

**PRODUCT REQUIREMENTS
DOCUMENT**

TEAM 3

Product Requirements

Hardware requirements of the product:

- ◆ The hardware consists of two modules: one being the Bluetooth module where the data received and transmitted and second being the FPGA module where we encrypt the location data.
- ◆ Bluetooth module size is: 12.5mm x 18.0mm x 3.4mm and FPGA chip size: 22 x 22. Thus, together with all the modules and the circuitry in it, our hardware size must less than or equal to 40mm x 60mm x 15mm.
- ◆ The weight of the product must be less than 95g.
- ◆ The design must be such that it can easily be carried in the pocket.
- ◆ Bluetooth range must be within 20-25 meters.
- ◆ Supply voltage for charging must be between 3.0-3.3V.
- ◆ Battery life must let at least 4.5 hours of continuous use and standby time must be over 80 hours.
- ◆ Bluetooth can work in the existence of external wireless devices such as Wi-Fi sources without interfering with these.

Software requirements of the product:

- ◆ Software shall be user friendly and its size must be less than 10mb.
- ◆ Users shall be able to communicate through messaging feature whilst seeing other users' locations on the map.
- ◆ Users shall be able to communicate with group members in conference mode whilst seeing other users' locations on the map.
- ◆ The Program must work with both Wi-Fi and cellular data on smartphones with GPS.
- ◆ The Program shall be able to encrypt information in case the encryption device battery run out.
- ◆ The Program shall enable its users to see their estimated locations through the cell towers that they are close to, in case GPS is unavailable.

- ◆ Sending the location data to the encryption device and getting the encrypted data from the hardware must be carried out through Bluetooth hence smartphones must have Bluetooth as well.
- ◆ Users shall be able to create groups.
- ◆ The program shall be able to indicate whether a user is online or not.
- ◆ Users shall be able to see last few locations of his friends even if they are offline.
- ◆ Each user shall have different public and private keys.
- ◆ Before information is sent, it shall be encrypted with public key of receiver.
- ◆ Only the receiver with the correct private key shall be able to open delivered information.

QFD Analysis

Customer Requirements	Functional Requirements							
	1	2	3	4	5	6	7	8
Column #	1	2	3	4	5	6	7	8
Max Rating	9	3	9	3	9	9	9	9
Weight	39.13	39.13	117.39	52.17	78.26	273.91	234.78	391.3
Relative Weight	3.19	3.19	9.57	4.26	6.38	22.34	19.45	31.91
Limit or Target Value		<95 gr	40mm(50mm)Strm	20-25 meter		20 \$		
Customer Requirements	Colour	Weight	Size	Connection Range	Power Consumption	Cost	Hardware Design	Software Design
1	9							9
2	9	3	9	1			3	
3	9					9		
4	9					9		
5	9						9	9
6	9							9
7	9			3			9	9
8	9				9			
9	9							9
10	9	9						

In the QFD being above, rows demonstrate customer requirements whereas columns show the functional requirements of the project.

Customer requirements which take place in the rows, were obtained by the desires of the customers. Easy use of interface means to what extent the customers can use the software easily. This is a significant factor which attracts people to prefer our product. Transportability is about whether the hardware of the project can be carried confidentially and easily. Because of the fact that a more portege device is much more desired, transportability is also so important for to be sold. It is closely related to size, weight and connection range of the hardware device. Low price which is one of the most important desires for the vast majority of the customers shows the price of the product and it is closely related to the costs in the manufacturing period. Due to the fact that price is one of the most influential point to buy a product, the price and costs of the product should be decreased as much as it can be done.

High-level encryption performance means to what extent the products achieve to hide information sent by making encryption. Making better encryption increases the cost of the product so it is related to cost. Speed level shows whether the product works rapidly or not. It is completely related to software and hardware designs. Position accuracy shows the rate which the product shows of the true positions of the users. It is solely about software.

System security means how rate chance the product gives the users to hide all their position information. It has a moderate relation with connection range whereas it has very strong relations with hardware and software. Battery life shows how long a device can work without charging. It is completely related to power consumption of the device. Sustainability means software should go on working without hardware stops to operate in a way. For example, if the battery runs out of steam, the software should continue to work to give the possibility to the user to use the product. It is about software design. Appearance of the product is also important for the customers. It is related to color of the device.

The second House of Quality graph shows the correlation relations between the customer requirements. It has an important role on decision analysis of the manufacturers because it gives remarkable information about how much the manufacturers may sacrifice when they win from another requirement. For example, transportability has a negative correlation with battery life. It means that transportability will be more difficult if we have long battery life by using bigger battery. Low price has a strong negative correlation with high-level encryption performance, speed level and battery life whereas it has weaker negative correlation with system security. High-level encryption performance has strong positive correlation with system security. It shows that if we have better encryption performance security of the system will increase substantially. Speed level has also a negative correlation with battery life. If we reach higher speed level, the battery life will be shorter a little bit. Finally, if we have longer battery life, sustainability of the product will increase.