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M.Sc. in Physical Engineering

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**REPUBLIC OF TURKEY**

**GAZİANTEP UNIVERSITY**

**GRADUAL SCHOOL OF NATURAL & APPLIED SCIENCES**

# TACTILE, EMBEDDED, AUDIBLE SENSATION SYSTEM FOR BLIND PEOPLE

**M.Sc. THESIS**

**IN**

**PHYSICAL ENGINEERING**

**BY**

**KEMAL KARAOĞLAN**

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**M.Sc. Thesis**

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**Supervisor**

**Prof. Dr. Zihni ÖZTÜRK**

**by**

**Kemal KARAOĞLAN**

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Approval of the Graduate School of Natural and Applied Sciences

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Prof. Dr. Ramazan KOÇ
Head of Department

This is to certify that we have read this thesis and that in our consensus opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

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**Kemal KARAOĞLAN**

## ABSTRACT

### TACTILE, EMBEDDED, AUDIBLE SENSATION SYSTEM FOR BLIND PEOPLE

**KARAOĞLAN, Kemal**
**M.Sc. in Physical Engineering**
**Supervisor: Prof. Dr. Zihni ÖZTÜRK**
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**59 pages**

It is not possible for visually impaired individuals to move around without getting support from another person when they go out of their houses and perceive their surroundings. He gets help to get to where he is going in the city and in all settlements, he does not know which street, street, building or institution he is when he comes to a door or entrance, when he comes to a street. For this reason, the visually impaired individual is guiding another person, which limits the individual life opportunities of the visually impaired individual. For this purpose, dots called the sensitive line, which are developed for this purpose, are not sufficient but only allow the visually impaired person to follow a line and realize that the end of the line is at the end of the line. You can not find out where you are walking, where you will be at the end of your walk, where you end up, and where the junction is. For this reason, he needs a support or knowledge again.This thesis study examines a system that allows the visually impaired individuals to use and perceive the place to go. It consists of a cane, wireless glasses and earphone, a movable cane carried by the user, and an informative unit which can be placed on the surface, buried in the pavement walkway and used indoors and outdoors



**Key Words:** Audible eye, Sensitive lines, Voice relief lines, Voice access, Visual impairment orientation

# ÖZET

## GÖRME ENGELLİLER İÇİN KABARTMA, SESLİ ALGILAMA SİSTEMİ

**KARAOĞLAN, Kemal**
**Yüksek Lisans Tezi, Fizik Müh. Bölümü**
**Tez Yöneticisi: Prof. Dr. Zihni ÖZTÜRK**
**April 2019**
**59 sayfa**

Görme engelli bireylerin konutlarının dışına çıkınca başka bir insandan destek almadan dolaşmaları, çevrelerini algılamaları mümkün olamamaktadır. Şehirde ve tüm yerleşim alanlarında gideceği yere ulaşmak için yardım almakta, bir kapıya veya girişe geldiğinde, yada bir cadde sokak başına geldiğinde hangi cadde, sokak, bina veya kurum olduğunu bilmemektedir. Bu nedenle görme engelli bireye bir başka kişi rehberlik yapmakta, bu durum ise görme engelli bireyin bireysel yaşam olanaklarını kısıtlamaktadır. Bu amaçla geliştirilen duyarlı hat adı verilen kabartmalı düz çizgiler ve kabartmalı noktalar içeren kaldırımlara, koridorlara ve yürüyüş yollarına döşenen kaplama ve karolaryeterli olmamakta sadece görme engelli bireyin bir hattı takip etmesini sağlamakta ve hattın sonundaki noktalı kabartmalardan hattın sonuna geldiğini anlamaktadır. Bu hatlarda yürürken nereye doğru yürüdüğünü, yürüdüğü yönün sonunda nereye varacağını, sonuna geldiği yolun ve kavşağın neresi olduğunu öğrenememektedir. Bu nedenle tekrar bir desteğe veya bilgiye ihtiyaç duymaktadır. Bu tez çalışması görme engelli bireylerin kullanacağı, gidecekleri yeri sesli algılamalarını sağlayan bir sistemi incelemektedir. Kullanıcının elinde taşıdığı, baston, kablosuz gözlük ve kulaklık, uzunluğu değişebilen bastonu ve ilgili yere yerleştirilen, yüzeye, kaldırım yürüyüş hattına gömülebilen, iç ve dış mekanlarda kullanılabilen bilgi verici üniteden oluşmaktadır.



**Anahtar Kelimeler:** Sesligöz, Duyarlı hatlar, Sesli kabartma hatlar, Sesli erişim, Görme engelli yönlendirme

*”Dedicated to redskin people”*

## ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Prof. Dr. Zihni ÖZTÜRK without their guidance, motivation, and encouragement this thesis would not have become a reality. They motivated me to pursue my studies in all stages of the thesis. TÜBİTAK-TEYDEB have been support for R&D of work and to made the prototip. I would also like to express the warmest gratitude to my friends for their moral support. This study would have never been completed without the moral support, continuous help and encouragement of my dearest classmate. Therefore, my very special thanks are due to them.

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| **IR** | Infrared |
| **GPS** | Global Position System |
| **RF** | Radyo Frequence |
| **FM** | Frequence Modulation |
| **PV** | Photovoltaik cell |
| **PIC** | Prtogrammeble Interface Controller |
| **DAC** | Digital, Anmalog Converter |
| **ADC** | Analog Digital Converter |
| **SD** | Secure Digital (memory) |
| **SDHC** | Secure Digital High Capacity |
| **SDXC** | Secure Digital Extended Capacity |
| **PWM** | Pulse Width Modulation |
| **SPI** | Serial Peripheral Interface |
| **LED** | Light Emmited Diode |
| **PCB** | Printed Circuit Board |

# CHAPTER 1

# INTRODUCTION

## 1.1 Introduction

Emerging technology is providing advancing in the living areas by allowing the disabled people access systems to be developed and providing more convenient access to the necessary areas of activity for disabled people. At the beginning of the work done in this area are the sensible relief lines [1] developed for the visually impaired individuals to be directed to their places of residence in the living areas and placed on the pavement as well as on the walkway along the walkways in the building. However, sensible relief lines [2] that are commonly placed in living areas are insufficient. For this reason, it is necessary to add audible recognition systems to these embossed lines. We aimed to improve the audible acces systems by starting from this need. We have to work on the this thesis and the project will answer this need.

This thesis is concerned with the audible acces system that visually impaired individuals will use in their living areas. The environment in which visually impaired individuals and less sight persons are present and the institutional establishment in the environment are related to a system that enables them to acquire information and walk around without support from anyone, by voicing the visions that enable them to perceive street signs. It is not possible for visually impaired individuals to move around without getting support from another person when they go out of their houses and perceive their surroundings. He gets help to get to where he is going in the city and in all settlements, he does not know which street, street, building or institution he is when he comes to a door or entrance, when he comes to a street. For this reason, the visually impaired individual is guiding another person, which limits the individual life opportunities of the visually impaired individual.

For this purpose, the pavement, corridors and walkways with embossed straight lines [1] and embossed dots called the sensitive line, which are developed for this purpose, are not sufficient but only allow the visually impaired person to follow a line [2] and realize that the end of the line is at the end of the line. You can not find out where you are walking, where you will be at the end of your walk, where you end up, and where the junction is. Voice navigation systems are not enough for visually impaired individuals, but it is not possible to load the details of each pavement on the navigation. When the visually handicapped person changes direction, the GPS and voice navigation systems do not express directional distinction, the individual can not respond to his needs. For this reason, he needs a support or knowledge again.

In this thesis we will answer this need, our audible acces system is adapted to relief sensitive lines [3]. A simple system that can be used both on the exterior and the interior, which is easy to use and does not require any additional training, has been designed and realized. The user can will detect and find the way, by the cane and earphone.

**Figure 1.1** View of the knowledge transmitter unit embedded into the tactile pathway having embossed straight lines.

The system consists of knowledge transmitters, triggers and receiver units in (Figure1.1)

Knowledge transmitters (two varieties):

a- Two-direction knowledge transmitters

b- Four-direction knowledge transmitters

**Triggers :**

A walking stick is used as a trigger. The battery-operated IR transmitter circuit, rechargeable battery, integrated interface circuitry, charge-in and turn-off switch connected to the circuit will be placed in the back cover of the cane hand-held part. The cane contains ergonomic finger handles that prevent it from slipping while you are using it. When it is not used, it is telescopic in order to place to the pocket.

The interior part is made of chrome and the hand part is made of polyurethane material.

**Receiver:**

The receiver is a wireless headset. Ergonomically shaped structure that can be attached to the ear. It has an interface circuit consisting of a receiver module that can receive the freedcast broadcast information from a transmitter and an audio amplifier. On the outside, there is an on / off switch and a charging input.

In this thesis, in urban settlement, in walking areas, in relieved lines, in inner walkways [4] and corridors; the direction of walking, the return points, the front of each section and section, and the places to be distinguished. The text will be planned in advance and the necessary voice recordings will be made to the point where the placed informants will be placed. The voice recordings are planned according to the place where the informants are to be placed, the directions are determined according to the direction of the user's arrival, and the directions of the knowledge transmitters according to the place of the knowledge transmitters aspects where the informants will be placed, the determination shall be made without error and listed on the basis of registration. The two-sided straight-line [5] informants will be positioned to indicate the direction along the walking track. Knowledge transmitter with four-way point relief surfaces will be placed at the rotation points to indicate where the user will return in what direction [6]. The visually impaired person during will walk on the sidewalk or inside while walking on the embossing walkway following the embossing lines on the floor of the walking area, while wearing the earphone once and opening the cane opening swich to keep the walking hand in the direction of walking forward. The knoewledge transmitter will be triggered and broadcast when approaching a few meters near the information providers. The router broadcast by the

information provider will be heard by the user at the headset and the user will either continue on his way to this information or will return to the desired direction re numbered and sccording to voice recordings will be completed.

### 1.2 Design of system

The system consists of knowledge transmitters, triggers and receiver units.

The knowledge transmitters consist of two groups.

a-Two direction knowledge transmitters. (Figure 1.2)

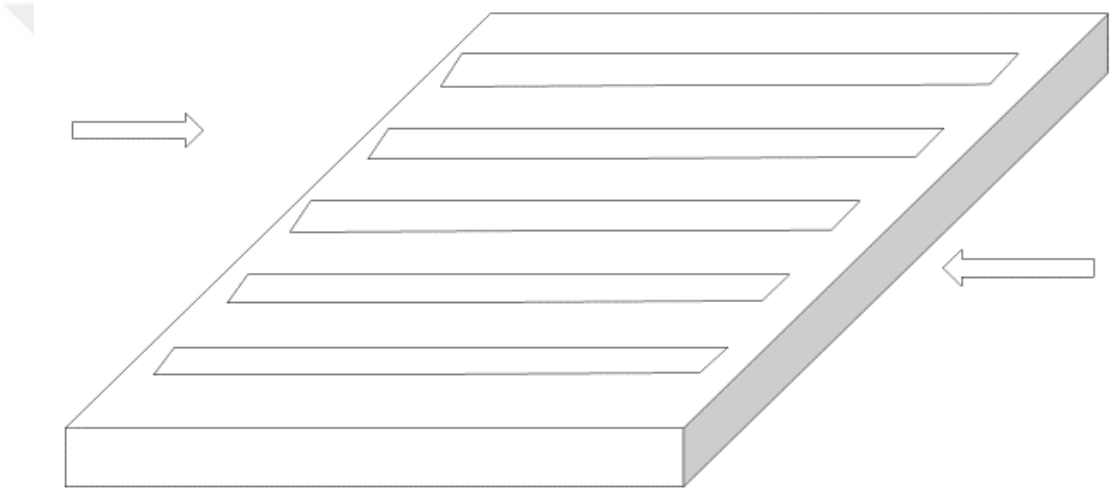


**Figure 1.2**-View of the konwledge transmitter unit embedded into the tactile pathway having embossed **two directions** with tactile line.

It will be able to give four different audio information according to the developments in the two directions.

b- Four direction knowledge transmitter. Figure 1.3

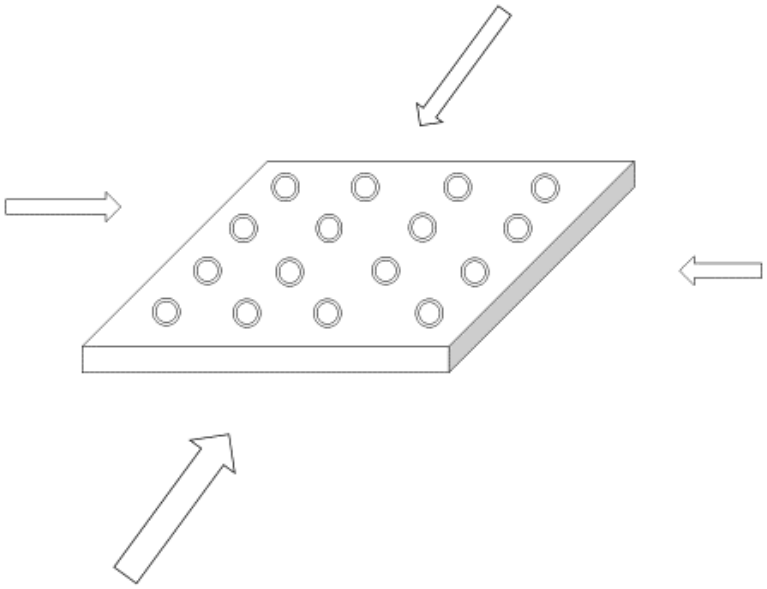


**Figure 1.3**- -View of the konwledge transmitter unit embedded into the tactile pathway having **four direction** with tactile dots.

It will be able to give four different audio information according to the developments in the four directions.

A walking stick is used as a trigger (Figure 1.4). The battery-operated IR transmitter circuit, rechargeable battery, integrated interface circuitry, charge-in and turn-off switch connected to the circuit will be placed in the back cover of the cane hand-held part.

The cane contains ergonomic finger handles that prevent it from slipping while you are using it. It is designed to be made from chrome, telescopic structure and parts can be produced from polyurethane material, hand-held part to be able to place it in unused place.

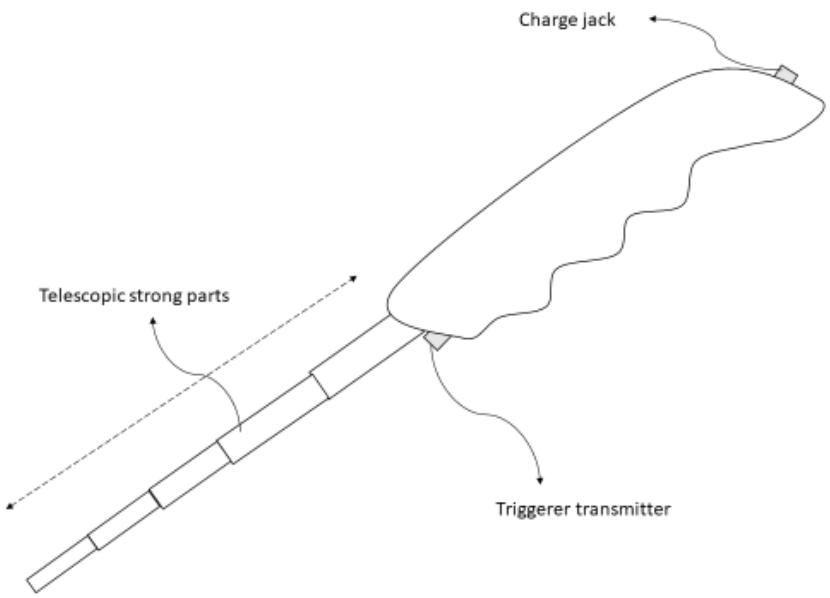



**Figure 1.4**- View of the triggerer, telescopic cane

The receiver is a wireless headset. Ergonomically shaped structure that can be attached to the ear. It has an interface circuit consisting of a receiver module that can receive the freedcast broadcast from the information transmitter and a circuit and an audio amplifier. On the outside, there is an on / off switch and a charging input (Figure 1.5).

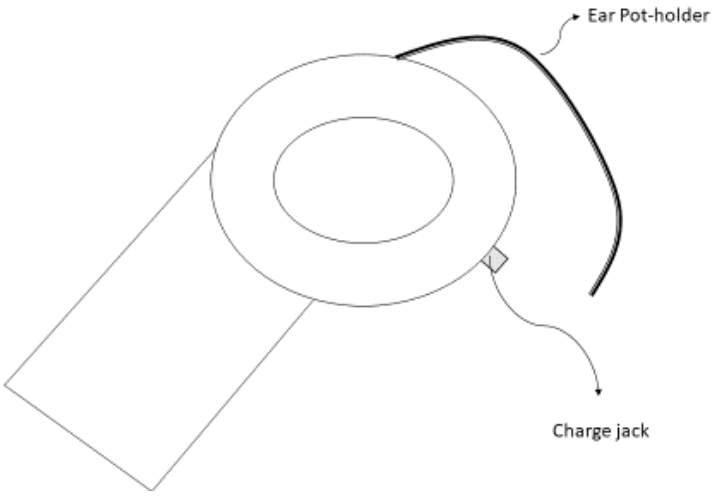



**Figure 1.5** View of the designed headphone

In this thesis, In urban settlements, walking areas, relief-tactile lines, interiors walking tracks [7] and corridors; the direction of walking, the return points, the front of each section and section, and the places to be distinguished. The text will be planned in advance and the necessary voice recordings will be made to the point where the placed informants will be placed. The voice recordings are planned according to the place where the informants are to be placed, the directions are determined according to the direction of the user's arrival [8], and the directions of the informers are numbered and gore voice recording is completed to them. According to the informative aspects of the place where the informants will be placed, the determination shall be made without error and listed on the basis of registration. The two-sided straight-line informants will be positioned to indicate the direction along the walking track. Information points with four-point relief surfaces will be placed at the rotation points to indicate where the user will return in what direction.The visually impaired person will walk on the sidewalk or inside while walking on the embossing walkway following the embossing lines on the floor of the walking area, while wearing the headphone once and opening the cane opening key to keep the walking hand in the direction of walking forward. The information transmitter will be triggered and broadcast when approaching a few meters near the information providers. The router broadcast by the knowledge transmitter will be heard by the user at the headset and the user will either continue on his way to this information or will return to the desired direction.

### 1.3 Tactile, Embedded, Audible Sensation System For Blind Peopleas a Tool

- Tactile, embedded audible acces system is promising as a system that enables visually impaired individuals to participate in urban life without any help, to be able to go to their own places easily, to have knowledge about the institutional establishment, street streets and directions around them and to be able to practice with visually impaired individuals.
- *Ease to use*

  The system is designed to be easy to use. The informants will be placed on the sidewalks and embedded in walking lines in both indoor and outdoor areas and will be at the same level as the walking area surface. As the user

approaches the informant while controlling the way with his walking stick while the user is walking, the information transmitter is triggered and broadcasts, the user will hear the guidance information broadcast from the headset.

- *Reliable acces*

  Proper and error-free orientation of the user is an important issue. In the designed system, the trigger will not be triggered directly against the information sensor's deflection, and this will remove the errors. In addition, gore is planned in the way that the sensors [8] are placed on the information transmitter, and the sensors outside the arrival direction are set so that they are not accidentally triggered. Energy comes from PV [9] that under the surface of knowledge transmitter. This will provide accurate and secure access.

- *Clean acces*

  The placed points and placed points text have to preparing to accourding routing points, that will be prepared at this point are planned in such a way that they will not share the error. Reduction of error margin is minimized thanks to the insertion angle of the sensors. For this purpose, the sensors are designed so that a few meters of IR light can be taken to the depth of the information provider's body, with horizontal angles.

- *Maintenance free*

  The system does not require maintenance after installation. The surface that is buried is sturdy and waterproof structure that can be walked on without being removed. In cases where the voice recordings need to be changed, the embedded voice recorders can be replaced by replacing the voice recordings by replacing them with special locks from the embedded pod.

- *Interaction speed-up*

  As the user approaches the transmitter with the cane while walking, the user will be triggered without delaying the time instantly and will be able to transmit information and be sensitive to the user instantly. It will not cause a fault because there is no time delay.

- *Ergonomically design*

The tactile surface of knowledge transmitters are arranged according to the accepted international standards for disabled walking lines. The structure of the cane and the ear is ergonomic. The cane is telescopic and designed to be hand-held in a size that is small enough to fit in the pocket when it is not used, and it will sit in hand and be snugly gripped.

- *Environmental Energy issue*

  The knowledge transmitters are designed to charge the internal batteries by generating energy from the sunlight [10] and have environmental characteristics for its need. It does not damage the environment by producing its own energy from the light of the environment [11], so it does not need any cable connection for energy.

- *Free frequence*

  There is no electronic contamination between the informants and the receiving headset, since transceiver modules that operate freely in the international are used. In addition, the communication frequency used does not interfere with other electronic devices.

- *Requirements and legistlation*

The system we have designed is defined as a necessity and necessity in all the laws concerning the access of the disabled, and since the system is not yet a similar application, it is an urgent necessity for the service.

In this thesis study, we examine how a simple ergonomic and environmental system can be implemented with new technology for disabled access systems [4]and support for visually impaired individuals in life activities.

In this study, the main objective is to realize a voice guidance system that will allow visually impaired individuals to go home on their own without the help of anybody else.

For this purpose;

**Consist of**

a-knowledge transmitters b-triggerer cane c-receiver headphone designed and produced

Designing and construction of the knowledge transmitters (Figure 1.6).

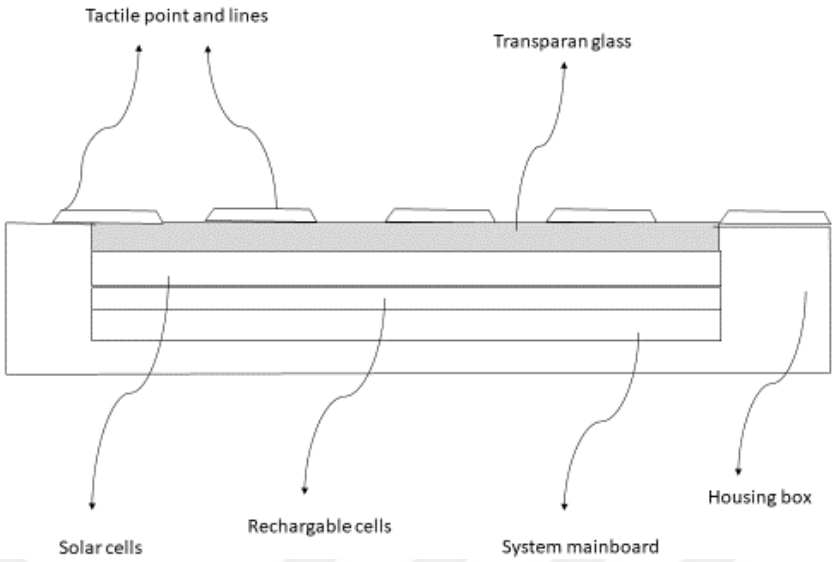



**Figure 1.6**- View of the designed embedded Audio knowledge transmitter unit

**Technical feathures;**

The informants are made of transparent light-transmissive material, in which the interface board of the information-providing unit is covered with a solar [12] panel underneath and a transparent cover, and at the bottom the rechargeable battery is housed in a walk-proof, waterproof IP 66 standard and the top surface is embossed and devices with straight line embossing. To be buried at one time, they are buried in a capsule and placed in this capsule and fixed with a lock. They can be removed and reinserted when needed.

b-Triggerer ;

Technical feathures

Trigger is a cane and telescopic hand holding part is ergonomic and there is an IR transmitter triggering circuit that can work with rechargeable batteries.

c-Receivers;

Technical feathures

The headset is used as a receiver and consists of an interface circuit consisting of freely available RF modules and an audio amplifier circuit, which are broadcast by the information transmitter.

### 1.4 Objectives and Methods

The system we have designed is an Data transmitter unit which can be placed into the related places, embedded in surfaces, sidewalks [1] and walkways and which can be used indoors and outdoors and can be carried by the user, comprising wireless glasses and built in headphones a hand held device to which wireless headphones can be connected to and a walking stick which can be adjusted in length. Data transmitter units are triggered and actuated when the Audible-Eye hand held device carried by the user senses the Audible-Eyeglasses and built in head headphonesand Audible-Eye walking stick [2], and said unit broadcasts the information recorded in memory, and the hand held device, senses the wireless headphone and wireless glasses and built in headphones and as a result announces said information audibly to the user. Data transmitter units broadcast from free frequency RF, FM channels via broadcasting techniques such as Bluetooth, and the hand held device broadcasts said information audibly; furthermore the device broadcasts a code comprising the information relating to the location and the corresponding audible information is audibly broadcasted. The information provided via Bluetooth after the Data transmitter units are actuated, have been designed such that they can be listened to by Bluetooth receivers that have compatible frequency. Data transmitter units can be provided in various forms to be used indoors, outdoors and as units embedded into disabled tactile [3] paths. All Data transmitter units can use the energy from the city mains, from the battery it houses or via solar batteries [12] that can be mounted on its surface(Figure 1.7). The outdoor Data transmitter units have been designed such that they are resilient enough to be tread on, so that they can be embedded into disabled walkways and such that they can convert solar power into electricity. Data transmitter units have different sensors for each direction such as single direction or

multi direction sensors [13] such that they can submit information for all directions in order to be able to provide information regarding different [14] directions.

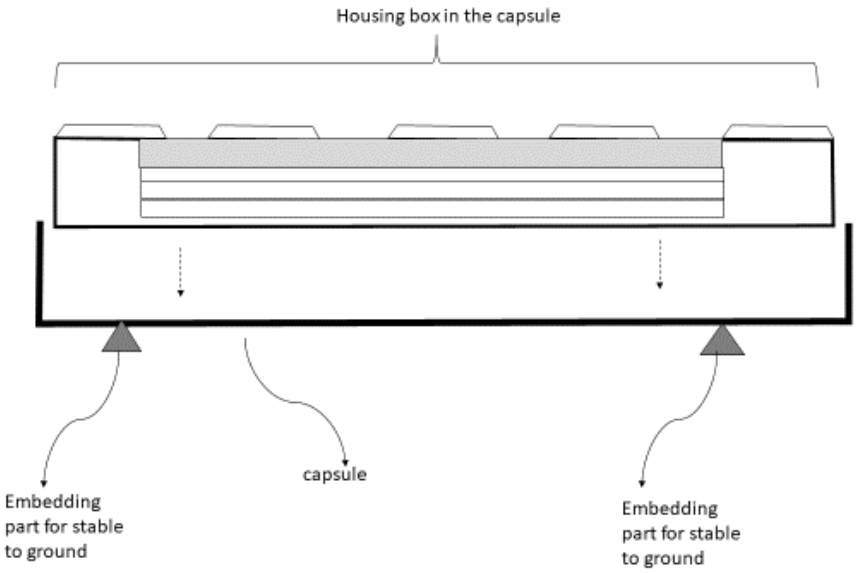



**Figure 1.7**-View of the designed of the embedded knowledge transmitter unit detailed

Embedded Data transmitter units that have been embedded into walkways and sidewalks, are similar to the tactile pathways for the visually impaired and have embossed straight line [1] surfaces at the sections that are continuous and embossed large dots [2] at the sections where the path ends, or when there is a junction or intersection.( Figure 1.10)

The Audible-Eye hand held device provides automatic connection in order to ensure that the information that has been broadcasted by Data transmitter units that have been triggered via Audible-Eye glasses and built in head headphones and Audible-Eye wireless headphones can be heard by the user. Audible-Eye Data transmitter unit triggering features have been provided in the wireless headphones Audible-Eyeglasses and built in head headphones and at the end of the walking stick [5]. Audible information can be listened to connecting wireless headphones to the hand held device.

The Audible-Eye walking stick can trigger [14] the Data transmitter units independently without having to be connected to the hand held device. When the

Audible-Eye walking stick is pointed towards the Data transmitter unit, the Data transmitter [15] unit is triggered and information can be heard from the headphones of the Audible-Eye hand held device. The triggering process of the Data transmitter unit by the Audible-Eye walking stick [6] and the hand held device, can be carried out via radio control, infrared control, RFID and magnetic triggering. The Audible-Eye hand held device receives the information broadcasted by the Audible-Eye Data transmitter units via the FM channel [15] at a free frequency, via Bluetooth and submits this information audibly to the user. Moreover the device can broadcast the sounds in its memory which correspond to the codes broadcasted by the Data transmitter unit.

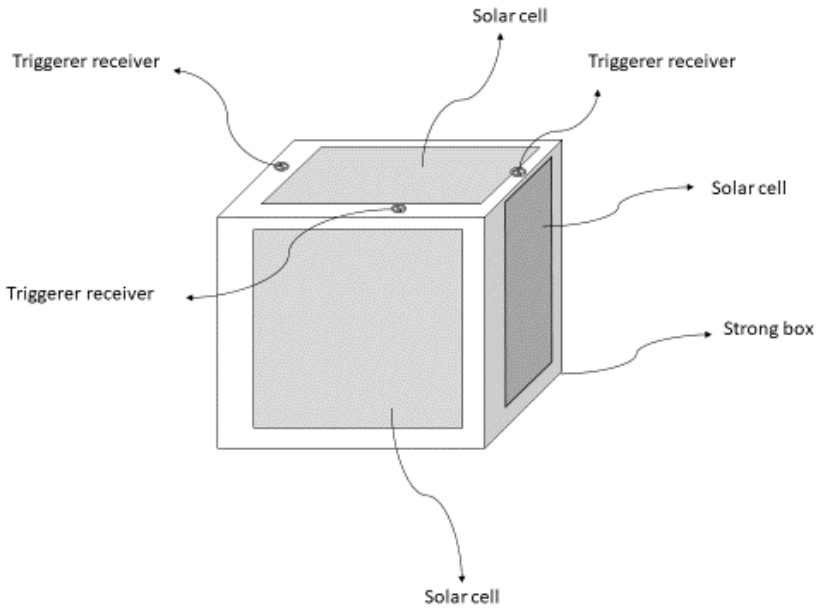



**Figure 1.8-** View of the outdoor knowledge transmitter unit four directions

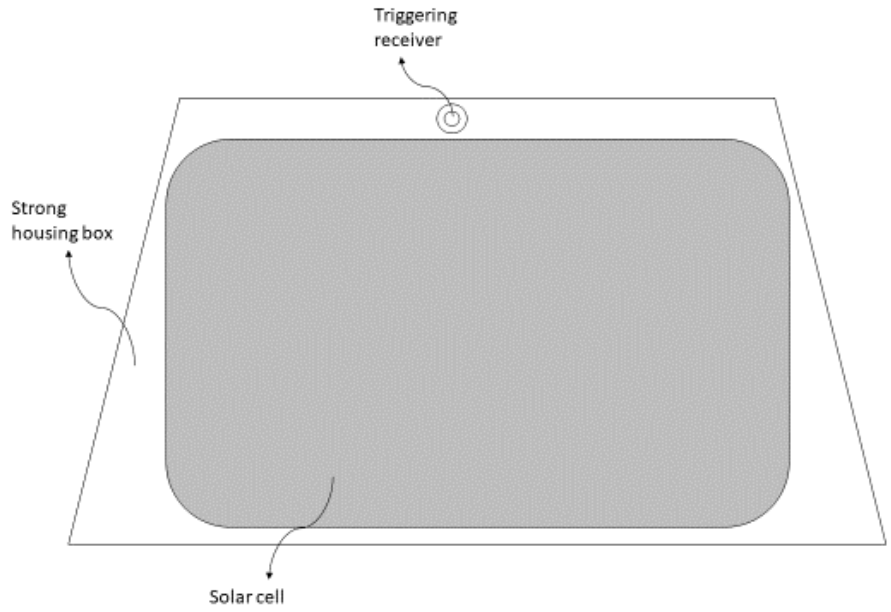



**Figure 1.9**- View of the outdoor knowledge transmitter unit one direction

The Audible-Eye hand held device comprises a GPS module within the processor circuit board in order to be able to receive information from the global positioning systems and to define the location of the user when necessary and in order to audibly broadcast the information received from the GPS to the user

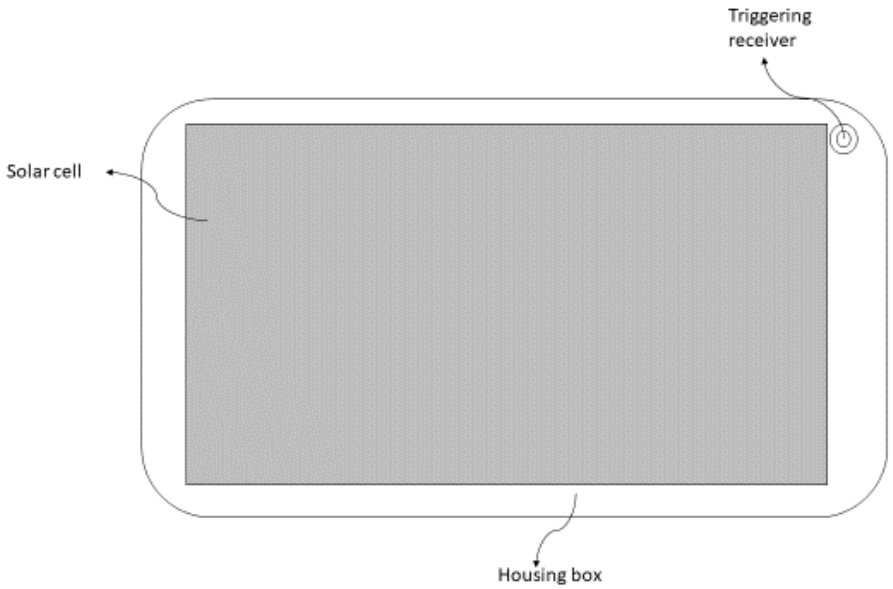



**Figure1.10**- View of the indoor knowledge transmitter unit

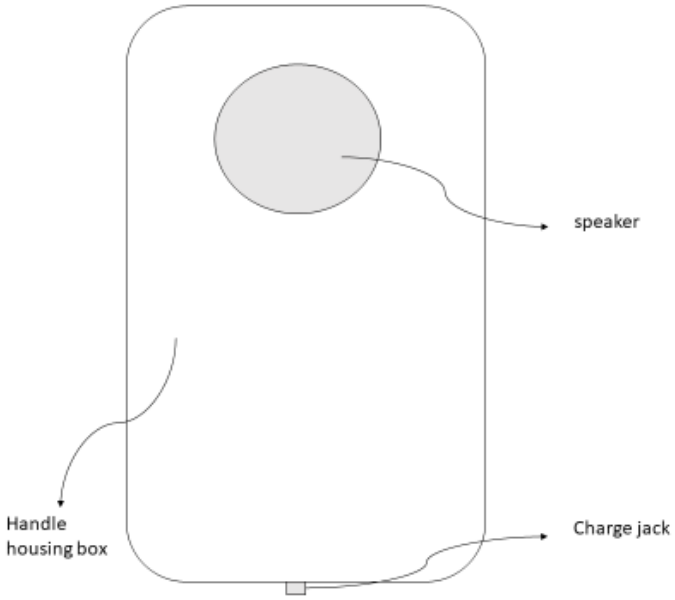



**Figure 1.11** View of the handle devices

The Audible-Eye hand held device operates by means of the rechargeable batteries it houses and can be charged by plugging in the charger into a socket. The user can trigger the Data transmitter unit by pointing the hand held device forward when he/she is walking. The user can also trigger the Data transmitter unit located at the direction when the user turns his/her head whilst wearing the glassesand by plugging in the plug of the glasses to the Audible-Eye hand held device or the user can hear the information from the headphones or the hand held device by triggering [8] he Audible-Eyedata transmitter unit that is in its direction and to which the user is getting closer to by holding the Audible-Eye walking stick to the tactile visually impaired pathway [7] and by plugging in the headphone plug into the Audible-Eye hand held device or by directly listening to the Audible-Eye hand held device without using headphones.

The Audible-Eye hand held device, can not only be used by holding it parallel to the ground but also by plugging in Audible-Eye glasses and headphones to the hand held device, or by using a walking stick and the device can also be used by wireless headphones. The user has the alternative to use the device according to his/her preference, according to the environment he/she is located in or according to any preference that seems easier to be used by the user in relation to the special condition

of the user. The user can control both the path and the road with the walking stick by putting on wireless headphones and at the same time while walking outdoors with the Audible-Eye walking stick and the user can also trigger the Audible-Eye Data transmitter units via the Audible-Eye walking stick and[1] can listen to the audible information while continuing on his/her way.

The Audible-Eye system and walking stick embedded into surfaces and tactile pathways for the visually impaired which we has been designed and carried out in order to reach the aims of the invention have been shown in the figures and the figures illustrate the following;

### 1.5 Scope

The most ideal application for handicapped access is to add audible systems to the sensible relief gait lines and to transfer the information of the diverting information to the user, both versatile and multi-disciplined, using both touch and hearing sense. To be able to use both touch and hearing, audible systems need to be adapted with error-free planning to sensible relief lines. The combined use of the two senses will make it easier for the disabled person to imagine and make decisions, so that they behave with confidence. The use of both touch and hearing can be used both indoors and outdoors.

### 1.6 Structure

The remainder of this dissertation is organized as follows:

The introduction (this chapter) gives a huge overview of the study, then, main purpose, the methods, approaches, discusses on eye gaze as an input and thesis roadmap is presented. The contributions to the field of research are finally listed.Chapter two as background starts with a definition of audio acces system, motivation followed by tactileacces history. It describes existing systems and technologies with their application. It also presents the audio acces used in this thesis. Furthermore, it discusses the current challenges and the scientific work is done up to now on a general level. Special related work sections are part of the corresponding chapters. In chapter three, design and implementation steps are all explained step by step. All background is presented from tactile embedded audio acces system application. In chapter Four, producting the prototype and product experiment explained.

In the chapter Five, explained result and further works.

# CHAPTER 2

# BACKGROUND

## 2.1 Introduction

Accessibility of visual impairments is very important for topical sensitivity. For this purpose, the use of embossing lines is beneficial and elevated. It is possible that reinforced walkways are reinforced with audio systems, installation of broadcast equipment or systems containing information on the places to be identified, and that the system or devices are triggered by the approach of the user. For this purpose it is a new and convenient technique to solve the problems with interface circuits which contain RF receiver and transmitter modules and sound recording integrations.

## 2.2 Human Eye instead touch and heart.

For people who do not see it is very important and valuable to use the sense of hearing instead of the sense of sight. The sense of hearing is a qualitative sensation that can work out alternative and lacking in seeing, interpreting, and feeling emotion in the environment. Attempting to eliminate the lack of visual impairment with the sense of hearing will also provide the social and psychological comfort of the visually impaired individual. The most effective sense of visually impaired individuals is their sense of touch and hearing instead of sight[8]. The most useful and necessary technique is to base the system on the sense of touch and hearing, which will facilitate the access of visually impaired individuals.

The sense of hearing is a sense that allows the visually impaired individuals to feel safe and use them unlimitedly. It is known that individuals with disabilities complete their unusable abilities with their existing sense organs instead of missing ones. The work to be done in order to move this intelligence to bring visually impaired individuals to a more equipped position in life is the need for technology to be developed and to serve human values.

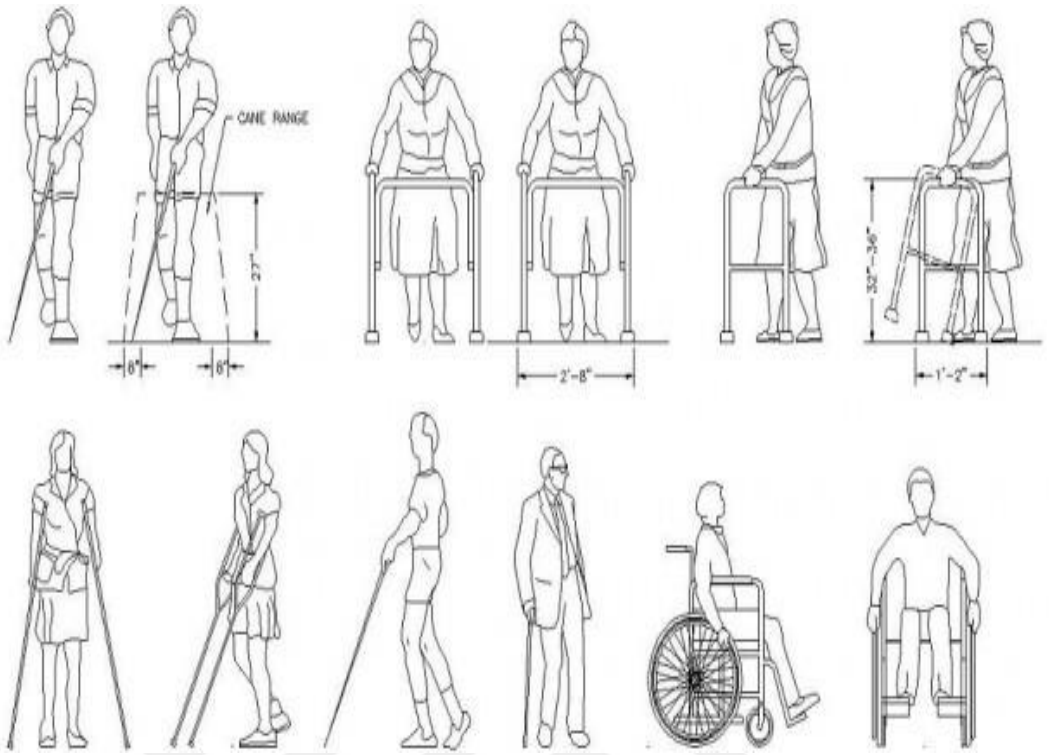



**Figure 2.1** Assit enstrument for impaired people

**Figure 2.2** Classical assist enstrument of blind

## 2.3 Motivation

Disability access technology is usually applied only with touch-sensitive systems that appeal to the sense of touch. Until now, the inability of the blocking systems to be supplemented with voice systems has led to the inefficiency and inefficiency of these systems.(Figure 2.3)

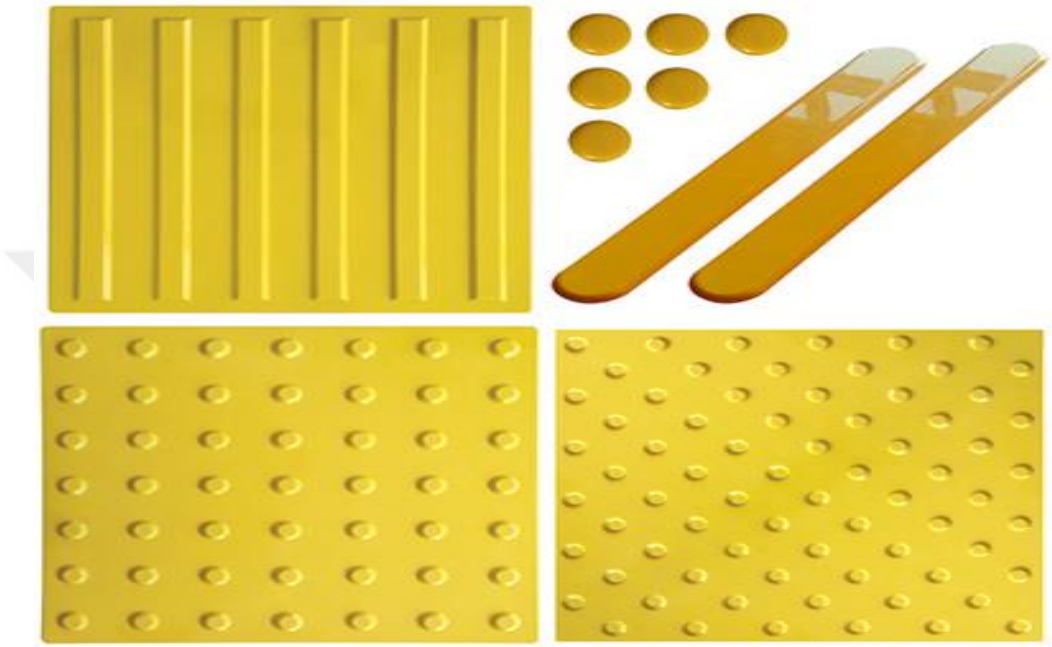


**Figure 2.3** Tactile materials

**Figure 2.4** Tactile materials application sample

Touch-based perceptible access systems allow both the feet and the feet to follow the path while the visually impaired person is walking on the walkways, while the relief six-point alphabet reads and recognizes the texts. However, the support of the embossed touch systems with audio systems enables both touch and hearing senses to be used together instead of visual impairment, thus achieving more information and directing and informing. (Figure 2.4)

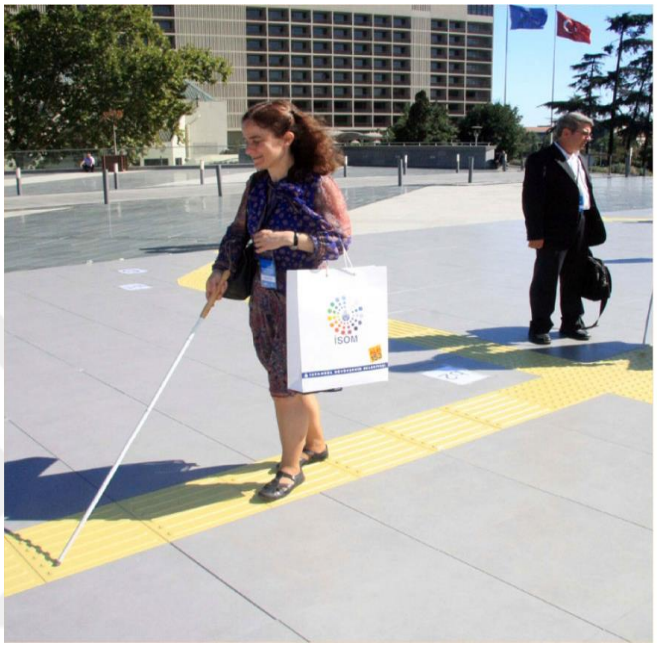



**Figure 2.5** Following technic on tactile


**Figure 2.6** Audio orientation devices for blind

As seen in the picture, it is seen that a visually impaired person walked by following a path with a walking stick in a relief-felt walking path.(Figure 2.5)

At the same time, a disabled orientation device for disabled people on the road is shown in (Figure 2.6) Relaxing the disabled and equipping them with audio systems is necessary and necessary for both the disabled individual and the other members of the community. For this purpose, it is practical and necessary to apply audible systems to relief gait lines.

### 2.4 Model Based Approaches

Model-based approaches are based on learning how to use the devices designed by the user practically. For this reason, the design of the walking stick is telescopically designed so that it can be adjusted to suit the height of the user. The sensors of the knowledge transmitters are placed in the storage box and positioned so as to be angled with the body surface in order to catch the arrival angle correctly. In order for the sensors to be triggered only by IR rays coming from the opposite side, the material from which the housing box is made is selected from the IR-free material. The earphone is designed so that the ear can be worn on the ear and the ear can not be disturbed by the weight and shape, and the sound tone can be adjusted.

### 2.5 Tactile, embedded, audible acces system applications

Embossed, perceptible walking floor applications are used in many urban areas, university campuses, hospitals, public institution buildings, but voice recognition systems have not been implemented. Only voice navigation systems are available and these systems can work with blind map and satellites. They do not work in closed areas. Visually impaired individuals can not serve every point, every street detail building position and especially pavements and turns are not identifiable. With this state of the art, voice navigation systems do not meet the needs of visually impaired individuals. Therefore, it is necessary to integrate the voice recognition systems into the relief gait lines.

## 2.6 State of The Art

As a result of our thesis research we have done, we have not come across or reached the master's thesis about the implementation of the disabled access with the voice recognition system.

However, one of the first studies in this area is the sesligöz named work which was registered to TPE by us in 2016 and we have been conducting research and development activities since long time.

Apart from these, patent applications have been made in many countries in this area and the main ones are listed below. However, none of them could be put into practice.

## 2.7 Challenges

As a result of this thesis, all possible problems have been solved by overcoming the difficulties and the system has been made successful. The rest of the system is applied to all living areas to start life from the university campus. The main objective of this study is to present the technology to human service and to be an example of future technological development works.

The images on which the products are produced are obtained from the actual products (Figure 2.7).

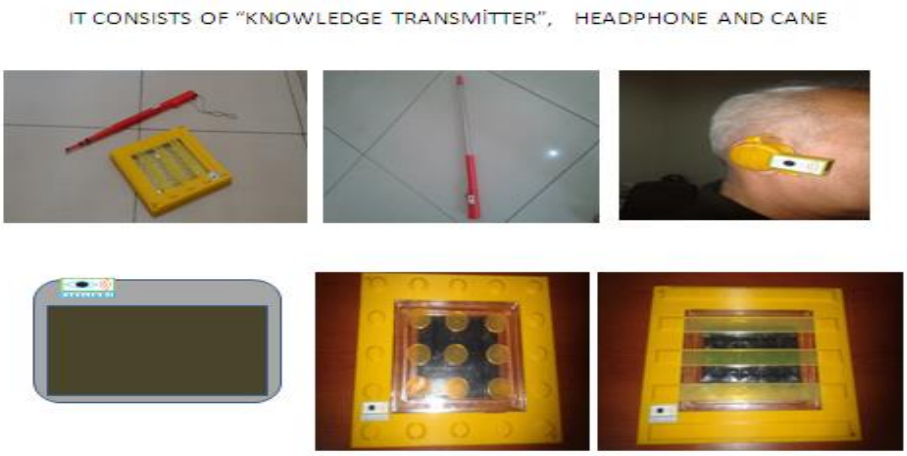



**Figure 2.7** Product of the thesis work

# CHAPTER 3

# DESIGN & IMPLEMENTATION

## 3.1 Introduction

The research activities were supported by TÜBİTAK-TEYDEB in priority categories and as a result of the R & D project, outputs were obtained in line with the targeted results for the scope of the project.

## 3.2 Output products

Outputs produced as a result of the R & D project;

1-Two way knowledge transmitter and circuits (Figure 3.1) and (Figure 3.2)

**Figure-3.1** Two direction knmowledghe transmitter

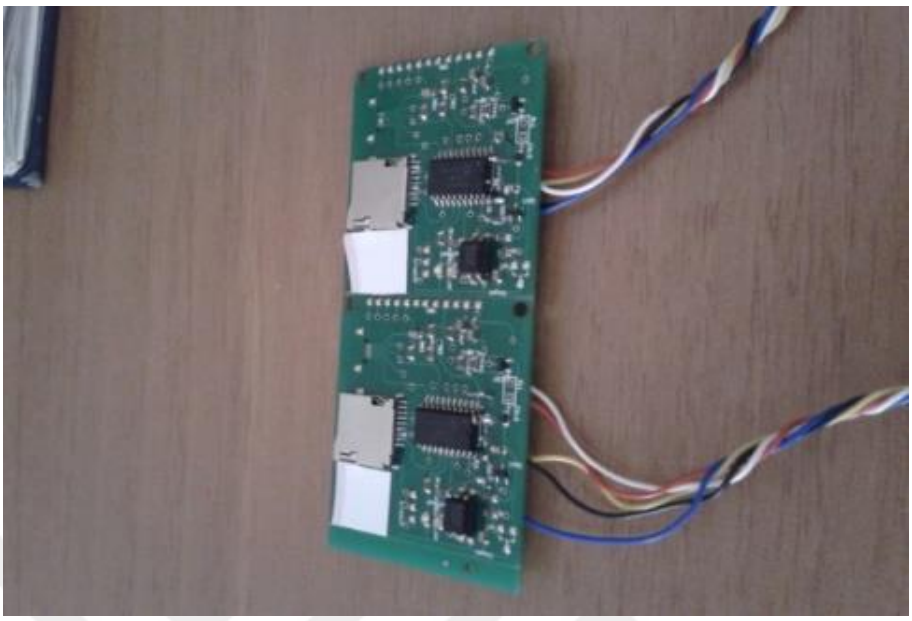


**Figure 3.2** Circuit of two direction knowledge transitter

2- Four direction transmitter and circuits Figıure 3.3 and Figure 3.4


**Figure 3.3** Four direction knowledge transmitter

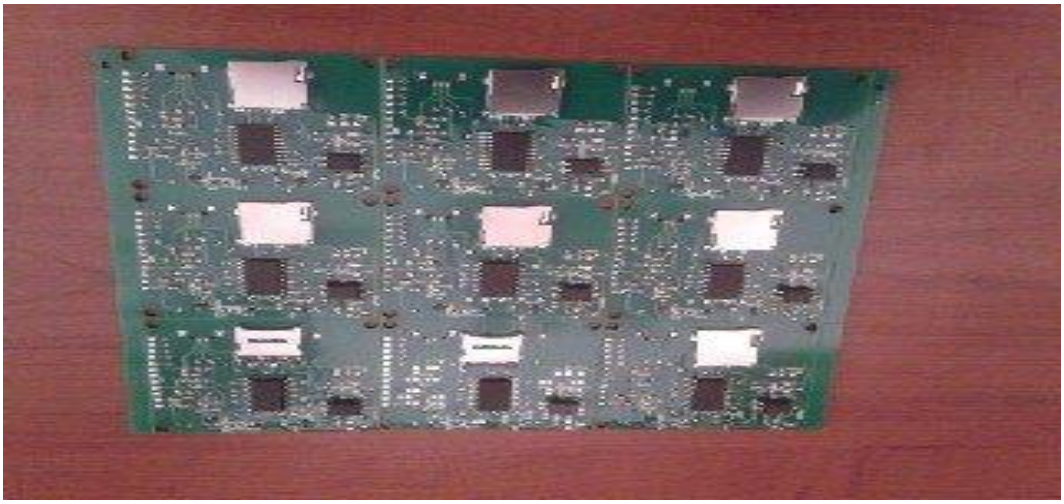


**Figure 3.4** Circuit of four direction knowledge transmitter

3-Outdoor knowledge transmitters

Four direcionsFigure 3.5 One directions Figure 3.6

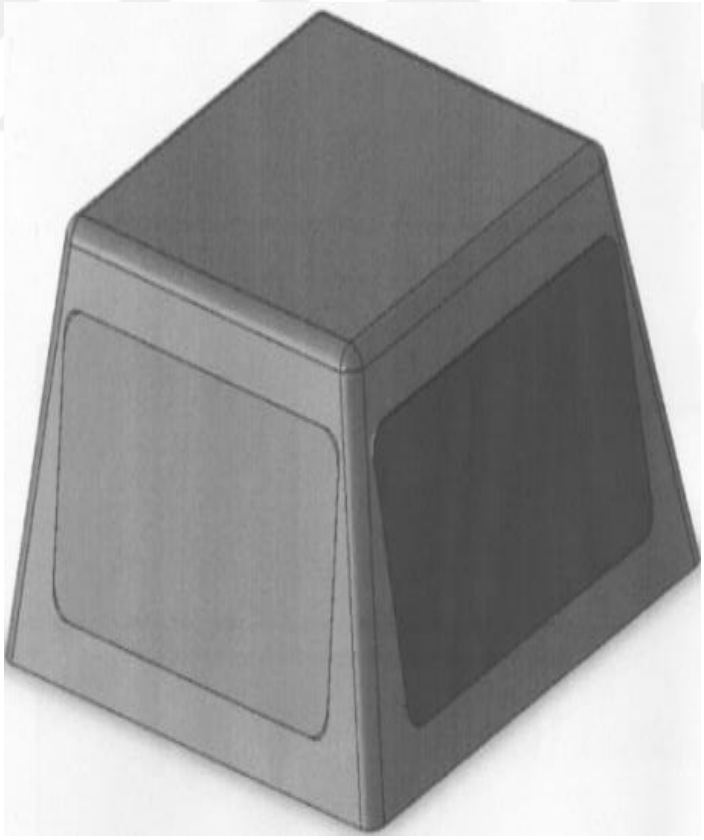
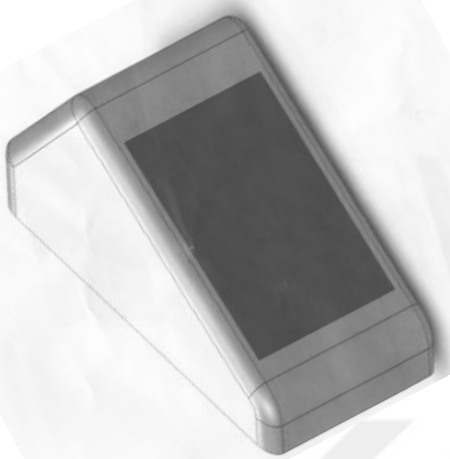


**Figure 3.5** Four direction outdoor knowledge transmitter



**Figüre 3.6** one direction outdoor knowledge transmitte

4-Indoor knowledge transmitters (Figure 3.7) and (Figure 3.8)


**Figure 3.7** Indoor knowledghe transmitter

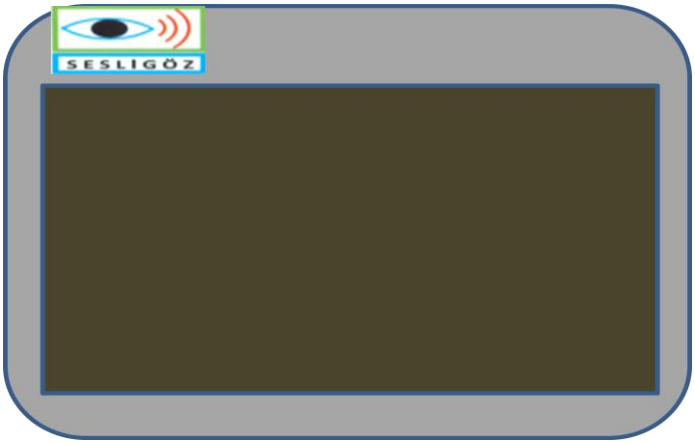



**Figure 3.8** Indoor knowledge transmitter with PV

Interiors are two models with PV surface and electric supply. All knowledge transmitters mainboard has circuit that PIC16F690 audio record, playing and controlling by software:

The PIC16F690's ADC digitizes the sound and store it in the SD or SDHC card. The firmware works for SD or SDHC cards only, Can not usable SDXC cards with this project because some of them work on 1.8V drive. The code detects whether the card is SD or SDHC and selects the proper addressing system for the card.

The PIC's CCP is used as a DAC to convert the digital data back to audio. The sound is converted to 20KHz 8 bits mono in a format similar to wav files. The quality of the audio is reasonable.

SD card interface the PIC in SPI mode. Reading and writing data is in multi-blocks. Memory is used at the rate of 20KB/s. The Error LED indicates error sent by the SD card. The software doesn't use any file system, it just uses absolute memory addresses (raw). Since the programme is less than 680 bytes there is much resources left for adding features.

Audio input is 1Vp-p , can usable the mic circuit or other source. The CCP in PWM mode gives 20KHz wave with duty cycle modulated to the audio amplitude. A low pass filter removes the 20KHz component. It is enough a simple 2 transistors amplifier to boost the power to drive 32 Ohm speaker or headphone.

SD/SDHC CARD SOUND RECORDER 3.3V PIC16F690

This sound recorder that has the difference is the supply voltage is 3.3V. This makes the direct drive of the SD card simpler. It also makes it easier to power it from a battery.

8MHz internal oscillator is used, if the frequency drifts it causes the playback to change speed. I left pins 2 and 3 free in case I have to use crystal oscillator.

**Troubleshooting:**

If the Error LED is on immediately on power up it means that the card failed to initialize. This code works for SD card rev 2 or SDHC card, it doesn't work for SDXC (1.8V) or MMC or SD rev 1 cards.

For a successful recording a sector (512 Bytes) has to be writen in 20ms, old SD cards may be too slow writing data to the flash memory, in such case the error LED comes on.

PIC 16F690 audio record and playing basic lpogic shema diagram. Figure 3.9

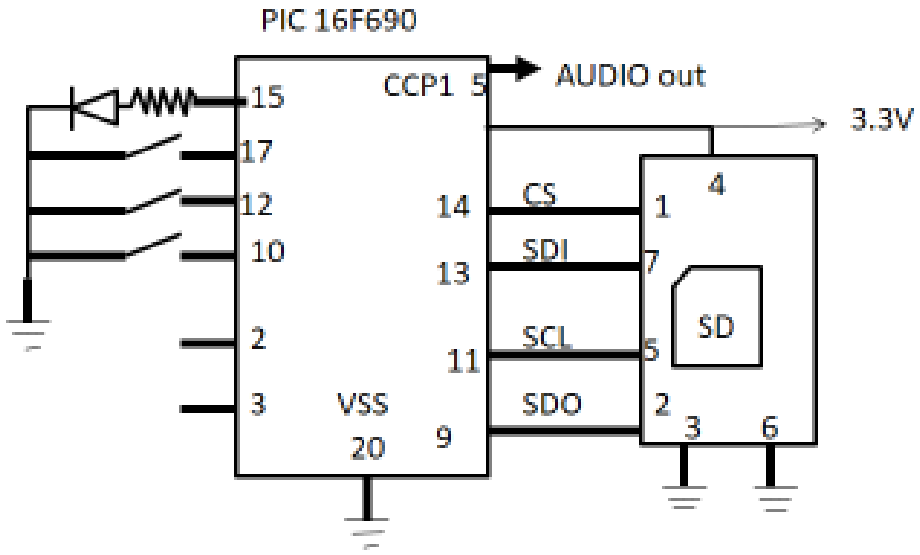



**Figure 3.9** PIC 16F690 audio record and playing basic logic shema diagram.

The basic circuit integratted with audio ampliphicator, low pass circuit, triggering circuit and audio transmitter module.( Figure 3.10)

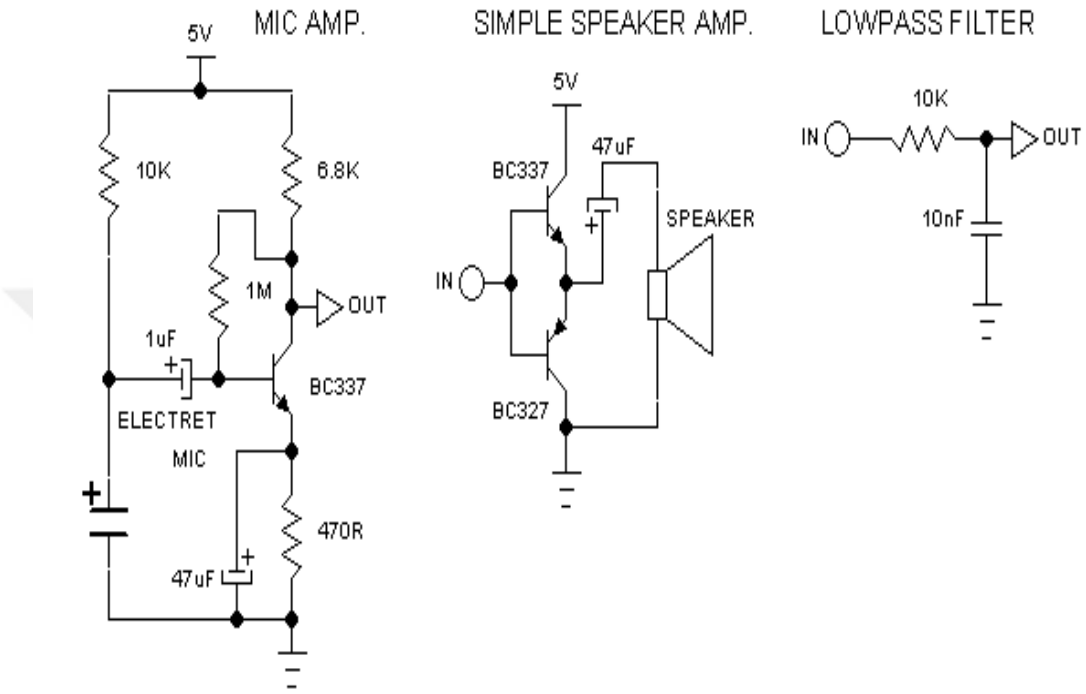



**Figure 3.10** audio ampliphicator, low pass circuit, triggering circuit and audio transmitter module

The mainboard of knowledge transmitter completted and converted to PCB in (Figure 3.11)

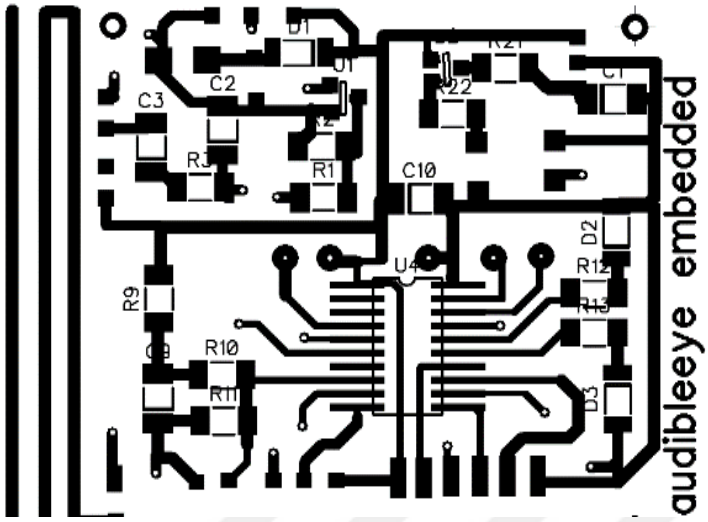



**Figure 3.11** Knowledge transmitter circuit PCB

For to transmitting the audio knowledge used RF "audio transmitter " module. The RF transmitter module condition and parameter Schedule in (Table 3.1) and (Table 3.2 )

**Table 3.1** VCondition parameter of RF module

Absolute Maximum Ratings

| Parameter | Value | Units |
|---|---|---|
| Power supply and/or Modulation Input Voltage | 3 | V |
| Operatin temperature | -40 to +80 | ℃ |

**Table 3.2** Parameter Schedule of RF modüle

| Parameter | Symbol | Condition | | Value | | | Unit |
|---|---|---|---|---|---|---|---|
| Sensitivity | Psens | Vcc=3.0V, TA-25℃<br>SINAD=20dB<br>1KHz sine wave, MOD Input22.5KHz | | min | typ | mx | |
| | | | 868.35MHz | | -95 | -93 | dBm |
| | | | | | | | |
| | | | | | | | |
| Supply current | Icc | | | | 7 | | mA |
| Output level | Vout | Vcc=3.0V, TA+25℃<br>1KHz sine wave, MOD input 22.5KHz | | | 100 | | mV |
| Suply Voltage Range | Vcc | | | +2.7 | 3 | +3.3 | V |
| Frequence responce | Fres | | | 20 | | >20K | Hz |
| Distortion | | RF input Level-640dBm | | | | 1 | % |
| Freq.Offset | | | | -20 | | +20 | KHz |

5-Triggerer cane and circuit's( Figure 3.12)  and (Figure 3.13)

**Figure 3.12** wireless trigerer cane

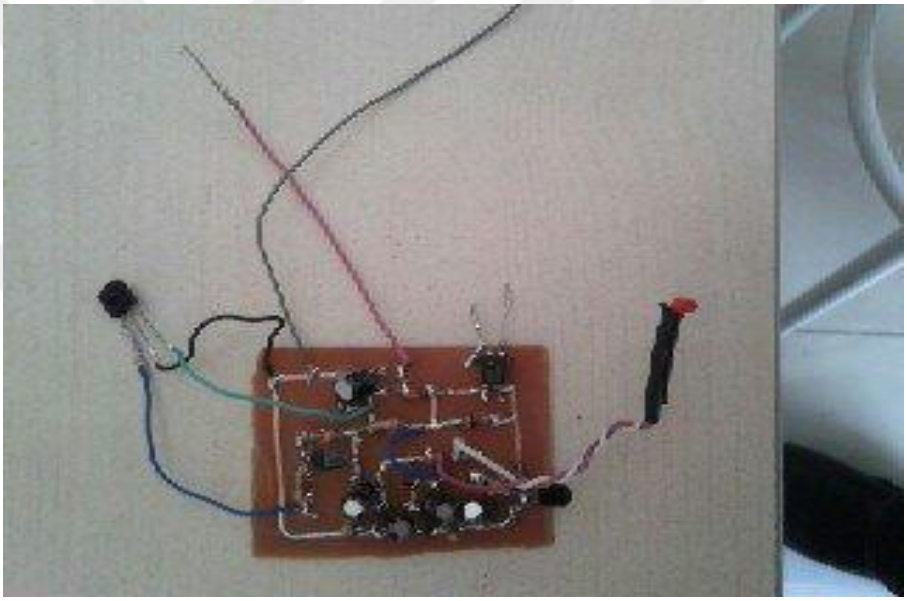


**Figure 3.13** wireless trigerer cane ircuit

For to produce the cane triggering circuit used IR transmitting circuit with IR led.

6- Receiver headphone and circuit’s (Figure 3.14 ) and (Figure 3.15)

**Figure 3.14** wireless receiver headphone

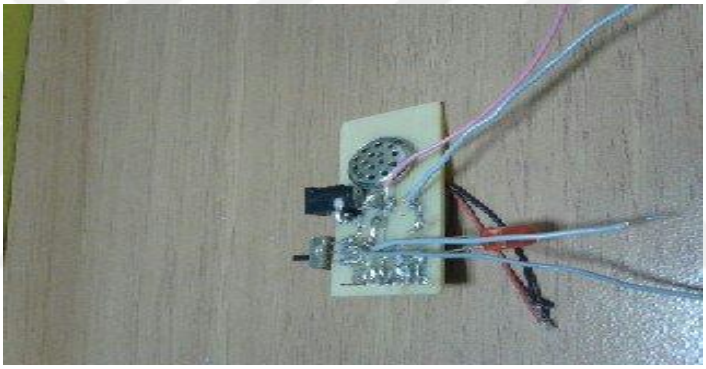


**Figure 3.15** wireless receiver headphone circuit

The receiving optained by audio RF receiver and raising for powerfull to easy hearing. For powerfully audio receiving used IC LM4871 in powerfull circuit Figure 3.18. This circuit in headphone and handle devices.For to receiving the audio knowledge used the RF “audio receiver”module, same frequence with transmitter audio module.

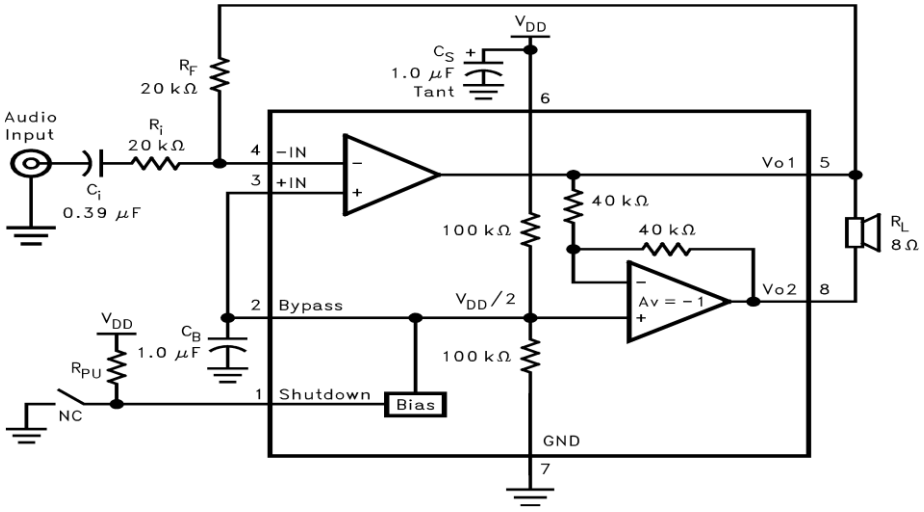



**Figure 3.16** LM 4871 logic diagram

The thesis work of the research project has been successfully completed and the test works which produced the prototips have been utilized with the visually impaired individuals who test the devices they met for the first time in front of the online camera and the positive statements about the produced system. The questionnaire results supported the test performance obtained from the subjects in using the audible acces system. Showed in Table 3.3 and Figure 3.17

**Table 3.3** embedded, tactile, audio acces system testing result

system test results

| | testers | successfull | unsuccessfull |
|---|---|---|---|
| Between 20 – 40 | 45 people | 44 | 1 |
| 40 years old + | 20 people | 20 | 0 |
| Female | 5 people | 5 | 0 |

Audible acces system testing by 75 blind people, where succed to easy using and clearly earing the knowledge transmittion that transmitted by the knowledge transmitters.

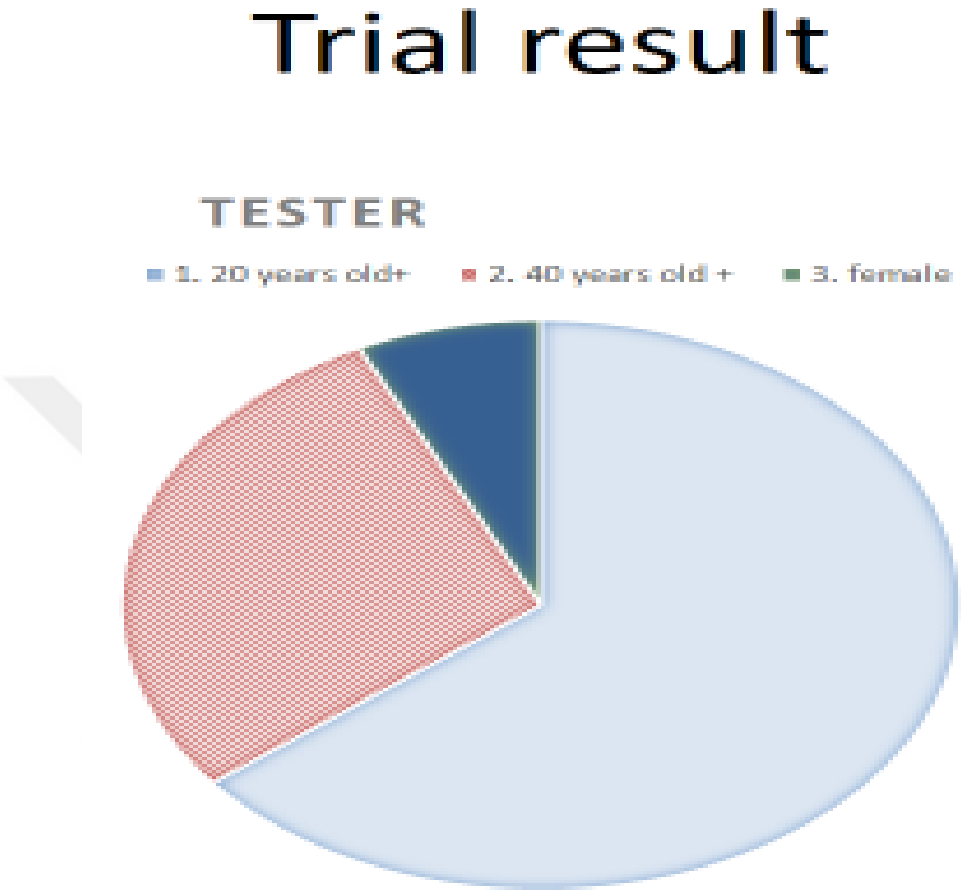



**Figure 3.17** Test result diagram

1. 20 years old plas tester blind people = 45
2. 40 years old plas tester blind people = 20
3. Female tester blind people = 5

%95 tester had been succeded to using the audio acces system and they say " we need this system for to travel in life area" . %5 tester people not succesed to using the audio acces system and they say " we are need'nt the electronics devices and other system unfortunatelly"

# CHAPTER 4

# EXPERIMENTAL RESULTS

## 4.1 Introduction

The deigned and produced equipments have neen registered to patent system of TPE (Turkish Patent Enstitute).

## 4.2 Tactile, Embedded audio acces Experiment

Both national and international patent applications have been made during the work. The first application was registered by TPE under TPE TR2016 / 01856 and the patent document was given. This is first project that provided base of the work, “embedded, tactile, audio acces system”. The audio acces system have tested by blind people and the success rate was %95

**Table 4.1** Testing satisfaction result

system testing satisfaction results

| | testers | satisfied | unsatisfied |
|---|---|---|---|
| Between 20 – 40 | 45 people | 43 | 2 |
| 40 years old + | 20 people | 19 | 1 |
| Female | 5 people | 5 | 0 |

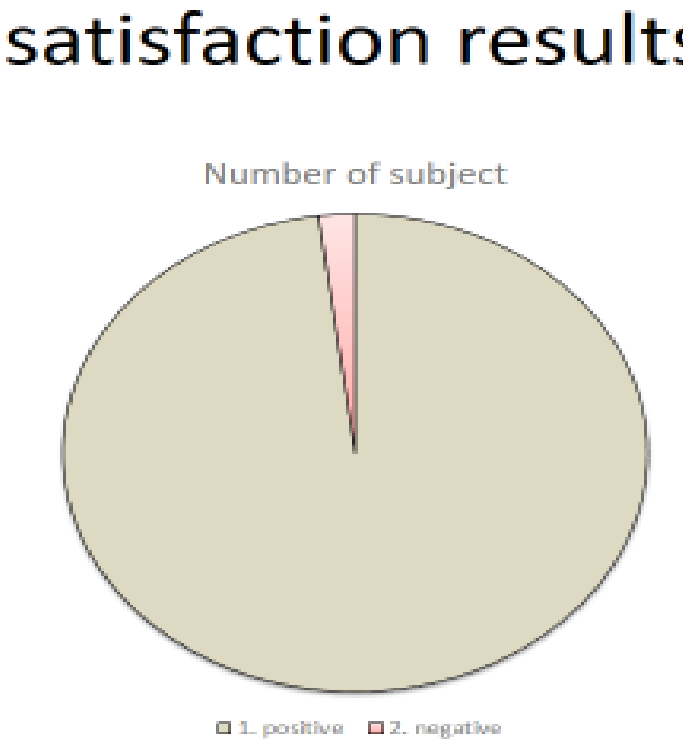



Figure 4.1 Testing satisfaction result diagram

Subsequent stage designs were processed with TPE 2016/01856 file number.This design was processed by the international patent office WIPO and processed with the file number PCT TR2016 / 00020.

The folder has published the above-indicated international application on 25 August 2016 under no. WO2016/133477(WIPO)

**4.3 System Application Points**

Produced prototype products were tested by the members of the board of directors of Gaziantep "Altı Nokta Körler Derneği" in the life flow in the city and found to be useful and practical. It has also been proven by these tests that the use of the system is made simple enough to require no training.

In the areas where the system will be applied, it is necessary to determine the places where informants will be placed. The applications suggested by us are suggested to be four directions to the streets (Figure 4.5) and (Figure 4.6), two directions to the walking directions (Figure 4.3) and (Figure 4.4), one way to the front of the buildings

and four directions to the return points of the embankment walking bays in the inner spaces, two directions to the straight lines and a one way application.

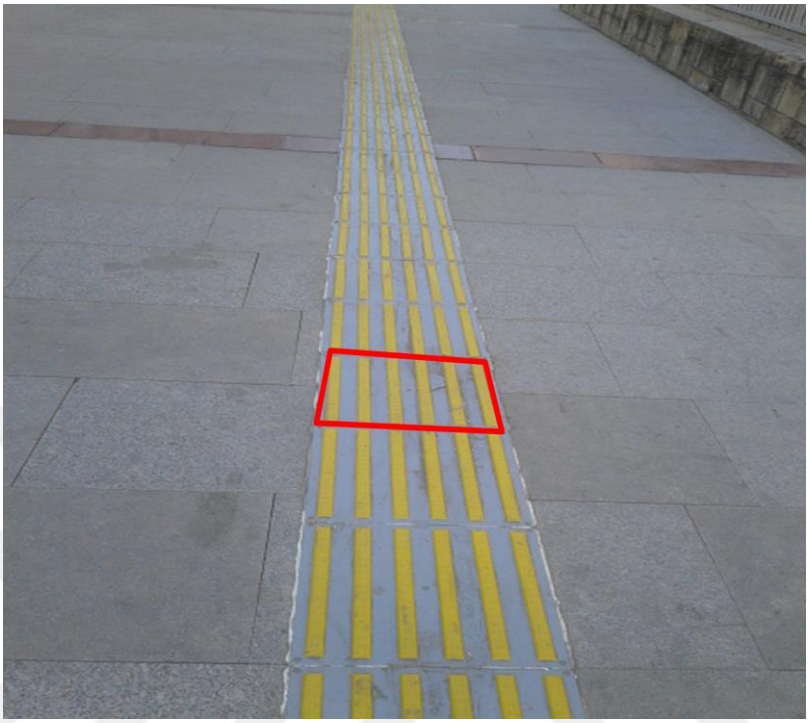


**Figure 4.2** Walking direction line


**Figure 4.3** Walking direction line

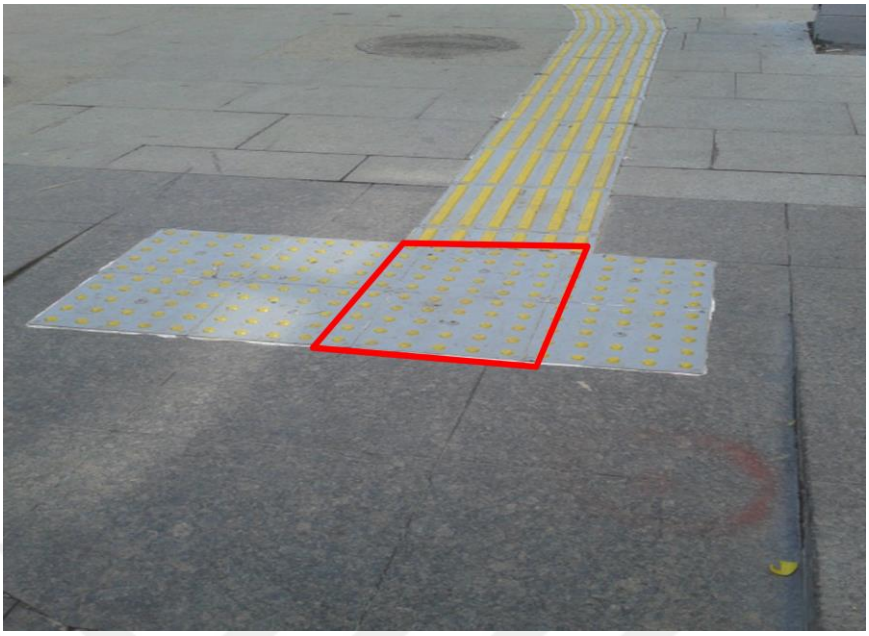


**Figure 4.4** Four direction line

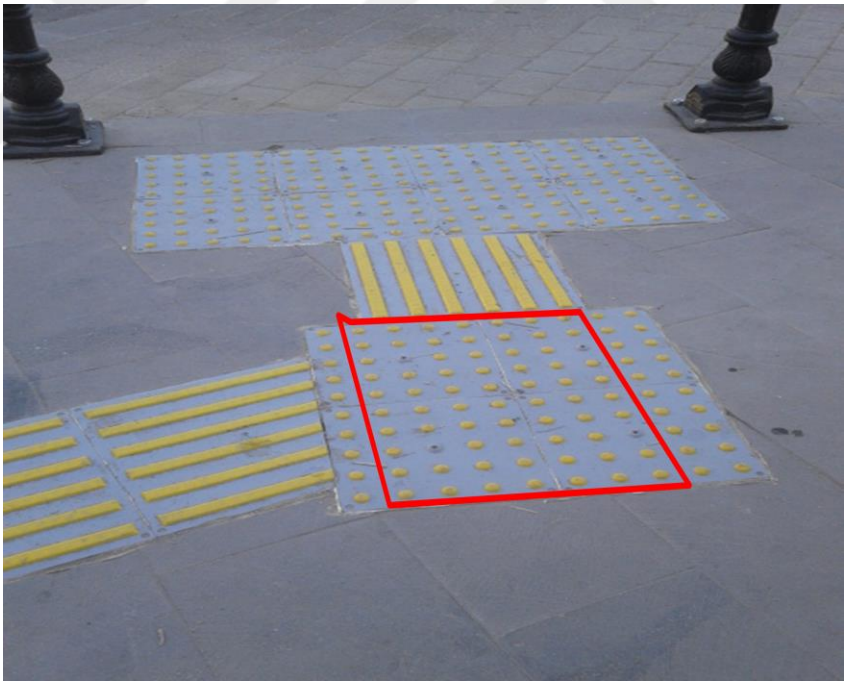


**Figure 4.5** Four direction line

# CHAPTER 5

# CONCLUSION AND DISCUSSION

## 5.1 Summary of the Results

The research results of the thesis were completed with R & D project and the system was realized and tested by real users in real life with working samples and found successful. After completed the R&D and production we have tested together by blind people, in live area in city, University campus, outdoor, indoor and on tactile walking lines. Test subjects were selected from different age groups and sexes. The devices we produced with these subjects were first tested in the ease of use test in the laboratory environment. The ergonomic features of the devices we have manufactured have been tested. As a result of the test run, it was seen that the subjects could easily use the devices. It was understood that the devices were ergonomic. Urban living areas were tested for use in the human crowd. In the tests made in the city, it was seen that the subjects could integrate with the devices that they could use the devices comfortably. Practice tests were conducted on the University campus site. Subjects could use the devices comfortably and simply. In the test work with the subjects, the subjects expressed their satisfaction and demanded that this system should be applied to the city pavements as soon as possible. Especially after the tests, the subjects stated that the non-audible embossed lines can not be used but will respond to the need of the blind if used with the audio system. As a result of these tests, we have seen that the work we have done is appropriate for the purpose. Determination of the success of our work

## 5.2 Further Work

The first aim of the this study is to provide the scientific and technological research and discussion of the planned system and to implement the voice guidance systems that can be used in the direction of the results of this study. Our second goal is to ensure that the work we are doing is a reference to further work to be done after that and it is the basis for this area. In this thesis, knowledge transmitter is to provide

voice access of visually impaired individuals and to provide services by developing technological technologies that will enable the perception of the user's environment to be more advanced with the image processing process.

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# APPENDİX A

## C cod of PIC 16F690 for knowledge transmitter

```
// Sound Recorder using SD/SDHC card and PIC16F690, by kemal karaoglan,
//
 // File will compile with the MPLAB free Hi-Tech C compiler or MPLABX with XC8.
  // Recording is done by the ADC using only the LSB. Bytes are written to the SD
// at the rate of 20KHz.
// For playback CCP is used as a DAC (Digital to Analogue Converter).
#include <htc.h>
#if defined(__XC8)
#pragma config FOSC=HS, CP=OFF, CPD=OFF, WDTE=OFF, BOREN=OFF,
MCLRE=OFF
#else defined(COMPILER_MPLAB_PICC)
  __CONFIG(WDTDIS & UNPROTECT & HS & MCLRDIS & UNPROTECT & BORDIS &
                                        PWRTDIS);
#endif
#define CS RC2                  //chip select input
#define Stop RA2       //stop pushbutton
#define Play RB5       //play PB
#define Rec RB7                 //record PB
#define Pause RA1     //pause PB
#define RecLED RC0
#define errorLED RC1
#define sdLED RC4     //SD or SDHC optional LED
```

```
//prototypes
unsigned char SPI(unsigned char data);
char Command(unsigned char frame1, unsigned long adrs, unsigned char frame2 );
void InitSD(void);
void main(void);
void WriteSD(void);
void ReadSD(void);
unsigned long loc;     //pause location
unsigned char sdhc=0;          //standard sd
void main(void)
{
        OSCCON = 0B1110001;         //8MHz,
        // PIC I/O init
        ANSEL = 0;
        ANSELH = 0;
        TRISC = 0b1000100;              //  rc5=CPP1.
        TRISA = 0b110;          // switches
        TRISB = 0b10110111;
        //pullup on
        #if defined(__XC8)
        nRABPU = 0;
   #else defined(COMPILER_MPLAB_PICC)
RABPU = 0;
   #endif
```

```
        WPUA1 = 1;
        WPUA2 = 1;
        WPUB5 = 1;
        WPUB7 = 1;
        ANS8 = 1;       //analogue chan 8
RecLED = 0;
errorLED = 0;
sdLED = 0;
//analogue init
CCP1CON = 0B1100;  //PWM mode
PR2 = 100;      //20KHz
T2CON = 0B100;       //prescale 1, post scale 1, timer2 on
ADCON1 = 0B1010000;                  // Fosc/16.
ADCON0 = 0B10100000;       // ref=Vdd, right just, AN8, AD off
//SPI init
SSPCON = 0B110010; //low speed osc/64(125kHz),enabled,clock idle=H
CS = 1;                      // disable SD
InitSD();
if(sdhc){loc = 10;}else{loc = 5120;}   //SD or SDHC
while(1) {
if(!Rec) WriteSD();
if(!Play) ReadSD();
if(!Stop) {
if(sdhc){loc = 10;}else{loc = 5120;}
```

```
}
        }
}
unsigned char SPI(unsigned char data)              // send character over SPI
{
SSPBUF = data;                          // load character
while (!BF);            // sent
return SSPBUF;                  // received character
}
 char Command(unsigned char frame1, unsigned long adrs, unsigned char frame2 )
{
unsigned char i, res;
SPI(0xFF);
SPI((frame1 | 0x40) & 0x7F);//first 2 bits are 01
SPI((adrs & 0xFF000000) >> 24);             //first of the 4 bytes address
SPI((adrs & 0x00FF0000) >> 16);
SPI((adrs & 0x0000FF00) >> 8);
SPI(adrs & 0x000000FF);
SPI(frame2 | 1);                                //CRC and last bit 1
for(i=0;i<10;i++)       // wait for received character
{
res = SPI(0xFF);
if(res != 0xFF)break;
}
```

```
return res;
}
void InitSD(void)
{
unsigned char i,r[4];  CS=1;
for(i=0; i < 10; i++)SPI(0xFF);            // min 74 clocks
CS=0;                        // Enabled for SPI mode
i=100;  //try enter idle state for up to 100 times
while(Command(0x00,0,0x95) !=1 && i!=0)
{  CS=1;
SPI(0xFF);
CS=0;
i--;
}
if(i==0)errorLED = 1;  //idle failed
if (Command(8,0x01AA,0x87)==1){                    -//check card is 3.3V
      r[0]=SPI(0xFF); r[1]=SPI(0xFF); r[2]=SPI(0xFF); r[3]=SPI(0xFF); //rest of R7
   if ( r[2] == 0x01 && r[3] == 0xAA ){             //Vdd OK (3.3V)
//Command(59,0,0xFF);                 //CRC off
Command(55,0,0xFF);
         while(Command(41,0x40000000,0xFF)){Command(55,0,0xFF);}  //ACMD41
with HCS bit
}
}else{errorLED = 1;}
```

```
if (Command(58,0,0xFF)==0){                    //read CCS in the OCR - SD or SDHC
r[0]=SPI(0xFF); r[1]=SPI(0xFF); r[2]=SPI(0xFF); r[3]=SPI(0xFF);      //rest of R3
sdhc=r[0] & 0x40;
if(r[0] & 0x40)sdLED=1;
}
SSPM1 = 0;     // full speed 2MHz
CS = 1;
}
void WriteSD(void)
{
unsigned int r,i;
CS = 0;
ADON = 1;
RecLED = 1;
r = Command(25,loc,0xFF);   //multi sector write
if(r != 0)
{
errorLED = 1;
ADON = 0;
RecLED = 0;
}
SPI(0xFF);
SPI(0xFF);
SPI(0xFF);
```

```
while(Stop && Pause)
{
SPI(0xFC);       //multi sector token byte
for(i=0;i<512;i++){
//ADC input sample
 #if defined(__XC8)
 GO_DONE = 1;
 #else defined(COMPILER_MPLAB_PICC)
GODONE=1;
 #endif
while(!TMR2IF){}       //20KHz clock
SPI(ADRESL);            //send analogue byte
TMR2IF = 0;
//comment next 2 lines to disable play while recording
DC1B1 = ADRESL & 1;//shift byte to get the required PWM duty cycle CCP1X
CCPR1L = (ADRESL >> 1);
}
SPI(0xFF);       // CRC
SPI(0xFF);       // CRC
if((r=SPI(0xFF) & 0x0F) == 0x05){      //data accepted        = 0101
for(i=10000;i>0;i--){
if(r=SPI(0xFF))break;
}
}
```

```
else{
errorLED = 1;
}
while(SPI(0xFF) != 0xFF);       // while busy
if(sdhc){loc += 1;}else{loc += 512;}   //SD or SDHC            }
SPI(0xFD);       //stop transfer          token byte
SPI(0xFF);
SPI(0xFF);
while(SPI(0xFF) != 0xFF);       // while busy  CS = 1;ADON = 0;
RecLED = 0;
}
void ReadSD(void)
{
unsigned int i,r;
unsigned char data;
CS = 0;
r = Command(18,loc,0xFF);   //read multi-sector
if(r != 0)errorLED = 1;                    //if command failed
while(Stop && Pause)
{
while(SPI(0xFF) != 0xFE);       // wait for first byte
for(i=0;i<512;i++){
while(!TMR2IF){}
data = SPI(0xFF);
```

```
DC1B1 = data & 1;     //shift byte to get the required PWM duty cycle

CCPR1L = (data >> 1);

TMR2IF = 0; }

SPI(0xFF);       //discard of CRC

SPI(0xFF);

if(sdhc){loc += 1;}else{loc += 512;}   //SD or SDHC }

Command(12,0x00,0xFF);     //stop transmitSPI(0xFF);SPI(0xFF);S = 1;}
```

# APPENDİX B

## PATIENT LIST OF WORLD AROUND

| PATIENT NUMBER | COUNTRY | DATE |
|---|---|---|
| TR2006/05726B | TR | October 13, 2006 |

Owner Name : Kemal KARAOĞLAN

| PATENT NUMBER | COUNTRY | DATE |
|---|---|---|
| US 2006/0108426A1 | UK | May 25, 2006 |

Inventors :Billy D. HOPKINS

ABSTRACT

Barcode scanning and digitizing technology incorporated in the tip of a white cane for the blind, which houses barcode reader, sonar, color sensory and audio production mechanisms. Apparatus detects and announces via audio or vibratory aoutput, obstacles, drop-ofs, colors or suitable imformational barcode sites placed with a plurality of locations or environments for assisting blind or visually impared urers to navigate. In one embodiment, the apparatus combines the white cane with a barcode scanner and decoder with laser depth finding capacity in the cane tip, an sonar technology within the cane housing; and a separate hand-held unit having color and standart UPC barcode scanners, both the cane and the hand held-unit being connected to the audio output device by a hard-wire or wireless connection.

| PATIENT NUMBER | COUNTRY | DATE |
|---|---|---|
| 2006/0129308A1 | USA | Jun 15, 2006 |

Inventors : Kates LAWRENCE

ABSTRACT

A computer-aided communication and navigation system that uses a computer or other processor in wireless communication with Radio Frequency Identification (RFID) tags to aid a blind peson. A communication module worn by the user

receives information from one or more RFID tagsreaders and provides audio and, optionally, stimulatory information to the blind person.In one embodiment, a tag reader is provided in walking cane. In one embodiment, tag readers are provided in one or more ankle bracelets or shoes.

| PATIENT NUMBER | COUNTRY | DATE |
|---|---|---|
| 2007/099416A2 | IT | 07.09.2007 |

Inventors : Andrea BORSIC

ABSTRACT

System for exploiting information selected on the basis of the position of a user, that includes- one or more transmitting devices capable of transmitting respective information.and arranged along a predetermined route, means for receiving said respective information selected on the basis of the position of a user and user menas to reproduce information content depending on said respective information selected on the basis of the position of a user.

| PATIENT NUMBER | COUNTRY | DATE |
|---|---|---|
| US 2009/0132158A1 | USA | May 21,2009 |

Inventors : Marco SIRONI

ABSTRACT

A navigation system for disabled persons, in particular visually impaired perons. The navigation system compaires a plurality of transponders with RFID tags, said transponders being installed at known locations and each of said RFID tags having a unique identifier. The navigation system further comprises a database comprising a mapping of the unique identifiers to the known location.

| PATIENT NUMBER | COUNTRY | DATE |
|---|---|---|
| TR 2012/0445 | TR | Jan. 13, 2012 |

Inventor : Kemal KARAOĞLAN

ABSTRACT

An eyeglass system that prosseing image and by textspeack audible speacking to users about shelds, road shelds and triggering the knowledge transmitter, receiving the knowledge of transmitter and heart to users.

| PATIENT NUMBER | COUNTRY | DATE |
|---|---|---|
| US 2012/0053826 | USA | Mar.01, 2012 |

Inventors : Milan SLAMKA

ABSTRACT

A navigation system help users navigate through an environment by a plurality of sensors. The sensors include one or both of short and long range sensors that detect objects within the user's environment. Information obtained from the sensors detection of objects within the user's environment can be used to help the user avoid colliding with objects within the environment and help navigate the user to a destination. The navigation system may provide the user with audible feed-back regarding the objects within the users environment and/or instructions regarding how to avoid colliding with an object and how to navigate to a destination.

| PATIENT NUMBER | COUNTRY | DATE |
|---|---|---|
| US 2013/0131985 | USA | May 23, 2013 |

Inventors : James D. WEILLAND

ABSTRACT

The system comprises a wearable, electronic image acquisition and processing system (or visual anhancement system) to guide visually impaired individuals through their environment, providing information to the user about nearby objects of interest, potentially dangerous obstacles, their location, and potential paths to their destination.

| PATIENT NUMBER | COUNTRY | DATE |
|---|---|---|
| US 2014/0253701 A1 | USA | Sep 11, 2014 |

Inventors : 1-Yonatan WEXLER 2-Erez N'AMAN 3- Ammon SHASHUA

ABSTRACT

An apparatus is provided for audibly reading text retrieved from a captured image. In one implementation, the apparatus comprises an image sensor configured to capture image data from an environtment of a user, and at least one processor. The processor is configured to determine an existence of a pointing trigger in the image data, the trigger being associated with a user's desire to hear text read aloud, and wherein the trigger identifies an intermediate portion of the text a distance from a level break in the text. The processor is further configured to perform a layout analysis on the text o identify a level break associatd with the trigger; and cause the text to be read alond from the level break associated with the trigger.

| **PATIENT NUMBER** | **COUNTRY** | **DATE** |
|---|---|---|
| TR 2015/01856 | TR | Feb. 15,2015 |

Inventors : Kemal KARAOĞLAN

ABSTRACT

The invention is an audible detection system comprising an audible-eye hand held device, audible-eye glasses, triggering audible-eye walking stick, and data transmitter system for indoors and outdoors which enble the visually impaired individuals to detect the place they are in audible position information via the knowledge transmitters. The system knowledge transmitter consist PV in for them needed energy.

| **PATIENT NUMBER** | **COUNTRY** | **DATE** |
|---|---|---|
| TR 2015/008873 | TR | 15.07.2015 |

Inventor : Kemal KARAOĞLAN

ABSTRACT

An audible shield system that when nearby person triggering and announcing about their knowledge where, who' s place, shop, manager and department.

# CIRRICULUM VITAE

Kemal KARAOĞLAN

I was born in Gaziantep /Turkey on 15th june 1959. After I completed primary and high school, I left Gaziantep to big city for University education. I graduated as Physic teacher at University and I worked for twenty years succesfully. During my proffession as physic teacher, I interested to experimental physics, wave teory and magnetism. After the working totally twelve years, I started my own private school about preparing the student to University exams. I was succesfull during run of my own private school, but I was not happy in my job. Because my childhood dreams to be scientist and to design new technology, cars , electronics devices and other things. My childhood dreams are not to earn much Money and easy life, my dream is to create new technology and technology for life of future.

Therefore I closed my all private schools in the 2005 and I began to design new technological devices. I started to apply on TPE(Turkish Patient Enstitituon) and WIPO for my desing, in the first year I designed 22 new patients.

I decided to start working about R&D and I started my R&D company in the Gaziantep University Technopark. During the working R&D years I worked as a teacher of R&D at the "Çukurova University" for BIL-406 and BIL-447 program courses in the Computer Engineering department 2012-2013 and 2013-2014 education years.

I graduated to Gaziantep University Faculty of Engineering Industrial department Masters degree on January 2016. After I studied English language at the Gaziantep University Foreign Language school and I graduated succesffully.

(M.Sc.) The program of last graduate : Gaziantep University Engineering Fakulty Endustry Engeneering and Technology management

Continuing education program : Gaziantep University Engineering Faculty of Physics M.Sc.

EDUCATION:

1-Institute of Education FKB part of graduation in June 1979

2-Physics Degree completion License diploma in 2010

3-Gaziantep University Institute of natural and applied sciences non-thesis master's diploma 01.18.2016

4- Gaziantep University Foreign Language School Prep education 2016-2017 graduate date :06.20.2017 Level: B2

GRADUATE COURSES TAKEN:

a-ME199 Mechanical Enginerring Orientation internship program Gaziantep. 2009

b- MI MAK513 Production Management / 2009-2010

c-MI MAK503-TQM and ISO9000 quality assurance standards / 2009-2010

d-Numerical Methods in Engineering MAK515-c- MI / 2009-2010

e- MI MAK516-forward Pascal and Fortran programming 77 / 209-2010

f-MI MAK532 e-Engineers for Ergonomics / 2009_2010

g - MI ELE515-Micro Electromechanical Systems / 2010-2011

h- MI ELE505-discrete-time control systems / 2010-2011

i- MI-wear and abrasion of MAK528 / 2012/2013

j- MI MAK529-Fatigue design and failure analysis / 2012-2013

k -MI MAK517 system design / 2012-2013

l - O processor Architecture2012 CENG544 Multi / 2013

m- O CENG546 Advanced Computer Network 2012-2013

PUBLISHED BOOKS:

K. KARAOĞLAN, "High School Physics Helper 1", Ertem Press Release, 1987, Ankara.

K. KARAOĞLAN "OSS, LMS Lecture Question Bank", Bilder Edition Publication, 1999, ANKARA

TRAINING, SEMINARS AND CERTIFICATES:

1. Modern Physics Course (MEB) -1983

2- Modern Chemistry Course (MEB) -1984

3. Model Aircraft Teacher Certification Turkish Aeronautical Association-1985

4- Training Management Seminar (MEB) 1992

5. Training Management Seminar (MEB) 1993

6- Private Education Institutions Training Administration (MEB) 1996

7- EU Project Management Information Seminar (9Eylül University) -2006

8- TRİZ- Innovative Problem Solving and R & D Management-Nov-2010

9-Solid Works Drawing Education 2016-2017

AWARDS:

Turkish Patent Institute from 1995-2009 Most Personal patent award

Registered PATENT DOCUMENTS:

1. THREE MOTOR VEHICLE SYSTEM PATENT NO: TR2006 / 05778B

2- VOICE EYE Patent No. TR2006 / 05726B

3- bike smart Patent No. TR2006 / 06678B

4-Smart Motobike TPE TR2006/06677B

5-Multi Functional Digital classroom and expression board TPE TR2015 00811(common with asist.Prof Alptekin DURMUŞOĞLU)

COMPLETED PROJECTS:

1-TUBITAK TEYDEB been run SUCCESS WITH THE PROJECT COMPLETED

Project NO: Teydeb-7080946

2-Kosgeb (Gaziantep University TDC) Project No: 2007/041

3-SESLİGÖZ industrial applications KOSGEB-File No: 2010/048

4-Gaziantep University Faculty of Electronics Department of collaboration

Scientific Research Projects (BAP)

HEALTH AND SAFETY COMMUNICATIONS-EMPLOYMENT PROJECT MINE in Gaziantep University Scientific Research Projects (BAP) Project Team: Prof.Dr.Celal KORAŞLI of asist. Prof.Tolgay KARA, Kemal KARAOĞLAN

5- On tactile walking lines embedded voice recognition system for the visually impaired

TUBITAK TEYDEB File No. 7140760