM
FloodDetection
Welcome to Flood Detection !
Check your device and enter the code which on it ..
Your Device ID :
Enter device ID
OK


41% 8:52 PM
FloodDetection
Distance is :
cm
Protect your home , before it's too late !
REFRESH
SETTING
EXIT


41% 8:52 PM
Setting
Version 1.0
Help
About


41% 8:52 PM
Setting
Version 1.0
Help
Help
Protect your home , before it's too late !
How to use this application ?!
- Search about your device ID and write it at first page.
- After that , you can get the distance between water surface and your device at your house.
- This application gives you a permission to check your house state.


41% 8:52 PM
Setting
Version 1.0
Help
About
About
Flood detection is an application gives the house owner permissions to check his house state when he was out his house.
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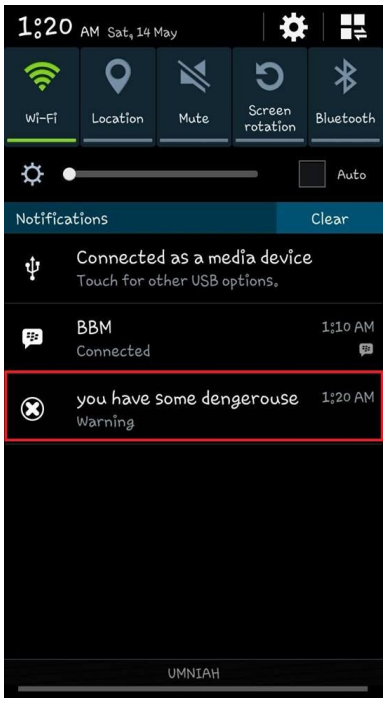
Done by:
- Abrar Al-Taj
- Ala'a Abu-Hantash


1:20 AM Sat, 14 May
Wi-Fi
Location
Mute
Screen rotation
Bluetooth
Auto
Notifications
Clear
Connected as a media device
Touch for other USB options.
BBM
Connected
1:10 AM
you have some dengerouse
Warning
1:20 AM
UMNIAH

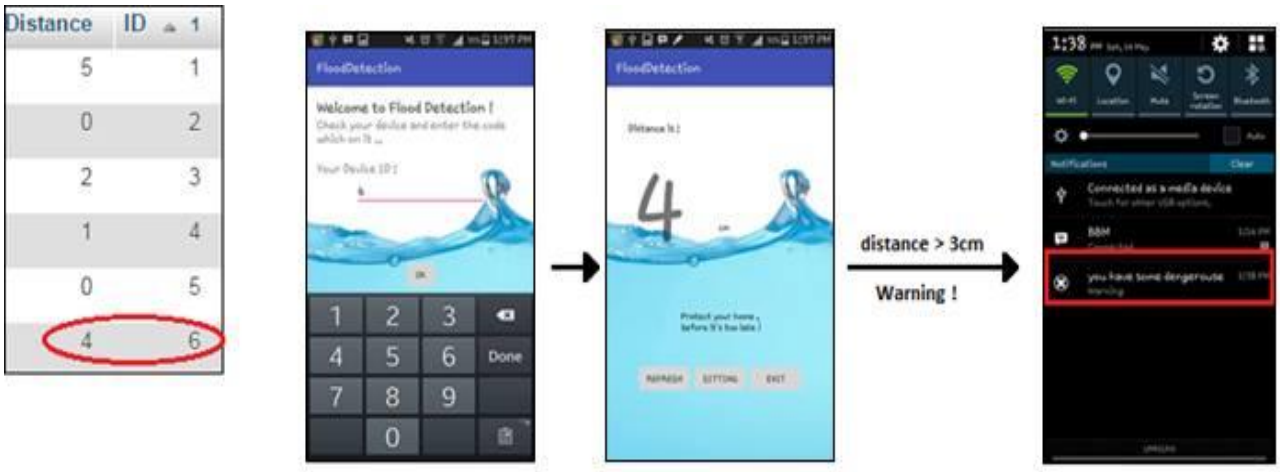
Results

- Case 1: If distance less than 3.

Ex: Your device ID is 3, when you enter it to your application. The application will check values in database at server and get the distance to display it for user.
At same time, it will checked the distance value and found it 2 (< 3) so it doesn't send anything to user.

- Case 2: If distance greater than 3.

Ex: Your device ID is 6, when you enter it to your application. The application will check values in database at server and get the distance to display it for user.
At same time, it will checked the distance value and found it 4 (> 3) so it send notification to alert the user.



What's the Next?

Looking forward to:

- Make Application send warnings According to risk level.
- Expand the project to include civil defense through making interface to connect the application users and their houses with civil defense.

References

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- http://developer.android.com/reference/android/app/NotificationManager.html
- http://www.tutorialspoint.com/android/android_php_mysql.html
- http://www.tautvidas.com/blog/2012/08/distance-sensing-with-ultrasonic-sensor-and-arduino/