



EAST WEST UNIVERSITY

SCHI-CLOVER

(A Device To Enhance The Quality Of Life For Schizophrenia Patient's)

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The report has been submitted to the Department of the Computer Science & Engineering at East West University in the partial fulfillment of the requirement for the degree of Bachelor of Science in Computer Science and Engineering.

8th May,2016

DECLARATION

The report has been submitted to the Department of the Computer Science & Engineering, East West University in the partial fulfillment of the requirement for the degree of Bachelor of Science in CSE performed by me under supervision of K.M. Imtiaz-Ud-Din. This is also needed to certify that, the report work is under the course '**Thesis Work (CSE-497)**'. I, hereby, declare that this report has not been submitted elsewhere for the requirement of any degree or diploma or any other purposes.

Signature of the candidate

(Tauheedul Maruf)

Abstract

In this report, SCHI-CLOVER can help a Schizophrenic patient to live his daily life without medicine and also in a controlled way. It can identify Schizophrenic patient based on their symptoms. And Psychiatrists can use this as a reference for their patient's further treatment.

(Tauheedul Maruf)

Letter of Acceptance

This report is submitted By Tauheedul Maruf, Id :2011-3-60-008 to the department of computer Science and Engineering, East West University, Dhaka Bangladesh is accepted as satisfactory for the partial fulfillment of the of the requirement for the degree of Bachelor of Science in Computer Science and Engineering on May 08, 2016.

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ACKNOWLEDGEMENTS

It has been great pleasure for me to develop a Device for Schizophrenic Patient's. I have gathered sufficient knowledge and experience during this report.

Most Importantly I would like to thank my honorable teacher and supervisor, K.M. Imtiaz-Ud-Din. Who guided me to proper analysis of the system and helped to develop an elegant and efficient system .It was a great pleasure to study and work with many gifted people who influenced me in many ways. First of all, I would like to thank my project Supervisor K.M. Imtiaz-Ud-Din. He encouraged me to seek out the clearest and deepest description of theoretical ideas as well as experimental findings. I am very grateful to him for his continuous support, advice and guidance.

Finally I would like to convey my Special thanks to my parents whom have always given me tremendous Support. Without their love and encouragement I would not had achieve this far.

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Chapter 1

Introduction

SCHI-CLOVER is a artificially trained device with a integrated software. By using this device we can sort out a schizophrenic patients symptoms and set a surveillance system to the patient for betterment. Basically it will find out a process to lead a normal life without medicine. And Psychiatrist can use this system as a reference to get data for further treatment of their patients.

1.1 What is Schizophrenia?

Schizophrenia is a serious disorder which affects a person thinking, feelings and acts. Someone with schizophrenia may have difficulty distinguishing between what is real and what is imaginary; They are mixing up themselves with real and imaginary World .They may have facing difficulties to express normal emotions in social situations.

1.2 Causes of schizophrenia:

Researchers still don't know exactly what causes schizophrenia, but they do know that the brains of people living with schizophrenia are different, as a group, from the brains of those who don't live with the illness. However, it appears that schizophrenia usually results from a complex interaction between genetic and environmental factors.

Genetic Causes

Schizophrenia has a strong hereditary component. Individuals with a first-degree relative (parent or sibling) who has schizophrenia have a 10 percent chance of developing the disorder, as opposed to the one percent chance of the general population.

If any family member of a person have Schizophrenia that does not mean they have to have schizophrenia in future. Furthermore, individuals who are genetically predisposed to schizophrenia don't always develop the disease, which shows that biology is not destiny.

Environmental Causes

Twin and adoption studies suggest that inherited genes make a person vulnerable to schizophrenia and then environmental factors act on this vulnerability to trigger the disorder.

Research points to several stress-inducing environmental factors that may be involved in schizophrenia, including:

- Prenatal exposure to a viral infection
- Low oxygen levels during birth (from prolonged labor or premature birth)
- Exposure to a virus during infancy
- Early parental loss or separation
- Physical or sexual abuse in childhood

Abnormal brain structure

In addition to abnormal brain chemistry, abnormalities in brain structure may also play a role in schizophrenia. Enlarged brain ventricles are seen in some schizophrenics, indicating a deficit in the volume of brain tissue. There is also evidence of abnormally low activity in the frontal lobe, the area of the brain responsible for planning, reasoning, and decision-making.

Some studies also suggest that abnormalities in the temporal lobes, hippocampus, and amygdala are connected to schizophrenia's positive symptoms. But despite the evidence of brain abnormalities, it is highly unlikely that schizophrenia is the result of any one problem in any one region of the brain.

<http://www.mentalhealthamerica.net/conditions/schizophrenia>[1]

1.3 Types Of Schizophrenia

There are three types of schizophrenia patient's:

1. Paranoid Schizophrenia
2. Catatonic Schizophrenia
3. Disorganized schizophrenia, or hebephrenia (hebephrenic schizophrenia)

1. Paranoid Schizophrenia :

Paranoid schizophrenia is a subtype of schizophrenia in which the patient has delusions (false beliefs) that a person or some individuals are plotting against them or members of their family. **Paranoid schizophrenia is the most common schizophrenia type.**

The majority of people with paranoid schizophrenia, as with most schizophrenia subtypes may also have auditory hallucinations - they hear things that are not real. They may also have delusions of personal grandeur - a false belief that they are much greater and more powerful and influential than they really are.

An individual with paranoid schizophrenia may spend a disproportionate amount of time thinking up ways of protecting themselves from their persecutors.

Typically, a person with paranoid schizophrenia has fewer problems with memory, dulled emotions and concentration compared to those with other subtypes; which allows them to think and function more successfully. Even so, paranoid schizophrenia

is a chronic (long-term, lifelong) condition which may eventually lead to complications, including suicidal thoughts and behavior.

Some schizophrenia symptoms are not prominent, such as disturbances of volition, affect, speech and catatonia.

- **Auditory hallucinations** - hearing voices that are not there (they don't exist). Visual hallucinations are possible, but rare.
- **Delusions** - beliefs that are not real; false personal beliefs that are not subject to reason or contradictory evidence. The patient may firmly believe something, even though there is incontrovertible evidence that it is false. An example may be a belief that a neighbor is plotting to kill or poison the patient.
- **Anxiety** - a patient with paranoid schizophrenia will usually suffer from periods of high **anxiety**.
- **Anger** - this emotional state may range from mild irritation, which most healthy individuals sometimes have, to fury and rage. Anger may raise heart rate, **blood pressure** and levels of adrenaline and noradrenaline.
- **Detachment** - the patient may sometimes be physically or emotionally; reserved and remote (aloofness)
- **Aggression and violence** - aggression may reach levels in which violent outbursts occur.
- **Quarrels**
- **Condescension** - sometimes the patient may seem patronizing; perhaps they may feel they know stuff other people don't and subsequently assume such a manner.
- **Suicidal thoughts and behavior** - these may be noticeable by people around the individual, with statements such as "I wish I were dead", "I am going to kill myself", or "I wish I had never been born". The patient may go further and obtain the means to kill himself/herself, such as getting a weapon or accumulating pills. Other warning signs may be:

Patients with paranoid schizophrenia are more likely to be affected by positive symptoms, such as delusions and auditory hallucinations, and less by problems with mood, cognition (thinking, concentration, attention), compared to other types of schizophrenia.

Risk factors:

A risk factor is something which increases the likelihood of developing a condition or disease. For example, **obesity** significantly raises the risk of developing **diabetes** type 2. Therefore, obesity is a risk factor for diabetes type 2.

The risk factors for paranoid schizophrenia are basically the same as those for most schizophrenia sub-types, including [2]:

- **Genetics** - individuals with a family history of schizophrenia have a higher risk of developing it themselves. If there is no history of schizophrenia in your family your chances of developing it (any type) are less than 1%. However, that risk rises to 10% if one of your parents was/is a sufferer.
- **Viral infection** - if the fetus (unborn baby in the womb) is exposed to a viral infection, there is a bigger risk of developing schizophrenia.
- **Fetal malnutrition** - if the fetus suffers from **malnutrition** during the mother's pregnancy there is a higher risk of developing schizophrenia.
- **Stress during early life** - experts say that severe **stress** early on in life may be a contributory factor towards the development of schizophrenia. Stressful experiences often precede the emergence of schizophrenia. Before any acute symptoms are apparent, people with schizophrenia habitually become bad-tempered, anxious, and unfocussed. This can trigger relationship problems. These factors are often blamed for the onset of the disease, when really it was the other way round - the disease caused the crisis. Therefore, it is extremely difficult to know whether schizophrenia caused certain stresses or occurred as a result of them.
- **Childhood abuse or trauma**
- **Parental age when baby is born** - older parents have a higher risk of having children who subsequently develop schizophrenia, compared to younger parents.
- **Drugs** - the use of drugs that affect the mind or mental processes may sometimes raise the risk of developing schizophrenia.

2. Catatonic Schizophrenia

Catatonic schizophrenia is a type (or subtype) of schizophrenia that includes extremes of behavior. At one end of the extreme the patient cannot speak, move or respond -

there is a dramatic reduction in activity where virtually all movement stops, as in a catatonic stupor.

At the other end of the extreme they are overexcited or hyperactive, sometimes mimicking sounds (echolalia) or movements (echopraxia) around them - often referred to as catatonic excitement.

Patients may also present other disturbances of movement - seemingly purposeless actions are performed repetitively (stereotypic behavior), sometimes to the exclusion of involvement in any creative or productive activity.

Sometimes an individual with catatonic schizophrenia may deliberately assume bizarre body positions, or manifest unusual limb movements or facial contortions, sometimes resulting in the misdiagnosis with tardive dyskinesia.

Signs and symptoms

A symptom is something the patient senses and describes, while a sign is something other people, such as the doctor notice. For example, drowsiness may be a symptom while dilated pupils may be a sign.

- **Physically immobile** - the patient cannot speak or move. They may stare and hold their body in a fixed position. They appear to be unaware of their surroundings (catatonic stupor).
- **Waxy flexibility** - this is part of physical immobility. If the patient's arm, for example, is moved by someone else into a certain position, it remains in that position for possibly hours.
- **Excessive mobility** - the patient moves excitedly with what appears to have no specific or useful purpose. This may include pacing around energetically, walking in circles, making loud and unusual utterances.
- **Uncooperative** - the patient may resist any attempt to move them. They may say absolutely nothing (not speak) and not respond to instructions.
- **Strange movements** - the patient's posture may be unusual or inappropriate. There may be bizarre mannerisms and grimacing.
- **Unusual behavior** - the patient may repeat words, follow a ritual/routine with obsession. He/she may be obsessed with lining things up in a specific way.

- **Echolalia** (mimicking utterances) and/or **Echopraxia** (mimicking movements) - the patient may repeat something someone else has just said. There may be repetition of a movement or gesture made by another person.

Apart from the above, which are examples of catatonic schizophrenia symptoms, the patients may also have the following signs and symptoms of schizophrenia:

- **Delusions** - The patient has false beliefs of persecution, guilt of grandeur. He/she may feel things are being controlled from outside. It is not uncommon for people with schizophrenia to describe plots against them. They may think they have extraordinary powers and gifts. Some patients with schizophrenia may hide in order to protect themselves from an imagined persecution.
- **Hallucinations** - hearing voices is much more common than seeing, feeling, tasting, or smelling things which are not there, but seem very real to the patient.
- **Thought disorder** - the person may jump from one subject to another for no logical reason. The speaker may be hard to follow. The patient's speech might be muddled and incoherent. In some cases the patient may believe that somebody is messing with his/her mind.
- **Lack of motivation** - the patient loses his/her drive. Everyday automatic actions, such as washing and cooking are abandoned. It is important that those close to the patient understand that this loss of drive is due to the illness, and has nothing to do with slothfulness.
- **Poor expression of emotions** - responses to happy or sad occasions may be lacking, or inappropriate.
- **Social withdrawal** - when a patient with schizophrenia withdraws socially it is often because he/she believes somebody is going to harm them. Other reasons could be a fear of interacting with other humans because of poor social skills.
- **Unaware of illness** - as the hallucinations and delusions seem so real for the patients, many of them may not believe they are ill. They may refuse to take medications which could help them enormously for fear of side-effects, for example.
- **Cognitive difficulties** - the patient's ability to concentrate, remember things, plan ahead, and to organize himself/herself are affected. Communication becomes more difficult.

There may also be incoherent speech, poor personal hygiene, angry outburst, and uncoordinated movements (clumsiness)[2].

Without proper treatment a catatonic episode can persist for days and even weeks.

Patients with catatonic schizophrenia symptoms are not usually able to get medical help on their own. When their symptoms appear to have subsided, it is common for them to believe they are fine and do not need treatment. Seeking medical help is frequently initiated by a family member or good friend.

3. Hebephrenic schizophrenia :

Disorganized schizophrenia, or hebephrenia (hebephrenic schizophrenia) is one of several subtypes of schizophrenia, a chronic (long-term) mental illness - it is thought to be an extreme expression of *disorganization syndrome* that has been hypothesized to be one feature of a 3-factor model of schizophrenia symptoms; the others factors being delusions/hallucinations (reality distortion) and psychomotor poverty (poor speech, lack of spontaneous movement, and blunting emotion).

Disorganized schizophrenia is characterized by incoherent and illogical thoughts and behaviors; in other words, disinhibited, agitated, and purposeless behavior.

Experts say disorganized schizophrenia is a more severe schizophrenia type because the patient cannot perform daily activities, such as preparing meals and taking care of personal hygiene (washing). According to the Mayo Clinic, USA, people may not be able to understand what the person with disorganized schizophrenia is saying. The patient may become frustrated and agitated, causing him/her to lash out.

Signs and Symptoms:

- **Disorganized thinking** - the patient is unable to form coherent or logical thoughts. This inability affects speech - during a conversation the individual cannot stick to the subject, and leaps from one disparate subject to another. The speech problem may become

so severe that it is perceived as unintelligible garble (a muddle of sounds) to those around him/her. Writing is also severely affected by disorganized thinking.

- **Grossly disorganized behavior** - these symptoms may be so severe that the patient is unable to perform regular daily activities, such as bathing, dressing properly and preparing meals. For example, during a warm day the individual may put on several layers of clothing. There may be unprovoked agitation, or sexual behavior in public. Grossly disorganized behavior may feel normal to the person with schizophrenia, but appears bizarre to those around them. Behaviors may vary from being child-like and silly, to aggressive and violent.
- **Inappropriate or lacking emotional expression** (flat affect) - flat affect, also known as blunted affect, is sometimes a symptom of people with severe **depression** or schizophrenia - the individual may show the signs of normal emotion, may even talk with a monotonous voice. However, the face appears blank, facial expressions are significantly diminished. The patient appears extremely apathetic. There may be no eye contact with other people or any display of body language. On some occasions the individual may display behavior which is not appropriate for given situations - this may include bursting out laughing during a serious event.

Apart from the above, which are examples of disorganized schizophrenia symptoms, the patients may also have the following signs and symptoms of schizophrenia:

- **Delusions** - The patient has false beliefs of persecution, guilt of grandeur. He/she may feel things are being controlled from outside. It is not uncommon for people with schizophrenia to describe plots against them. They may think they have extraordinary powers and gifts. Some patients with schizophrenia may hide in order to protect themselves from an imagined persecution.
- **Hallucinations** - hearing voices is much more common than seeing, feeling, tasting, or smelling things which are not there, but seem very genuine to the patient.
- **Social withdrawal** - when a patient with schizophrenia withdraws socially it is often because he/she believes somebody is going to harm them. Other reasons could be a fear of interacting with other humans because of poor social skills.
- **Unaware of illness** - as the hallucinations and delusions seem so real for the patients, many of them may not believe they are ill. They may refuse to take medications which could help them enormously for fear of side-effects, for example.

- **Cognitive difficulties** - the patient's ability to concentrate, remember things, plan ahead, and to organize himself/herself are affected. Communication becomes more difficult.
- There may also be grimacing, bizarre postures, problems functioning at school/work, and clumsy/uncoordinated movements.

Patients with disorganized schizophrenia symptoms are not usually able to get medical help on their own. When their symptoms appear to have subsided, it is common for them to believe they are fine and do not need treatment. Seeking medical help is frequently initiated by a family member or good friend[3].

1.4 Effects of schizophrenia

When the signs and symptoms of schizophrenia are ignored or improperly treated, the effects can be devastating, both to the individual with the disorder and those around him or her.

Some of the possible effects of schizophrenia are:

- **Relationship problems.** Relationships suffer because people with schizophrenia often withdraw and isolate themselves. Paranoia can also cause a person with schizophrenia to be suspicious of friends and family.
- **Disruption to normal daily activities.** Schizophrenia causes significant disruptions to daily functioning, both because of social difficulties and because everyday tasks become hard, if not impossible to do. A schizophrenic person's delusions, hallucinations, and disorganized thoughts typically prevent him or her from doing normal things like bathing, eating, or running errands.
- **Alcohol and drug abuse.** People with schizophrenia frequently develop problems with alcohol or drugs, which are often used in an attempt to self-medicate, or relieve symptoms. In addition, they may also be heavy smokers, a complicating situation as cigarette smoke can interfere with the effectiveness of medications prescribed for the disorder.
- **Increased suicide risk.** People with schizophrenia have a high risk of attempting **suicide**. Any suicidal talk, threats, or **gestures** should be taken very seriously. People with schizophrenia are especially likely to commit suicide during psychotic episodes, during periods of depression, and in the first six months after they've started treatment.

1.5 Diagnosing schizophrenia

A diagnosis of schizophrenia is made based on a full psychiatric evaluation, medical history, physical exam, and lab tests.

- **Psychiatric evaluation**
- **Medical history and exam**
- schizophrenia, simple blood and urine tests can rule out other medical causes of symptoms. The doctor may also order brain-imaging studies, such as an MRI or a CT scan, in order to look for brain abnormalities associated with schizophrenia.

Criteria : The presence of two or more of the following symptoms for at least 30 days:

1. Hallucinations
 2. Delusions
 3. Disorganized speech
 4. Disorganized or catatonic behavior
 5. Negative symptoms (emotional flatness, apathy, lack of speech)
- **Significant problems functioning** at work or school, relating to other people, and taking care of oneself.
 - **Continuous signs of schizophrenia** for at least six months, with active symptoms (hallucinations, delusions, etc.) for at least one month.
 - **No other mental health disorder, medical issue, or substance abuse problem is causing the symptoms.**
 - [http://psychcentral.com/lib\[2\]](http://psychcentral.com/lib[2])

1.6 Medication

A cure for schizophrenia has not yet been found, but mental health recovery is possible as most people's symptoms can be improved with medication. The primary medications for schizophrenia, called antipsychotics or neuroleptics, help relieve the hallucinations, delusions and, to a lesser extent, the thinking problems people can experience. These medications are thought to work by correcting an imbalance in the chemicals that help brain cells communicate with each other.

The first generation of antipsychotic medications were introduced in the 1950s. These earlier medications, now called conventional, or typical, antipsychotics, often have side effects of restless motion (called akathisia), Parkinson-like symptoms (e.g., stiffness, dry mouth, sedation) and can cause a disabling, embarrassing and untreatable movement disorder called tardive dyskinesia.

Chapter 02

Medical science research about schizophrenia

An international team of scientists led by Cardiff University researchers has provided the strongest evidence yet of what causes schizophrenia - a condition that affects around 1% of the global population.

In the journal *Neuron* Published at 03/06/2015, their work presents strong evidence that disruption of a delicate chemical balance in the brain is heavily implicated in the disorder.

In the largest ever study of its kind, the team found that disease-linked mutations disrupt specific sets of genes contributing to excitatory and inhibitory signaling, the balance of which plays a crucial role in healthy brain development and function.

Another publications show that an computer generated avatar may help control voices in schizophrenia. Auditory hallucinations is a most common symptoms of schizophrenia and this novel therapy technique attempts to tackle this [3].

1.1 Medications :

Followings drugs are experimental for schizophrenia patient's :

Compound	Trade Name	Companies	Method of Action	FDA Trials Phase
iloperidone	Zomaril	Titan/Novartis	D2/5-HT2 antagonist	Phase III
DTA 201A		Knoll (BASF)	D3 antagonist	Phase II
DU 127090		Solvay/Lundbeck	D2/5-HT1a antagonist	Phase II
ORG 5222		Organon (Akzo Nobel)	D2/5-HT2 antagonist	Phase II
Osanetant		Sanofi-Synthelabo	neurokinin-3 antagonist	Phase II
MEM 3454		<u>Memory Pharmaceuticals Corp.</u>	partial agonist of the nicotinic alpha-7 receptor	Phase I

[http://www.schizophrenia.com/meds.html#\[4\]](http://www.schizophrenia.com/meds.html#[4])

1.2 Treatment Facilities

BEACON (Bangladesh)

National Institute of Mental health Care (Bangladesh)

Pacific Grove Hospital

Park Royal Behavioral Health Service

American Residential Treatment Association

LakeView Behavioral Health and etc.

Those are the most common treatment facilities all over the world.

1.3 Side Effects

Perspective of Beacon (Bangladesh) And National Institute of Mental health Care :

If a patient spend a week at this two facilities they cannot even sort out their own name or memorizing their own siblings and not even his/her children or brother or sisters. Even if by the effect of their medications they can be cure for a certain time.

1.4 Time Duration of the Treatment & Cost Analysis

Basically No one can Give a Clear Estimation about time but average time duration 1 month.

Per Day at Those Facility for a single patient Room Cost- 6000 BDT
 Medicine Cost- 1700 BDT (minimum) (1 Day)
 Doctor Visiting Charge-12000 BDT (Weekly)

So Average Time & Cost : 1 Month = 2,11000 BDT

1.5 Statistical Survey Report :

Descriptive statistics describing service utilization and level of treatment for each country, organized by World Bank income classifications[7]

Income classification/country	Population	Estimated prevalence	Treated prevalence ^a	Facility utilization rate ^b (%)			
				Outpatient	Inpatient		
					Mental hospital	General hospital psychiatric unit	Treatment gap ^c (%)
Low-income							
Afghanistan	23 627 000	338	15	53	10	37	95
Bangladesh	153 122 000	343	9	78	5	17	97
Burundi	7 603 000	329	16	74	26	0	95

Income classification/country	Population	Estimated prevalence	Treated prevalence ^a	Facility utilization rate ^b (%)			
				Outpatient	Inpatient		Treatment gap ^c (%)
					Mental hospital	General hospital psychiatric unit	
Eritrea	4 631 000	329	13	49	51	0	96
Ethiopia	72 746 000	272	35	97	3	0	89
Kyrgyzstan	5 282 000	513	263	73	22	5	49
Mongolia	2 517 000	444	166	58	22	21	63
Myanmar	48 345 000	343	167	98	2	0	51
Nepal	27 222 000	343	36	94	3	3	90
Nigeria	27 386 609	329	178	96	4	0	35
Uzbekistan	26 320 000	495	339	69	30	1	31
Lower-middle-income							
Albania	3 099 000	513	233	79	12	9	55
Armenia	3 068 000	513	487	80	18	2	5
Azerbaijan	8 538 000	495	245	84	16	0	50
Belize	288 000	427	131	77	16	7	69
Bolivia (Plurinational State of)	9 524 000	384	152	93	7	0	60
China (Hunan)	66 977 000	444	262	90	9	1	41
Congo	2 854 600	329	25	72	0	28	92

Income classification/country	Population	Estimated prevalence	Treated prevalence ^a	Facility utilization rate ^b (%)			
				Outpatient	Inpatient		
					Mental hospital	General hospital psychiatric unit	Treatment gap ^c (%)
Djibouti	805 000	338	84	66	0	34	75
Ecuador	13 203 000	384	12	21	70	10	97
Egypt	75 718 000	338	84	70	27	4	75
El Salvador	6 037 000	384	108	89	11	0	75
Georgia	4 100 000	513	222	100	0	0	57
Guatemala	12 397 000	384	138	96	4	0	64
Guyana	764 000	427	119	45	12	42	72
Honduras	7 032 000	427	147	94	6	0	66
India (Gujarat)	51 000 000	343	24	81	12	6	93
Iran (Islamic Republic of)	69 982 000	424	84	65	26	9	80
Iraq	27 564 000	338	182	93	5	2	46
Kosovo	1 900 000	513	188	82	0	18	63
Maldives	288 000	343	108	99	0	1	68
Morocco	30 152 000	338	234	83	9	8	31
Nicaragua	5 386 000	427	25	70	28	1	94
Pakistan	176 952 000	338	13	25	24	51	96

Income classification/country	Population	Estimated prevalence	Treated prevalence ^a	Facility utilization rate ^b (%)			
				Outpatient	Inpatient		Treatment gap ^c (%)
					Mental hospital	General hospital psychiatric unit	
Paraguay	5 793 000	427	130	78	21	1	70
Philippines	85 496 000	444	82	85	8	8	82
Sri Lanka	19 462 000	486	302	83	3	14	38
Sudan	39 545 000	338	23	77	1	22	93
Timor-Leste	927 000	343	210	100	0	0	39
Tunisia	9 790 000	424	89	59	24	17	79
West Bank and Gaza Strip	3 636 000	338	122	90	10	0	64
Upper-middle-income							
Chile	16 127 000	427	188	84	7	9	56
Costa Rica	4 396 000	427	157	73	22	4	63
Dominica	71 286	427	421	24	0	76	1
Dominican Republic	9 674 000	427	79	92	6	1	82
Jamaica	2 696 000	427	52	27	55	18	88
Latvia	2 337 000	482	1069	70	29	1	0
Panama	3 232 000	427	51	68	14	18	88

Income classification/country	Population	Estimated prevalence	Treated prevalence ^a	Facility utilization rate ^b (%)			
				Outpatient	Inpatient		Treatment gap ^c (%)
					Mental hospital	General hospital psychiatric unit	
Saint Lucia	169 000	427	275	37	62	1	36
Suriname	510 000	427	125	81	19	0	71

^a Calculated as the number of people per 100 000 population who were treated annually for schizophrenic disorders in all types of mental health facilities.

^b Calculated as the number of people treated annually for schizophrenic disorders in each type of mental health facility divided by the total number of patients with schizophrenic disorders treated annually in all mental health facilities.

^c Defined as the proportion of individuals with schizophrenic disorders who failed to receive treatment.

<http://www.who.int/bulletin/volumes/90/1/BLT-11-089284-table-T2.html> [5]

Chapter 03

Proposed Method:

I proposed a method which can probably enhance a patient's quality of life.

1.1 Method details:

This method is a combination of sound, visual information gathered from a patient's behavioral reactions.

Relation between Sound Wave & Visual Information with schizophrenia:

Sound Wave:

Sound wave can help us alter our consciousness and unleash mind powers that are normally not accessible to us in ordinary consciousness. There are some recognized brain wave ranges:

1. Theta (4-7 Hz) meditative states
2. Beta (14-30 Hz) waking consciousness
3. Alpha (7-14 Hz) states of relaxation and
4. Delta (0.5-4 Hz) deep sleep and profound meditative states.
5. Gamma Wave (Greater than 40) High Mental Activity.

Studies have demonstrated that when people listen to sounds that are in the theta range (4.0-7.0 Hz), they enter deep meditative states and tend to have greater visualizations. Those are the effects of how Sound wave affects in normal human being.[6]

Visual Information:

We can detect stress , anxiety , emotions , Depression and many other reaction of a person using visual information and image processing.

Explanation of neurotransmitter and its effects in schizophrenia :

Brain uses chemicals called neurotransmitters to send messages across brain cells. One such neurotransmitter is called dopamine and another called Serotonin. Only about 0.3% of the cells in your brain use dopamine; however, it plays a vital role in many body functions and illnesses. Since researchers cannot directly measure the levels of dopamine in someone's brain, they rely on dopamine markers that give an indirect measure of dopamine levels.

Researchers have estimated that up to 90 per cent of people who have schizophrenia hear voices either talking to them, or talking about them which is Theta Sound wave because when they listening to those voices they are in meditative states.

So every persons brain have two major chemical components Dopamine and Serotonin. And Imbalance of Dopamine causes auditory hallucinations and low serotonin levels are associated with depression which is together one of the major cause of schizophrenia. Now Dopamine is a neurotransmitter that is involved in many necessary brain functions. It is

released when we get rewarded and is linked to feelings of pleasure. Any behavior that induces a sense of pleasure such as: gambling and winning, doing certain drugs, drinking alcohol, high fever, or eating candy – all stimulate the dopaminergic system and when we highly stressed, have sleeping issues, struggle with anxiety and/or panic attacks, and be more susceptible to depression then those are stimulate the Serotonin[7].

Dopamine Causes:

Depersonalization:	Low DP
Confusion:	Difficult time + Not Enough DP
Cognitive impairment:	Insufficient DP
Blunted affect:	Low DP + Expression Less
Anxiety:	High DP
Attention deficits:	Low DP
Weight changes:	Low DP
Social withdrawal :	Low DP
Slow thinking :	Low DP
Sleepiness:	Low DP
Monotone speech:	Low DP
Memory impairment:	Low DP
Low libido:	Low DP
Inattentiveness:	Low DP
Poor concentration:	Low DP
Learning problems:	Low DP
Lack of motivation:	Low DP
Fatigue:	Low DP
Disorganized thinking:	Low DP + at a time different symptoms
Depression:	Low DP + Overt Observation

Suggested Medicine:

L-Tyrosine
L- Phelalanine

Serotonin Causes:

Anxiety:	Low SR
Carbohydrate cravings:	Low SR + Carbohydrate
Cognitive impairment:	Low SR + Poor Memory
Depression:	Low SR (20% cases)
Digestive problems:	Low SR
Emotional sensitivity:	Low SR
Fatigue:	Deficient SR
Headaches:	High SR
Insomnia:	Abnormally low SR
Irritability:	Low SR
Libido changes:	Low SR
Light sensitivity:	Low SR
Low self-esteem:	Low SR
Mood swings:	Low SR

Obsessive thoughts:	Low SR + Uncontrolled thinking
Overeating:	Low SR
Pain sensitivity:	Low SR
Restlessness :	Low SR
Sleep problems :	Low SR
Social withdrawal :	Low SR
Sound sensitivity :	Low SR
Suicidal thoughts :	Low SR
Weight gain:	Low SR

Suggested Medicine :
L-Tryptophen

But how Sound Wave is related to improve schizophrenia patients:

Now if some defined sound wave and visual information can assist to reduce patients symptoms then automatically dopamine and serotonin level will be merged as a normal persons behavioral range.

Explanations:

When a person is listening something he entered a meditative state but for schizophrenia patient's this meditative states creates a greater visualization and thinking for relating real and imaginary part with their thoughts , feelings and emotions .

Now there is some defined frequency sound wave which can make interruption in the meditative states of a patients for example at that time if we send a 528hz (which is known as a miracle sound wave) sound wave to his/her head for 5 to 6 minutes then he/she will feel relief about two to three hours and in the mean time their Dopamine level and Seotonin level Will be dramatically merged. There are many other waves that can interruption emotions, feelings etc and this is how sound and visual information is related to schizophrenia patients quality of life enhancement.

Talking with patients family members or his/her favorite admire, Blood pressure controlling, Or any supporting environment which can help patients to reducing those neural symptoms can help a schizophrenia patient feel better.

1.2 Test Cases:

For Reducing Anxiety :

Patient's who suffered from Paranoid Schizophrenia is always suffer from anxiety. That Means their :

Dopamine Level	:	High
Serotonin Level	:	Low

And additional sudden burst Of adrenaline & high levels of cortisol. And After effect causes hyper-vigilant emotional state of anxiety.

So now,

First apply attention (1050 Hz) Sine Wave Sound Frequency. Identify the visual information. Then, Binaural beats that induce alpha or theta brainwaves, since they will create a state of relaxation, as well as less anxiety and less stress apply this.

We know,

$$\begin{aligned} \text{Anxiety} &= \text{Vulnerability} - \text{Trust} \\ \text{Relief} &= \text{Vulnerability} + \text{Trust} \end{aligned}$$

$$\begin{aligned} \text{Here, Vulnerability} &= \text{DP(Dopamine)} + \text{SR(Serotonin)} \\ \text{Trust} &= (\text{Attention} * 30\%) + (\text{Binaural Beats} * 50\%) + (\text{Visual} \\ &\text{Confirmation} * 20\%) \end{aligned}$$

$$\begin{aligned} \text{Now Putting value DP} &= 1, \\ \text{SR} &= 0, \\ \text{Attention} &= 1, \\ \text{BB} &= 1, \\ \text{Visual Confermation} &= 1, \end{aligned}$$

$$\text{So anxiety} = (1+0) - (.3+.5+.2) = 0$$

Anxiety = 0 False

$$\text{And Relief} = (1+0) + (.3+.5+.2) = 2$$

Relief = 2 True

There is a error level between 0.90 to 1.5 for relief . if relief > 0.90 and < 1.50 then error level will not count.

This is a experimental procedure for patients symptoms analysis.

Chapter 04

Implementation

Software :

Software has all the controls of the each and every part of it. It provide 24/7 visual information about patients present condition. It can send customized voice clip & sound wave to the audio input of a computer. Image processing used for judging live condition of a patients activity. It always matches symptoms from its behavioral database and make a list of which type of schizophrenia he/she have. It can send sound wave and process a patients reactions at a time and after that it input data to the patient's dataset for sorting out the symptoms. Then particular part of the sound wave transmitted trough speaker constantly.

Sine **Saw Tooth** **Preset** **Voice**

Set Sawtooth Wave Parameters

First Freq: 7235

Duration: 300

Dwell: 2

Second Freq: 4

Duration: 300

Dwell: 2

Repetitions: 5

Send Wave

DAY COUNT = 0

Type 1 (Paranoid)	Type 2 (Catatonic)	Type 3 (Disorganized)
<input type="radio"/> • Auditory hallucinations	<input type="radio"/> • Physically immobile	<input type="radio"/> • Disorganized thinking
<input type="radio"/> • Delusions	<input type="radio"/> • Waxy flexibility	<input type="radio"/> • Grossly disorganized behavior
<input checked="" type="radio"/> • Anxiety	<input type="radio"/> • Excessive mobility	<input type="radio"/> • Inappropriate expression
<input type="radio"/> • Anger	<input type="radio"/> • Uncooperative	<input type="radio"/> • Uncooperative
<input type="radio"/> • Detachment	<input type="radio"/> • Strange movements	<input type="radio"/> • Cognitive difficulties
<input type="radio"/> • Aggression and violence	<input type="radio"/> • Unusual behavior	<input type="radio"/> • Delusions
<input type="radio"/> • Contdescension	<input type="radio"/> • Hallucinations	<input type="radio"/> • Hallucinations
<input type="radio"/> • Suicidal behavior	<input type="radio"/> • Cognitive difficulties	

Source Code:

```
using System;
using System.Collections.Generic;
using System.Drawing;
using System.Windows.Forms;
using Emgu.CV;
using Emgu.CV.Structure;
using Emgu.CV.CvEnum;
using System.IO;
using System.IO.Ports;
using System.Diagnostics;
using System.Runtime.InteropServices;

using System.Threading;
using SpeechLib;
using System.ComponentModel;

using DShowNET;

namespace MultiFaceRec
{
    public partial class FrmPrincipal : System.Windows.Forms.Form
    {
        //unsigned char MSB = 0;
        //unsigned char LSB = 0;

        [DllImport("kernel32.dll")]
        private static extern bool Beep(int frequency, int duration);

        private SpeechVoiceSpeakFlags SpFlags = SpeechVoiceSpeakFlags.SVSFlagsAsync;
        private SpVoice Voice = new SpVoice();
        SerialPort port;

        //sbyte MSB = 0;
        uint LSB = 0;
        uint MSB = 0;
        int servoPosition = 90;
        int servoOrientation = 0;
        int servoPosition1=90;
        int servoOrientation1=0;

        Image<Bgr, Byte> currentFrame;
        Capture grabber;
        HaarCascade face;
        HaarCascade eye;
        MCvFont font = new MCvFont(FONT.CV_FONT_HERSHEY_TRIPLEX, 0.5d, 0.5d);
        Image<Gray, byte> result, TrainedFace = null;
        Image<Gray, byte> gray = null;
        List<Image<Gray, byte>> trainingImages = new List<Image<Gray, byte>>();
        List<string> labels= new List<string>();
        List<string> NamePersons = new List<string>();
        int ConfTrain, NumLabels, t;
        string name, names = null;

        public FrmPrincipal()
        {
```

```

InitializeComponent();
init();
string strVoice;
foreach (SpeechLib.ISpeechObjectToken sot in Voice.GetVoices("", ""))
{
    strVoice = sot.GetDescription(0);    //The token's name
    cboVox.Items.Add(strVoice);
}

if (cboVox.Items.Count <= 0)
{
    MessageBox.Show(this, "Show");
}

face = new HaarCascade("haarcascade_frontalface_default.xml");
//eye = new HaarCascade("haarcascade_eye.xml");
try
{
    //Load of previus trained faces and labels for each image
    string Labelsinfo = File.ReadAllText(Application.StartupPath + "/TrainedFaces/TrainedLabels.txt");
    string[] Labels = Labelsinfo.Split('%');
    NumLabels = Convert.ToInt16(Labels[0]);
    ContTrain = NumLabels;
    string LoadFaces;

    for (int tf = 1; tf < NumLabels+1; tf++)
    {
        LoadFaces = "face" + tf + ".bmp";
        trainingImages.Add(new Image<Gray, byte>(Application.StartupPath + "/TrainedFaces/" + LoadFaces));
        labels.Add(Labels[tf]);
    }
}
catch(Exception e)
{
    //MessageBox.Show(e.ToString());
    MessageBox.Show("Trained Patients To the Software", "", MessageBoxButtons.OK,
    MessageBoxIcon.Exclamation);
}

}

public void init()
{
    port = new SerialPort();
    port.PortName = "COM3";
    port.BaudRate = 9600;
    try
    {
        port.Open();
    }
    catch(Exception ex)
    {
    }
}

private void button1_Click(object sender, EventArgs e)
{
    //Initialize the capture device
    grabber = new Capture();
    grabber.QueryFrame();
    //Initialize the FrameGraber event
    Application.Idle += new EventHandler(FrameGrabber);
}

```

```

    button1.Enabled = false;
}

private void button2_Click(object sender, System.EventArgs e)
{
    try
    {
        //Trained face counter
        ContTrain = ContTrain + 1;

        //Get a gray frame from capture device
        gray = grabber.QueryGrayFrame().Resize(320, 240, Emgu.CV.CvEnum.INTER.CV_INTER_CUBIC);

        //Face Detector
        MCvAvgComp[][] facesDetected = gray.DetectHaarCascade(
            face,
            1.2,
            10,
            Emgu.CV.CvEnum.HAAR_DETECTION_TYPE.DO_CANNY_PRUNING,
            new Size(20, 20));

        //Action for each element detected
        foreach (MCvAvgComp f in facesDetected[0])
        {
            TrainedFace = currentFrame.Copy(f.rect).Convert<Gray, byte>();
            break;
        }

        //resize face detected image for force to compare the same size with the
        //test image with cubic interpolation type method
        TrainedFace = result.Resize(100, 100, Emgu.CV.CvEnum.INTER.CV_INTER_CUBIC);
        trainingImages.Add(TrainedFace);
        labels.Add(textBox1.Text);

        //Show face added in gray scale
        imageBox1.Image = TrainedFace;

        //Write the number of triained faces in a file text for further load
        File.WriteAllText(Application.StartupPath + "/TrainedFaces/TrainedLabels.txt",
            trainingImages.ToArray().Length.ToString() + "%");

        //Write the labels of triained faces in a file text for further load
        for (int i = 1; i < trainingImages.ToArray().Length + 1; i++)
        {
            trainingImages.ToArray()[i - 1].Save(Application.StartupPath + "/TrainedFaces/face" + i + ".bmp");
            File.AppendAllText(Application.StartupPath + "/TrainedFaces/TrainedLabels.txt", labels.ToArray()[i - 1]
+ "%");
        }

        MessageBox.Show(textBox1.Text + "'s face detected and added :)", "Training OK",
            MessageBoxButtons.OK, MessageBoxIcon.Information);
    }
    catch
    {
        MessageBox.Show("Enable the face detection first", "Training Fail", MessageBoxButtons.OK,
            MessageBoxIcon.Exclamation);
    }
}

void FrameGrabber(object sender, EventArgs e)
{

```

```

label3.Text = "0";
//label4.Text = "";
NamePersons.Add("");

//Get the current frame form capture device
currentFrame = grabber.QueryFrame().Resize(320, 240, Emgu.CV.CvEnum.INTER.CV_INTER_CUBIC);

//Convert it to Grayscale
gray = currentFrame.Convert<Gray, Byte>();

//Face Detector
MCvAvgComp[][] facesDetected = gray.DetectHaarCascade(
face,
1.2,
10,
Emgu.CV.CvEnum.HAAR_DETECTION_TYPE.DO_CANNY_PRUNING,
new Size(20, 20));

//Action for each element detected
foreach (MCvAvgComp f in facesDetected[0])
{
    t = t + 1;
    result = currentFrame.Copy(f.rect).Convert<Gray, byte>().Resize(100, 100,
Emgu.CV.CvEnum.INTER.CV_INTER_CUBIC);
    //draw the face detected in the 0th (gray) channel with blue color
    currentFrame.Draw(f.rect, new Bgr(Color.Navy), 1);

    if (trainingImages.ToArray().Length != 0)
    {
        //TermCriteria for face recognition with numbers of trained images like maxIteration
        MCvTermCriteria termCrit = new MCvTermCriteria(ContTrain, 0.001);

        //Eigen face recognizer
        EigenObjectRecognizer recognizer = new EigenObjectRecognizer(
            trainingImages.ToArray(),
            labels.ToArray(),
            3000,
            ref termCrit);

        name = recognizer.Recognize(result);

        //Draw the label for each face detected and recognized

        currentFrame.Draw(name, ref font, new Point(f.rect.X - 2, f.rect.Y - 2), new Bgr(Color.White));
        double cal=0,thita=0;

        //Math.Atan(-5);
        thita = Math.Tan(f.rect.Y / f.rect.X);
        l3.Text = Convert.ToString(thita);

        //char c1 = 'k';
        //port.WriteLine(c1.ToString());

        //int p1 = Convert.ToInt32(port.ReadLine());
        //l4.Text = Convert.ToString(p1);
        char c2 = 'p';
        port.WriteLine(c2.ToString());

        // ||||| ANOTHER TRY |||||
        /*if (Convert.ToInt32(f.rect) == 0)
        {

```

```

// Initialize orientation
// This just makes it so the camera first goes to the side that it's leaning towards
// So if the camera is already mostly facing the left side it goes to the left end
// before going to the right. And the other way around.
if (servoOrientation == 0)
{
    if (servoPosition >= 90)
        servoOrientation = 1;
    else
        servoOrientation = -1;
}

if (servoOrientation == 1)
{
    char c1 = 'l';
    port.WriteLine(c1.ToString());

    // This code is identical to the one on the Arduino side
    servoPosition += 1;

    if (servoPosition > 180)
    {
        servoPosition = 180;
        servoOrientation = -1;
    }
}
else
{
    char c2 = 'r';
    port.WriteLine(c2.ToString());

    // This code is identical to the one on the Arduino side
    servoPosition -= 1;

    if (servoPosition < 0)
    {
        servoPosition = 0;
        servoOrientation = 1;
    }
}

////////////////////////////////////
if (servoOrientation1 == 0)
{
    if (servoPosition1 >= 150)
        servoOrientation1 = 1;
    else
        servoOrientation1 = -1;
}

if (servoOrientation1 == 1)
{
    char c3 = 'u';
    port.WriteLine(c3.ToString());
    // This code is identical to the one on the Arduino side
    servoPosition1 += 3;

    if (servoPosition1 > 160)
    {
        servoPosition1 = 160;
        servoOrientation1 = -1;
    }
}

```



```

    }
    else
    {
        char c4 = 'd';
        port.WriteLine(c4.ToString());
        // This code is identical to the one on the Arduino side
        servoPosition1 -= 3;

        if (servoPosition1 < 140)
        {
            servoPosition1 = 140;
            servoOrientation1 = 1;
        }
    }

}

////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////////
}*/

// Run this if the camera can see at least one circle
//for(i=0; i < p_seqCircles->total; i++) { // for each element in sequential circles structure
(i.e. for each object detected)
//if (Convert.ToInt32(f.rect) != 0)
// {
// radius of circle

// Reset servo orientation as the camera now has focus of a circle
// Servo orientation is important only when the camera doesn't see a circle
servoOrientation = 0;

//char outputChars[] = "p_fltXYRadius[0]";
//WriteFile(hSerial, outputChars, strlen(outputChars), &btsIO, NULL);

//char outputChars1[] = "p_fltXYRadius[1]";
//WriteFile(hSerial, outputChars1, strlen(outputChars1), &btsIO, NULL);

// Check whether camera should turn to its left if the circle gets near the right end of the screen

I1.Text = Convert.ToString(f.rect.X);
I2.Text = Convert.ToString(f.rect.Y);

if (f.rect.X > 90 && f.rect.X < 170)
{
    char c5 = 'l';
    port.WriteLine(c5.ToString());

    servoPosition += 1;

    if (servoPosition > 180)
        servoPosition = 180;
}

// Check whether camera should turn to its right if the circle gets near the left end of the screen
if (f.rect.X > 5 && f.rect.X < 90)
{
    char c6 = 'r';
    port.WriteLine(c6.ToString());

    servoPosition -= 1;

```

```

        if (servoPosition < 0)
            servoPosition = 0;
    }

    //////////////////////////////////////
    servoOrientation1 = 0;

    if (f.rect.X > 170 && f.rect.X <250)
    {
        char c7 = 'e';
        port.WriteLine(c7.ToString());

        servoPosition1 += 1;

        if (servoPosition1 > 180)
            servoPosition1 = 180;
    }

    // Check whether camera should turn to its right if the circle gets near the left end of the screen
    if (f.rect.Y > 5 && f.rect.Y <60 )
    {
        char c7 = 'f';
        port.WriteLine(c7.ToString());

        servoPosition1 -= 1;

        if (servoPosition1 < 0)
            servoPosition1 = 0;
    }
    if (f.rect.Y > 110 && f.rect.Y < 160)
    {
        char c7 = 'd';
        port.WriteLine(c7.ToString());

        servoPosition1 -= 1;

        if (servoPosition1 < 0)
            servoPosition1 = 0;
    }

    /*uint i = Int32.MaxValue;
    uint j = Int32.MaxValue;
    //int i = unchecked((int)f.rect.X);
    j = Convert.ToUInt32(f.rect.X);
    i = Convert.ToUInt32(f.rect.Y);
    LSB = j & 0xff;
    // read next significant byte
    MSB = (j >> 8) & 0xff;
    port.WriteLine(MSB.ToString());
    port.WriteLine(LSB.ToString());

    // Send Y axis
    LSB = i & 0xff;
    MSB = (i >> 8) & 0xff;
    port.WriteLine(MSB.ToString());
    port.WriteLine(LSB.ToString());*/

    //}
}

```

```

NamePersons[t - 1] = name;
NamePersons.Add("");

//Set the number of faces detected on the scene
label3.Text = facesDetected[0].Length.ToString();

/*
//Set the region of interest on the faces

gray.ROI = f.rect;
MCvAvgComp[][] eyesDetected = gray.DetectHaarCascade(
    eye,
    1.1,
    10,
    Emgu.CV.CvEnum.HAAR_DETECTION_TYPE.DO_CANNY_PRUNING,
    new Size(20, 20));
gray.ROI = Rectangle.Empty;

foreach (MCvAvgComp ey in eyesDetected[0])
{
    Rectangle eyeRect = ey.rect;
    eyeRect.Offset(f.rect.X, f.rect.Y);
    currentFrame.Draw(eyeRect, new Bgr(Color.Blue), 2);
}
*/

}
t = 0;

//Names concatenation of persons recognized
for (int nnn = 0; nnn < facesDetected[0].Length; nnn++)
{
    names = names + NamePersons[nnn] + ", ";
}
//Show the faces procesed and recognized
imageBoxFrameGrabber.Image = currentFrame;
label4.Text = names;
names = "";
//Clear the list(vector) of names
NamePersons.Clear();

}

private void button3_Click(object sender, EventArgs e)
{

}

private void FrmPrincipal_Load(object sender, EventArgs e)
{

}

private void btnPlayAdhoc_Click(object sender, EventArgs e)
{
    try
    {

```

```

// Set vars for sine wave tone
int startFreq = Convert.ToInt32(txtStartFreq.Text);
int endFreq = Convert.ToInt32(txtEndFreq.Text);
int duration = Convert.ToInt32(txtDuration.Text);
int dwell = Convert.ToInt32(txtDwell.Text);
int steps = Convert.ToInt32(txtSteps.Text);
int reps = Convert.ToInt32(txtRepetitions.Text);

int diff = Math.Abs(startFreq - endFreq);
diff = Convert.ToInt32(diff / duration);

for (int rep = 0; rep < reps; rep++)
{
    // tone
    int CurrentFreq = startFreq;

    for (int i = 0; i < steps - 1; i++)
    {
        Beep(CurrentFreq, Convert.ToInt32(duration / steps));
        CurrentFreq = CurrentFreq + diff;
    }

    // dwell
    Thread.Sleep(dwell);
}
}
catch (Exception ex)
{
    MessageBox.Show(this, ex.Message.ToString() + ":", ex.StackTrace.ToString());
}
}

private void btnPlaySawtooth_Click(object sender, EventArgs e)
{
    try
    {
        int freq1 = Convert.ToInt32(txtFreq1.Text);
        int duration1 = Convert.ToInt32(txtDuration1.Text);
        int dwell1 = Convert.ToInt32(txtDwell1.Text);
        int freq2 = Convert.ToInt32(txtFreq2.Text);
        int duration2 = Convert.ToInt32(txtDuration2.Text);
        int dwell2 = Convert.ToInt32(txtDwell2.Text);
        int reps = Convert.ToInt32(txtSawToothReps.Text);

        for (int i = 0; i < reps; i++)
        {
            Beep(freq1, duration1);
            Thread.Sleep(dwell1);
            Beep(freq2, duration2);
            Thread.Sleep(dwell2);
        }
    }
    catch (Exception ex)
    {
        MessageBox.Show(ex.Message.ToString(), "Error");
    }
}

private void btnPlayPresets_Click(object sender, EventArgs e)
{
    switch (cboPresets.Text.ToString())

```

```

{
    case "Master Warning":
        ToneGenerator.CannedWCAtones.PlayMasterWarning(true, 5);
        break;

    case "Master Warning2":
        ToneGenerator.CannedWCAtones.PlayMasterWarning2(true, 5);
        break;

    case "RAD":
        ToneGenerator.CannedWCAtones.Radiation();
        break;

    case "FALL":
        ToneGenerator.CannedWCAtones.PlayWheels();
        break;
}
}

private void btnPlayVox_Click(object sender, EventArgs e)
{
    try
    {
        if (chkSaveToWavFile.Checked)
        {
            Voice.Speak(txtSpeakText.Text, SpFlags);

            SaveFileDialog sfd = new SaveFileDialog();

            sfd.Filter = "All files (*.*)|*.*|wav files (*.wav)|*.wav";
            sfd.Title = "Save to a wave file";
            sfd.FilterIndex = 2;
            sfd.RestoreDirectory = true;

            if (sfd.ShowDialog() == DialogResult.OK)
            {
                SpeechStreamFileMode SpFileMode = SpeechStreamFileMode.SSFMCreateForWrite;

                SpFileStream SpFileStream = new SpFileStream();
                SpFileStream.Open(sfd.FileName, SpFileMode, false);

                Voice.AudioOutputStream = SpFileStream;
                Voice.Speak(txtSpeakText.Text, SpFlags);
                Voice.WaitUntilDone(Timeout.Infinite);

                SpFileStream.Close();
            }
        }
        else
        {
            try
            {
                Voice.Speak(txtSpeakText.Text, SpFlags);
            }
            catch (System.Exception ex)

```

```

        {
            MessageBox.Show(this, ex.Message.ToString() + "::-" + ex.StackTrace.ToString());
        }
    }
}
catch (Exception ex)
{
    MessageBox.Show(this, ex.Message.ToString() + "::-" + ex.StackTrace.ToString());
}
}

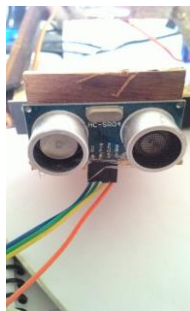
private void t1_Scroll(object sender, EventArgs e)
{
    char c3 = 'b';
    port.WriteLine(t1.Value.ToString());
    port.WriteLine(c3.ToString());
}

private void t2_Scroll(object sender, EventArgs e)
{
    char c3 = 'h';
    port.WriteLine(t1.Value.ToString());
    port.WriteLine(c3.ToString());
}
}

```

Hardwire :

It has 2 Microcontroller :
 1 Sonar Sensor :
 1 PIR Sensor :
 1 Cooling Unit :
 1 Directional Sound Amplifier
 1 Directional Sound Transmitter
 12 Volt Power Supply
 2 Pan tilt Frame :



Chapter 05

Conclusion and Future Work

5.1 Conclusion

There are many treatment facility for schizophrenia patients nowadays. But compare to those this device can make a better living platform for schizophrenia patient's and enhance their quality of life.

5.2 Future Work

This device is only for test purposes. In future I will make lot of improvement regarding this theory and then integrate this to the device for better performance.

5.3 Limitations

1. This Device must be connected through a Computer.
2. This device need a specially designed room to operate properly.

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