Pedestrian’s Signal Mechanism through Smart Traffic System centered on the vehicle

2016. 1. 19.

SE Lab, Hongik University
Hyeon Jun Lee

Advisor : R. Youngchul Kim

Table of Contents

I. Research Motivation

II. Related Work

IV. Pedestrian’s Signal Mechanism through Smart Traffic System centered on the vehicle

III. Simulation

V. Conclusion & Future Works

1. Research Motivation

"40초만에 건너라(?)"…횡단보도에 갇힌 노인들 어떻게생각하십니까

헤럴드경제 | 2015.04.27. | 네이버뉴스

보행시간은 진입시간 7초를 포함해 **40초** 남짓이다. 몸이 불편한 노인들이 횡단보도 위 '안전 보행'을 위협받고 있는 가운데 서울시 종로구 파고다공원 횡단보도를 촉박한 시간에 맞춰 아슬아슬하게 건너고...

[헤럴드경제=박혜림 · 양영경 기자] #1. 최근 온라인에서는 '20초간의 훈훈한 기다림'이라는 제목의 영상이 네티즌들 사이에서 큰 화제를 모았다.

이 영상에는 다리가 불편한 노인이 빨간불임에도 7차선 도로를 횡단하는 장면이 담겨있다. 노인은 당초 녹색불에 횡단보도를 건너기 시작했지만, 신호가 짧아 미처 제 시간에 횡단보도를 건너지 못한 상황이었다. 그러나 녹색불이 빨간불로 바뀌었음에도 노인이 횡단보도를 완전히 건너는 20초 동안 7차선 도로 위의 모든 차들은 '거짓말처럼' 노인의 횡단을 기다려줬고, 노인은 무사히 길을 건널 수 있었다

몸이 불편한 노인들이 횡단보도 위 '안전 보행'을 위협받고 있는 가운데 서울시 종로구 파고다공원 횡단보도를 촉박한 시간에 맞춰 아슬아슬하게 건너고 있다. 김명섭 기자/ msiron@heraldcorp.com

이에 일각에서는 "노인, 장애인 등 교통 약자를 위해 신호체계 연장을 확대할 필요가 있다"고 주장하고 있다.

하지만 다른 한 쪽에선 "교통체증을 유발할 수 있다"며 반대하는 등 의견이 분분하다.

몸이 불편한 노인들이 횡단보도 위 '안전 보행'을 위협받고 있는 가운데 서울시 종로구 파고다공원 횡단보도를 촉박한 시간에 맞춰 아슬아슬하게 건너고 있다. 김명섭 기자/ msiron@heraldcorp.com

27일 서울 종로의 파고다공원 인근 사거리에서 만난 신모(74) 씨는 "젊은 애들과 달리 우리 같은 노인네들은 빨리 건너고 싶어도 다리가 말을 안 듣는다"면서 "녹색불이 너무 짧다"고 불편을 호소했다.

There is a handicapped who have difficulties with the normal traffic system

Those people are slower than normal people, there is an issue that they have a hard time crossing the crosswalk safely with the normal pedestrian signal.

Causing traffic jams

required to customize the walking signal mechanism for the handicapped persons.

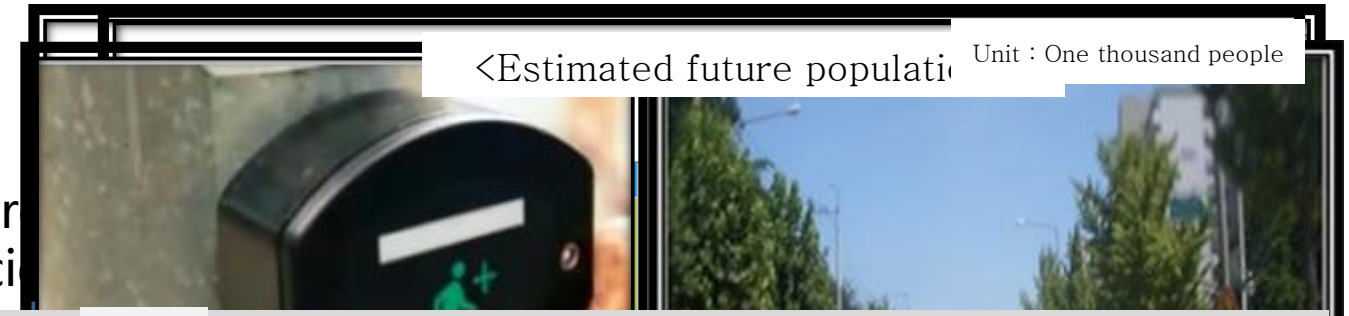
1. Research Motivation

Traffic accident of cr
1,970 times acci

Disabled persons
2013, Statistic

Elderly persons
2016, aged so
2026, super-a

Case by
Singapore, Ko



<Estimated future populati

Unit : One thousand people

Blind

<Traffic accidents in Seoul>

(Source : Road Traffic Authority)

Assortment	Elderly accidents(over 65year old)							Total accidents		
	Occurrences		Accident while walking	Death toll		Casualties		Occurrences	Death toll	Casualties
	Cases	Share		Case	Share	Case	Share			
11	3,733	9.2%	1,676	123	28.3%	3,971	6.6%	40.451	435	57.628
12	4,197	103%	1,829	144	34%	4,268	7.3%	40.829	424	58.583
13	4,492	11.4%	1,970	128	33.9%	4,597	8.1%	39.439	378	56.761

0~14 15~64 65~

2. Related Work

People can Change the walking signal through the "walk signal button "

-Its not for extension of the walking time.
-Its for the objective of a signal change

"voice signal button" for the People with blindness

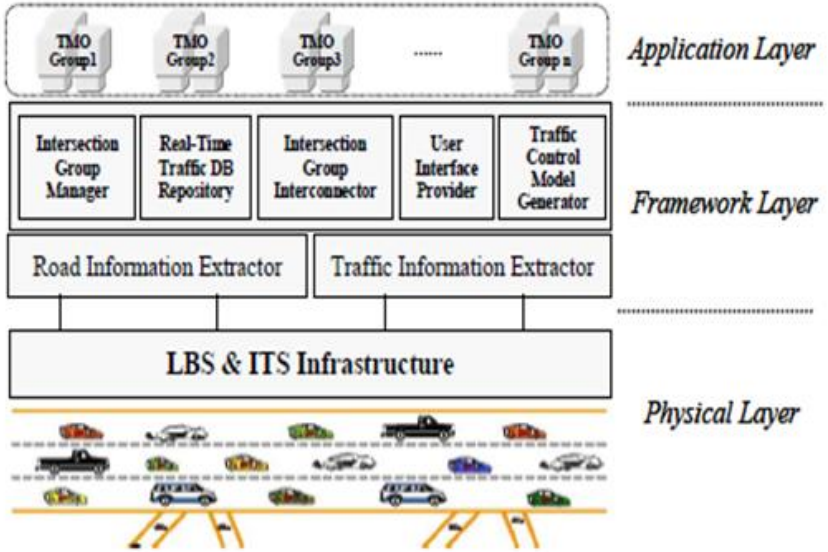
-User difficulty can find the position of the button for the operation of the voice signal

Elderly people of protected areas, children of protected areas

-There' s Relaxation of walking speed : 1.0m /s - > 0.8m/s
-This problem can be solved by expanding the time of the traffic light
-the efficiency of traffic signal lights will decrease

Woong-Gu Han, Kang-Won Shin, Kee-Choo Choi, Nam-Sun Kim, Sang-Hyun Sohn, "A Study on Intelligent Mobility Enhancement System for the Mobility Handicapped", Journal of Korean Institute of Intelligent Transport Systems, Vol 9 No.5 September 2010 (in Korean)

2. Related Work



Intersection Simulation System Model

Chang-Won Jeong "Design of Intersection Simulation System for Monitoring and Controlling Real-Time Traffic Flow", Journal of Korean Society for Internet Information, vol.6 no.6, pp. 85-97, December 2005.

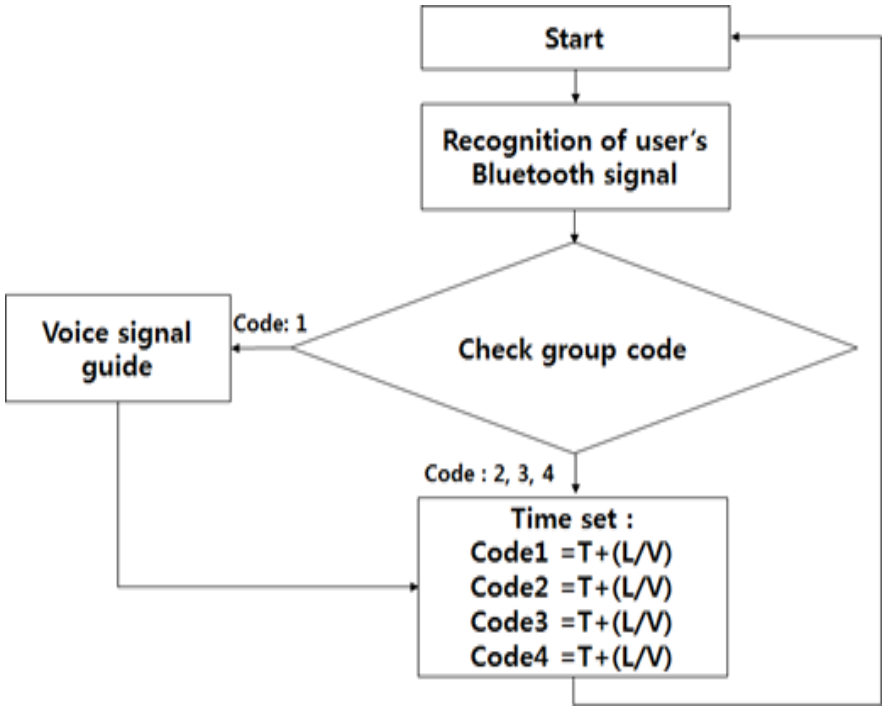
Layer 1 : The lower layer collects the physical layer of traffic information

Layer 2 : The middle layer is the framework that controls the traffic flow operation

Layer 3 : The upper layer is the application layer. This layer enables the road traffic to flow dynamically, based on intercommunication between the intersections

There is a major next-generation transportation system ITS (Intelligent Transportation Systems).ITS representative service is as follows: ATMS(Advanced Traffic Management System) is the automation of tasks such as road traffic management and optimal signal system, and the recognition of both enforcement systems and traffic accidents. APTS (Advanced Public Transportation System) manages the public transport system based on the information received from the transit operating system. CVO (Commercial Vehicle Operation) recognizes the status of each vehicle and then manages the electronic customs systems and the loaded vehicle managing system

3. Pedestrian's Signal Mechanism through Smart Traffic System centered on the vehicle



A Smart Crosswalk Traffic Light Diagram

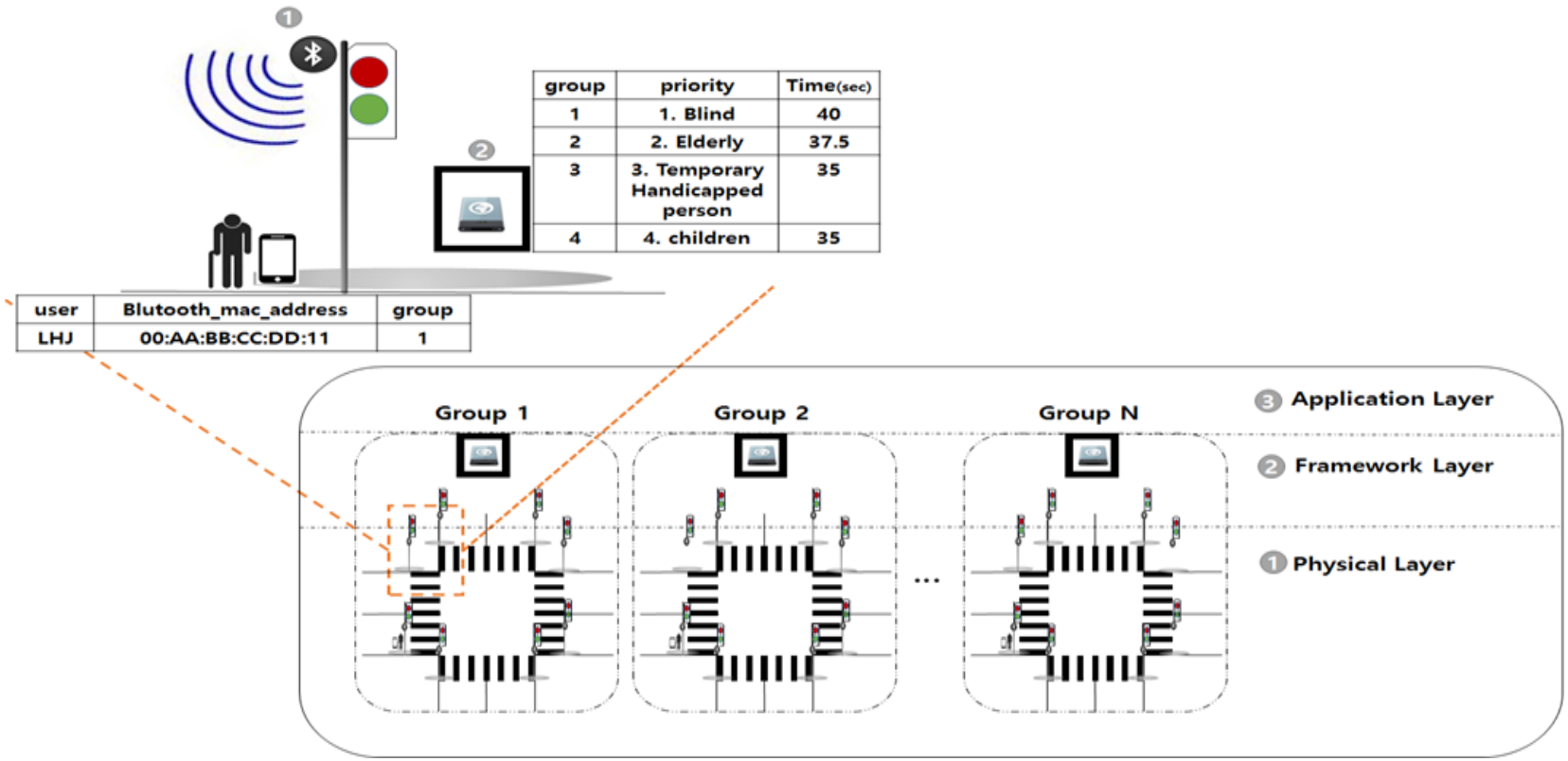
Step1 : The handicapped install a private application on their smart device

Step2 : The Bluetooth recognition devices installed in the traffic signal detects the Bluetooth signal from the pedestrian' s smart device.

Step3 : The traffic signal controller provides a signal to the smart pedestrian signals.

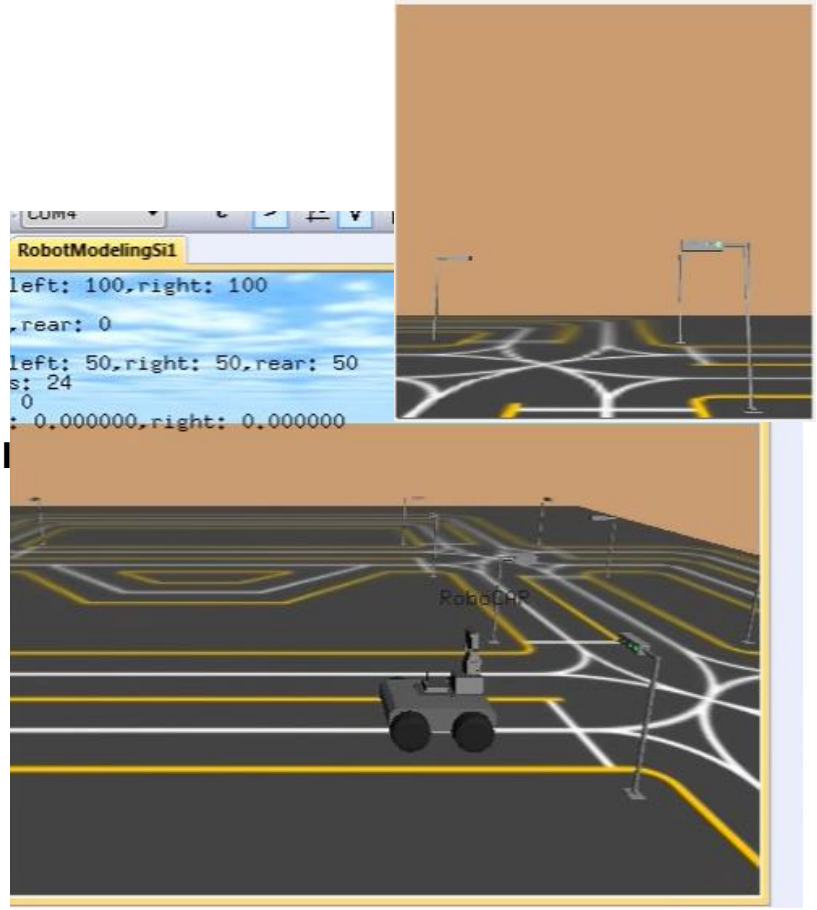
- At this time, the walking time is set to T + (L / V). T is a pedestrian crossing entry time, L is the distance of crosswalk, V is the velocity of the pedestrian. V is set based on the average walking speed of each trafficking weak. Then the walking speed is reflected in the time signal.

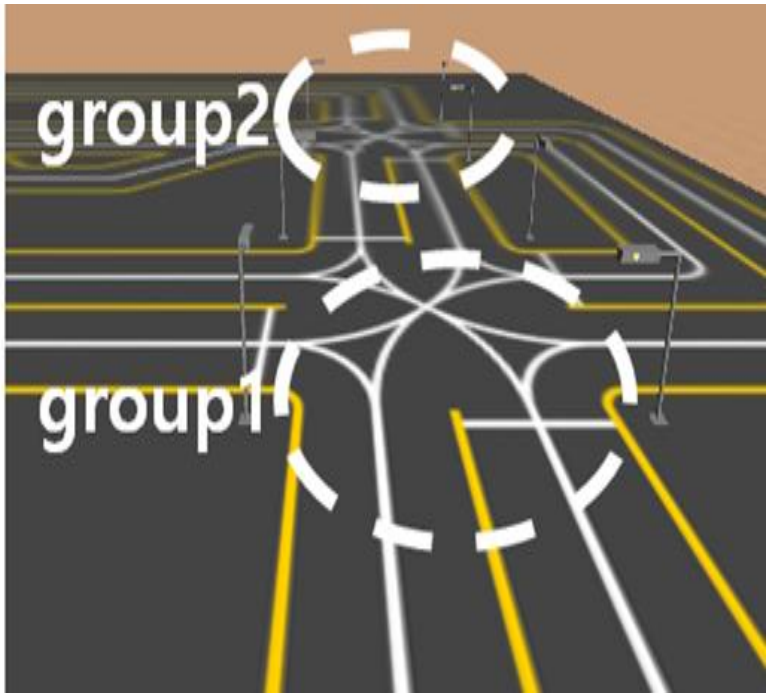
3. Pedestrian's Signal Mechanism through Smart Traffic System centered on the vehicle



- This picture is a virtual simulation to visualize the structure. The physical layer in this collects the data from the traffic weak and transmits the data to the upper layer. The framework layer provides additional walking time for the trafficking weak. Application layer manages and grouping intersections

III. Simulation



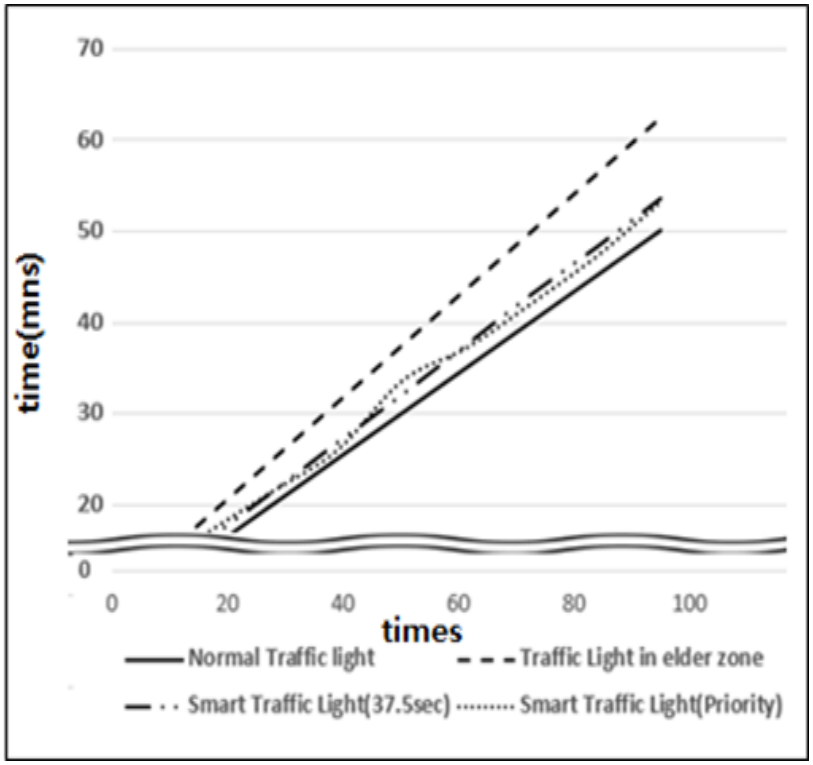


III. Simulation

Division	Population (thousand)	Contrast Ratio(%)	
		Population	handicapped
Elderly	638	12.7	39.8
Children	719	14.3	44.8
Disabled	249	4.9	15.4
Total	1606	31.9	100.0

Population data of handicapped persons

- Estimated future population. Over 65 year old. Statistics Korea. 2014
- Estimated future population. 0~14year old. Statistics Korea. 2014
- Declared handicapped person. Ministry of Health & Welfare. 2014(included over 65year old people)



Compare traffic by waiting time

V. Conclusion & Future Works

- Smart pedestrian signals **must be consider the effects of the traffic flow** due to the adjustment of the walking time of pedestrians.
- ITS can improve the vehicle traveling speed, minimize the degree of delay, and also, reduce air pollution. However, **ITS does not provide enough time for handicapped to cross the crosswalk safely**.
- We seek to improve the connection **between the intersection simulation based on the ITS for the smart pedestrian signals**
- Considering traffic flows and added walking time due to the handicapped, **the smart pedestrian is expected to be applied at the best time of the signal**.
- In this paper, only limited information due to ITS information. **In future studies**, we want to verify the actual implementation of the various possibilities for advanced smart pedestrian traffic signal system model

Thank you ⁝⁝

E-mail
Lucky.hyunjun@gmail.com