

## LIST OF FIGURES

2.1	Mobile Tracking Mechanism . . . . .	6
2.2	GPS Neo-6M . . . . .	7
2.3	Raspberry Pi 3 Hardware. . . . .	8
2.4	Huawei E3372 . . . . .	8
2.5	Inside Cloud Server. . . . .	9
2.6	Implementation on Firebase . . . . .	10
2.7	Wireshark 3.2.1. . . . .	10
3.1	Design System . . . . .	11
3.2	Tracking Flowchart . . . . .	12
3.3	Configuration Google Maps API on Firebase Flowchart . . . . .	13
3.4	Implementation Block System. . . . .	16
3.5	Neo-6M and Raspi Configuration . . . . .	17
3.6	Modem Configuration Command. . . . .	18
3.7	Firebase Rules Command. . . . .	19
3.8	Merging Configuration. . . . .	20
3.9	Database Raw Data . . . . .	21
3.10	Captured Data Using Wireshark. . . . .	21
3.11	Wireshark Statistic. . . . .	22
3.12	Paket Length. . . . .	23
3.13	Packet Loss On Wireshark. . . . .	23
4.1	Shifting Distance Graphic . . . . .	25
4.2	Shifting Distance Graphic . . . . .	26
4.3	Anomaly Data . . . . .	31
4.4	Anomaly Data Information . . . . .	31
4.5	Wireshark Information About Application Data . . . . .	42
4.6	Throughput On 1s Interval Data Transmission . . . . .	46
4.7	Throughput On 5s Interval Data Transmission . . . . .	47
4.8	Throughput On 1s Interval Data Transmission When Object Moved	47
4.9	Throughput On 5s Interval Data Transmission When Object Moved	47
4.10	Packet Loss On 1s Interval Data Transmission . . . . .	48
4.11	Packet Loss On 5s Interval Data Transmission . . . . .	48

4.12	Packet Loss On 1s Interval Data Transmission When Object Moved	48
4.13	Packet Loss On 5s Interval Data Transmission When Object Moved	49
4.14	Packet Loss On 1s Interval Data Transmission When Object Moved Below Tunnel . . . . .	49
4.15	Packet Loss On 5s Interval Data Transmission When Object Moved Below Tunnel . . . . .	50
4.16	Database Display . . . . .	50
4.17	Unix Time Converter Website . . . . .	51
4.18	Landing Page . . . . .	52
4.19	Registration Page . . . . .	52
4.20	Login Page . . . . .	52
4.21	List Data . . . . .	53
4.22	Map View According List Data . . . . .	53
1	Back-end and Firebase API Key Configuration . . . . .	59
2	Left Side Navigation Bar Front-end . . . . .	60
3	Data Table Page Content . . . . .	60
4	Back-end Database Reference Configuration . . . . .	61
5	Showing Data Through Table Back-end Configuration . . . . .	61
6	Character Encoding Capable Of Encoding Characters On The Web Configuration . . . . .	61
7	Left Navbar Front-end Configuration . . . . .	62
8	Front-end Header Display Configuration . . . . .	62
9	Front-end Homepage Content Configuration . . . . .	63
10	Back-end Library Load Configuration . . . . .	63