MASENO UNIVERSITY
SCHOOL OF COMPUTING AND INFORMATICS
DEPARTMENT OF COMPUTER SCIENCE

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UNIT: SCS 423 DESIGN PROJECT II

PROJECT TITLE: COMPUTERIZED AUTISM APPROACH SOFTWARE

A project report submitted in partial fulfillment of the requirement for the Bachelor of Science Degree (BSc.) in Computer Science & Technology

BY

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DECLARATION

I …….. And I ……

Signed: …… Signed: ……

Date: …… Date: ……

Do hereby declare that this project report is our original work and to the best of our knowledge, it has not been presented to any other examination body.

This project report is hereby presented for examination with the approval of the project supervisor.

Name: Mr. George Omuono

Signature: ---------- Date: ----------

ABSTRACT

As stated by the name of the project '**computerized autism approach software**, the software will be useful to people who suffer from autism. Our work began by studying autism in detail and the people who suffer from it. Before starting on programming the software, we did background research on other similar software that has been made in this field and analyze them.

The software is fully interactive with user-parent (supervisor), children (individual suffering from autism), such that the supervisor can log in and schedule tasks to be covered by the child.

LIST OF ABBREVIATIONS

AS -Asperger Syndrome
TQT - Twenty Questions Task
ASDs - Autism spectrum disorders
ECDE - Early Childhood Development Education

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Chapter 1: Introduction

1.1 Background Theory

Autism is a syndrome which has been on increase for the recent years and it doesn't seem to respect any borders. It doesn't matter if a person is from a healthy family or not, is black or white, from Europe or Africa. Everyone can expect to encounter or be affected by autism at any time during their lives. In fact everyone has probably met or at least seen an individual that suffers from autism. Autism has been studied for almost a century now and many treatments and solutions have been laid out. The estimated extent of autism spectrum disorder (ASD) in United Kingdom is around 1 out of 100 children. Autism also seems to affect more boys than girls; its ratio is believed to be 3 boys for 1 girl (University of Sunderland, 2008). Autism is a sub-class of autism spectrum disorder which is divided into five categories according to the severity of the symptoms, age of onset and association with other disorders. In the following dissertation, the focus is on the first two categories which are classic autism and Aspergers syndrome and when the word autism is used, it is only a reference to those two categories. Classic autism (infantile autism) is usually diagnosed when the child is between 18 – 36 months old. Persons who suffer from classic autism have a range of intellectual functioning from below to above average. Asperger syndrome is usually diagnosed later than classic autism since the symptoms are less severe. Person who suffer from Aspergers syndrome have in general intelligence from average to above average. People with Aspergers are harder to identify and are usually just considered eccentric (Organization for autism research, 2008). Autism will be examined and the living conditions here in Kenya, for the people who are in some way affected by autism. Most people who suffer from autism seem to be eager to escape from any situation which demands any communication with other persons at all. Most of them are being drawn more and more into the world of technology which can have both positives and negatives for them. The main aim of this project is to make contacts with people who are working in the field of autism. From there to see if it is possible to develop small software which is intended to help people with autism to life their lives and that can contribute to an improved social behavior.

1.2 Objectives
The aim of the project is:

- ✓ To seek to develop software for autistic children with special needs that will help them improve their condition by engaging them into learning (scheduled tasks).

- ✓ To enhance autism infected children creativity relating the graphics (picture/images) in their study scheduled tasks, with real life situations.

- ✓ To increase in-seat behavior and overall attention span of autistic children by encouraging them to seat and tackle scheduled tasks.

- ✓ To develop technology that can be used to teach effective problem solving by allowing the individual to experience social situations and choose appropriate responses to unexpected events.

- ✓ To help teach numerous skills to children with autism by using repetitive viewing of videos/ graphics due to the "predictability" of the information given; that is, knowing what's coming up next. These skills may include:

- **Language comprehension skills:** Receptive vocabulary skills can be taught through video taping (names of common everyday objects, toys, names of familiar people, animals, etc.). Directions to complete various routines can also be taught by the same video taping strategy (e.g., making the bed, setting the table, getting dressed, going to the library, etc.).
- **Social skills:** Numerous social situations can be video taped and replayed to teach identification of appropriate/inappropriate social behaviors. Video taped segments can be made of any social area in which the child might be experiencing difficulties (e.g., asking for assistance, initiating varied topics, maintaining topics initiated by others, repetitive / perseverative speech or question asking, interrupting others, etc.).

1.3 Scope of the study

Our project covers psychology department such as Early Childhood Development. It can be useful to both the learners (people with autism disorder) and tutors to assign tasks to them.

1.4 Fact Finding

Several techniques of data collection which were used to make our project report successful include:

a) Research and site visits- we conducted research about the domain problem of autism disorder through the internet and intranet.

b) Interviewing – we interacted with students taking Early Childhood Development and Psychology as their course and they helped indentify challenges people with autism disorder normally encounter in their real life.

1.5 PROBLEM DEFINATION

Autism spectrum disorders (ASDs) are primarily defined by problems with social interaction and communication, but they are also associated with a complex cognitive profile. One area of difficulty for children and adults with ASD is problem-solving, or the process of identifying a solution to a puzzle or question where the answer is hidden. This can be seen on the Twenty Questions Task (TQT), a commonly-used measure of verbal problem-solving and executive functioning. Children with autism are consistently less efficient than typically-developing children in their questioning on the task: for instance, rather than ask a general, category-based question (e.g. “Is it a living thing?”) they may ask about single items (“Is it the dog?”) or very restricted groupings (“Is it something you wear on your feet?”). This has previously been interpreted as an example of a concept formation deficit in autism, deriving from underlying difficulties with complex and integrative information processing. However, success in problem solving relies on a number of cognitive and linguistic processes that may be impaired in ASD.

Both autism and deafness are associated with delays in early language development, whereas Asperger Syndrome (AS) is not. To test whether language delay explains autistic problem-solving difficulties, experiment 4 compares TQT performance in 15 children with autism, 15 AS children and 15 age- and IQ- matched typically-developing controls. Participants with autism asked less efficient questions than both AS and TD participants, between whom no differences were observed. This suggests that the problem-solving profile in autism may be better explained as a consequence of atypical language development, rather than other aspects of information processing or executive dysfunction.

We have come Computerized Autism approach software to help us approach this defect by integrating TQT with graphics (pictures) to help autistic children relate real life.

1.6 **Feasibility Study**

1.61 Technical feasibility

At first it's necessary to check that the new system was technically feasible or not and to determine the technology and skill necessary to carry out the project. If they are not available then find out the solution to obtain them. Hardware is already available in the university.

1.62 Operational Feasibility

Under this type of feasibility it was:

a. User-friendly

The system would not be difficult to learn and use due to its ease interface and easy functionalities.

b. Reliability

The system would be reliable and would depend on external database.

c. Portability

The application would be developed using standard software like Java and mysql.

d. Availability.

This software would be always available in the internet for download.

e. Maintainability.

The system used the 2-tier architecture. The 1st tier the GUI, which is said to be front-end and the 2nd tier was the database, which uses MySQL server database which is the back-end.

1.63 Economic feasibility

While considering economic feasibility, it is checked in points like performance, information and outputs from the system. MySQL and Java were available as open source software and does not require additional software cost for the client tools. The cost incurred to develop the system was freeware & does not incur the cost to the project. Backend database Technology is a freeware. This justifies economic feasibility of the system.

1.64 Behavioral Feasibility

People are inherently resistant to change, and computers have been known to facilitate change. An estimate should be made of how strong a reaction the user is likely to have toward the development of autism approach based system. Therefore it is understandable that the introduction of a system requires special efforts to educate and train the public. The system that we are developing is user friendly and easy to use. Behavioral study strives on ensuring that the equilibrium of the organization and status quo in the organization are not disturbed and changes are readily accepted by the users.

Chapter 2: Autism

This chapter provides the necessary background material about autism e.g. characteristics, diagnosis and history, that is required before continuing.

2.1 Characteristics and symptoms

A person who suffers from autism has usually symptoms from all the three main categories as outlined below:

Qualitative impairment in social interaction: Autistic people often lack the intuition about other that the other people take for granted. These social impairments usually appear early in childhood and will follow the person throughout their life. A common autistic behavior of a child is like less eye contact. When the children grow up, the symptoms become more visible. The children are much unlikely to show social understanding, approach others, imitate after other people, communicating nonverbally and take turns with other children during e.g. a game. An autistic person usually displays less attachment security than a normal person but it is dependent on how severe the ASD is. They have much trouble understanding how their behavior can affect other people feelings. Autistic persons do however form attachment with the people that affect them the most e.g. their parents. Autistic people usually have a difficult time making friendships with other people and therefore the common belief is that they want to be alone. They tend to focus more on the quality of the friendship instead of the number of friends.

Qualitative impairment in communication: Around 30-50 % of autistic people don't develop enough natural speech to meet the daily requirements communication needs. An example of those characteristics that develop early may include; children starts much later to babble than usual, unusual gestures are used and less responsiveness. Later characteristics are like; delays in spoken language, they tend to repeat the last word a sentence without considering its meaning and they often take things that other people say to them to literally e.g. if a person says "hey this is a cool game", they think that he is actually meaning that this game is cold which is of course not the case.

Restricted and repetitive behaviour: The Repetitive Behaviour Scale-Revised (RBS-R) categories it into the following categories: stereotypy, compulsive behaviour, sameness, ritualistic behaviour, restricted behaviour and at last self injury. A classic symptoms for each category (in the right order) are hand flapping, arranging objects in a certain way, refusing a removal of a furniture, dressing ritual, limited focus and at last biting himself in the finger. No single category is specific to autism but autism seems to have a special pattern of occurrence and severity of the categorical behaviours.

There exists however symptoms that fall outside the three main categories mentioned above. This can be symptoms like difficulty to fall asleep, frequent nocturnal awakenings and early morning awakenings. Unusual responses to sensory stimuli are also common in autistic children, this can be either form of under-responsivity (e.g. walking into things) and over-responsivity (being very sensitive to loud noises) where the form of under-responsivity seem to be more common (CARD, 2008).

2.2 Diagnosis and resorts

So far there are no genetic or medical tests for identifying whether an individual is suffering from an ASD or not. Clinicians have to rely on behavioural observations. The diagnosis is divided into two steps: screening and a comprehensive diagnostic evaluation.
The first step-screening is in form of parent observations, impressions and concerns which are usually supported by either family photos or videos. If concerns are raised, then parents are usually asked to complete one or more of the available standardized screening instruments. They are usually in form of filling out a checklist. Examples of such screening instruments are Checklist for Autism in Toddlers (CHAT) and the Screening Tool for Autism in Two-Year-Olds (STAT). If there continues to be concern after the screening process, then it is needed to move on to the next step in the diagnosis process. The screening tools today have not yet been validated and are currently lacking evidence for effectiveness. It is by those reasons that the general population is not being screened.
The second step- comprehensive diagnosis evaluation is used to rule in or rule out an ASD diagnosis which is done by a team of professionals. This evaluation usually contains neurological, in depth cognitive and language testing and a hearing test. At last there are special assessments that have the objective to make the researchers absolutely sure whether there is a presence of ASD or not. The most commonly used assessments are Autism Diagnostic Observation Schedule (ADOS), Autism Diagnostic Interview-Revised (ADI-R) and the Childhood Autism Rating Scale (CARS) (Organization for autism research, 2008).
If a person is to receive a positive identification of having ASD, the individual needs to have at least 6 symptoms in total from the earlier categorization of autism. It must include at least two symptoms of qualitative impairment in social interaction, at least one symptom of qualitative impairment in communication, and at least one symptom of restricted and repetitive behaviour (Medscape, 2008).
When a child is diagnosed with autism, its family is faced with many questions e.g. will the person be able to live a normal life? What treatments should he receive? And so on. The main objectives of a treatment are to increase the quality of life for the person and his family, and to increase the person independence so that he will be able to live as normal life as possible. The first thing that the family of an autistic person should do is to seek out as much information as it can and from there they should be ready to make a decision on what treatment should best suit their child. The decision on what treatment should be chosen is an important one because each child is unique and a treatment that works well for one child might have the opposite effect on another child. The most commonly used treatments today are discussed as follows:
Applied Behaviour Analysis (ABA): This therapy is based upon the following theory: a reinforced behaviour is more likely to be repeated than a behaviour that is ignored. With the term reinforced behaviour it is meant that every time the child does something right, it will get some kind of a reward. When this method is used it is absolutely critical for its success to reinforce the behaviour every time that it occurs. This therapy is very effective in teaching a range of academic, social, communicative, motor and adaptive skills to the individual. The average work for each child is about 40 hours per week with a trained expert on board. The waiting list (waiting time) for an ABA therapist can be very long

because of the ever increasing demand. This technique is probably the most used one today.

Speech and language therapy: Its main focus in on the individual communication skills. It uses the same principles as the ABA therapy where a positive behaviour is encouraged. A trained expert in speech and languages is assigned to the child. The child's progress is assessed by The Assessment of Basic Language and Learning Skills (ABLLS) which is a assessment which aim is to carefully track an individual speech and language skills.

Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH): its aim is to build upon the skills that children with autism already have. It is a structured approach which believes that the environment should be adapted to the children instead of trying to adapt the children to the ever changing daily life. Since this method doesn't focus on acquiring new skills for the children, many families tend to not choose this one and instead choose one of the ABA therapies.

Picture Exchange Communication Systems (PECS): This method focuses on the communication aspects of autistic people. The main objectives are to get the language underway and the aid the ones that need it the most e.g. the ones that don't speak at all. As with so many other methods, this one uses the same ABA principles as so many other therapies out there. This method lets the children have a lot of pictures and when the child wants something, it has to give the instructor a picture that points to the thing that it wants.

Occupational therapy: This method is usually used simultaneously with other therapies. An occupational expert works with the autistic individual and measures the effect of the disorder on the individual life e.g. how autism affects the individual at home or in school and so on.

Physical therapy: Just a normal physical expert helps the autistic individual to build up enough muscle strength, coordination and motor skills. Another kind of therapy is recommended to be used alongside with this one (Organization for autism research, 2008).

Medical treatment: There is in many cases that medications are chosen to treat autism. The most commonly used medicines are antidepressants, stimulants and antipsychotic. So far there are not many researches available that support the effectiveness or the safety of this kind of treatments. In many cases the medications can have the opposite effect on the individual and no known medication can relieve the autistic individual of his core symptoms which are the social and communication impairments (National Institute of Mental Health, 2008).

2.3 Autism in Kenya

Since the aim of this project is to produce software for people who suffer from autism in Kenya, it is important to examine them and their living conditions a bit first. This can give us a better and clearer idea of those who are expected to use the intended software directly or indirectly. The living conditions of the people who suffer from autism in Kenya vary from city to city. As soon as the individual has been diagnosed with autism, he receives support through kindergarten and primary school. The amount of support received depends on how serious the individual's disability is. Many colleges in Kenya have started offering a 4 year long study that is specially designed for children who suffer from some kind of disability conditions where students study Early Childhood Development Education as a course. The aim of this study line is to give the individual a possibility to stay longer in school and get increased control and help with their lives. This 4 year long college study is becoming popular especially from the children parents point of view. After this 4 yearlong study, the individuals usually try to find some work to do, at least at some point. The labour market in Kenya isn't believed to be receptive enough for the individuals with any kind of disability conditions. For those individuals who live in Kenya have the possibility to further their study in Institutes that are specialized in teaching children with any kind of disability conditions. Currently there is a shortage of places for children in institutes which offer them to stay for couple of days in a month and just to give their parents a little rest. A special residential centre for people with any disability conditions is becoming increasingly popular today. A residence in apartments, which are not part of special residence centre, is also becoming popular. The main concerns for autistic people today are the residence issues and the labour market which can be really tough for most of those individuals. This support can be crucial, as mentioned before in this dissertation, for the decision making what treatment should be chosen. For the years 2005, 2006 and 2007, 0.6% of the people in each year suffered from some symptoms of the autism spectrum disorder. For the last years, the numbers of diagnosed people have been on the increase. The reason is believed to be the same as mentioned in the end of chapter two, which is broader definition of autism and increased awareness.

CHAPTER 3: **SYSTEM ANALYSIS AND DESIGN**

The emphasis of this chapter is on getting an idea of what the requirements are for the intended software. A profile of the general user is made at the beginning following with a description on how the requirement gathering was done. A revised storyboard is also made alongside with cognitive walkthrough on it and those two can give some idea of how the software will look like.

3.1 The client

The potential users of the intended software are people that suffer from, or are affected by autism in any way. To gather the requirements for the intended software, some possible users needed to be contacted. Since the clients are mainly the autistic people, the aim was set to make contact with people that work with them or study to work with them in the daily life. Maseno university faculty of education offers a course in ECDE (Early Childhood Development Education). It has a department that is specialized in working with autistic children. The age range of these children is from 6 – 16 years old, which is for normal children in Kenya who are in elementary school. We contacted the head of the department around January 2015 to collect hypothesis.

The main idea was to interview her and her colleagues and gather a rough idea on what kind of program would be good for autistic children and their parents. The interview was set up in the way that the interviewer (the author of this dissertation), the head of the department and her colleagues sat around one table, had some general conversation and everyone was allowed to express their thoughts when they wanted. The best thing about this method is that it is able to get most of the positive results as a normal interview would do, but it also manages to unify their general thoughts and ideas, that might be too different otherwise. Subjects all agreed that the software should be designed with the needs of the autistic children parents in mind rather than the teacher's or school's needs. After interviewing the teachers and sharing our thoughts with them we agreed on the kind of software that would be quite useful for the average autistic child and their family. The software requirements and main ideas will be discussed in detail next.

3.2 System requirements

3.21 Use case diagram

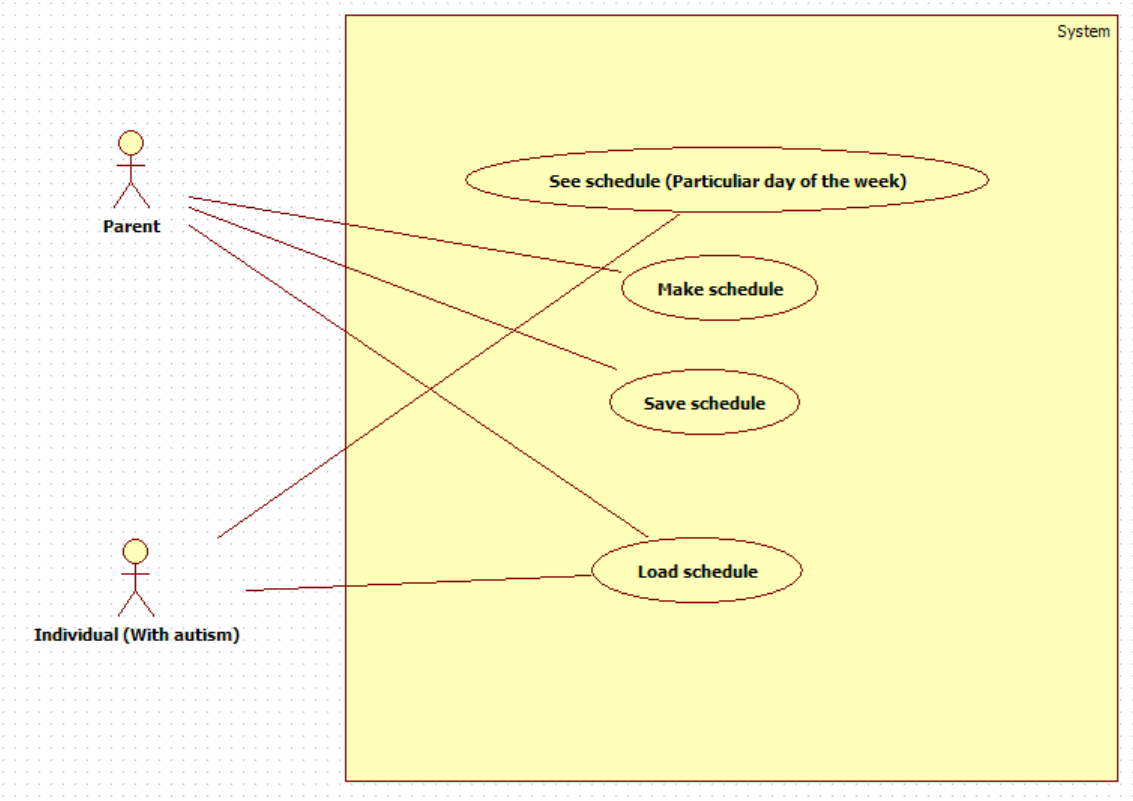


Figure 6: Use case model.

Use case 1: The autistic child will be able to see the daily schedule that the supervisor created for him.
Use case 2: The supervisor (parent) can create a schedule for an autistic child.
Use case 3: The supervisor (parent) can save his previously created schedule for future use.
Use case 4: Both the autistic child and the supervisor can load a previously created schedule.

3.22 First cut class diagram

The view components are marked as boundary classes. Their role is to handle the GUI of the system.
The model components are marked as entity classes. Their role is to contain the system overall functionality.
The control components will be placed both in the model and view classes. Their role is to handle all input from the user.

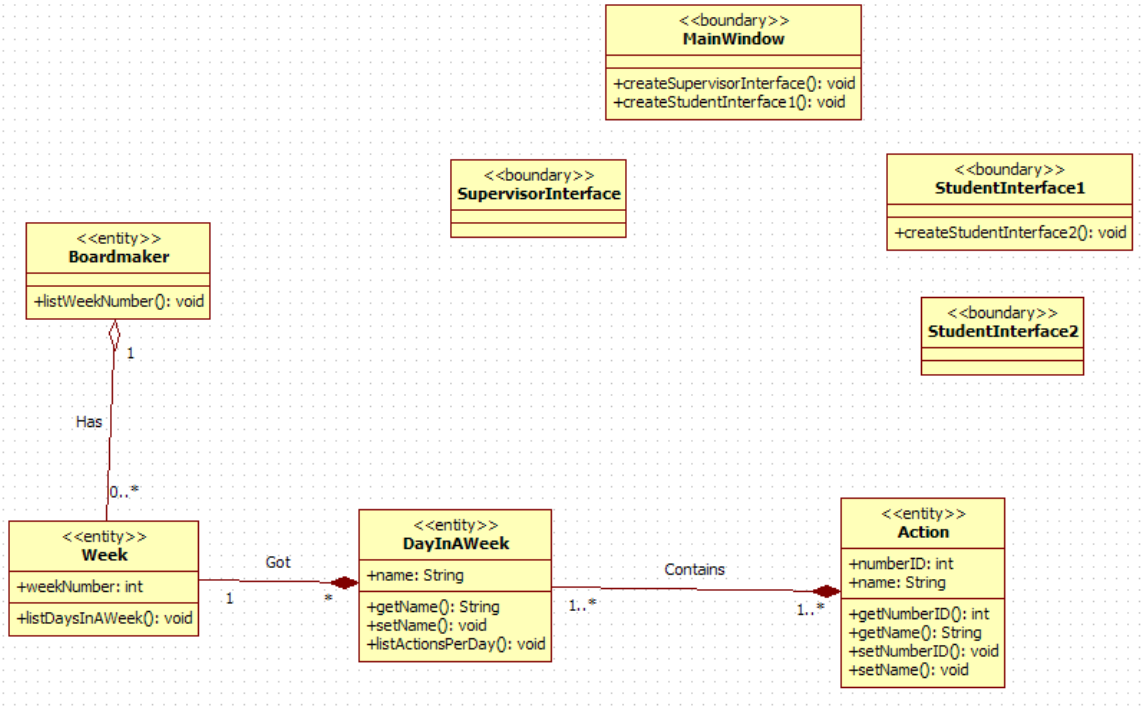


Figure 15: First cut UML diagram of our system.

3.23 Class diagram final version

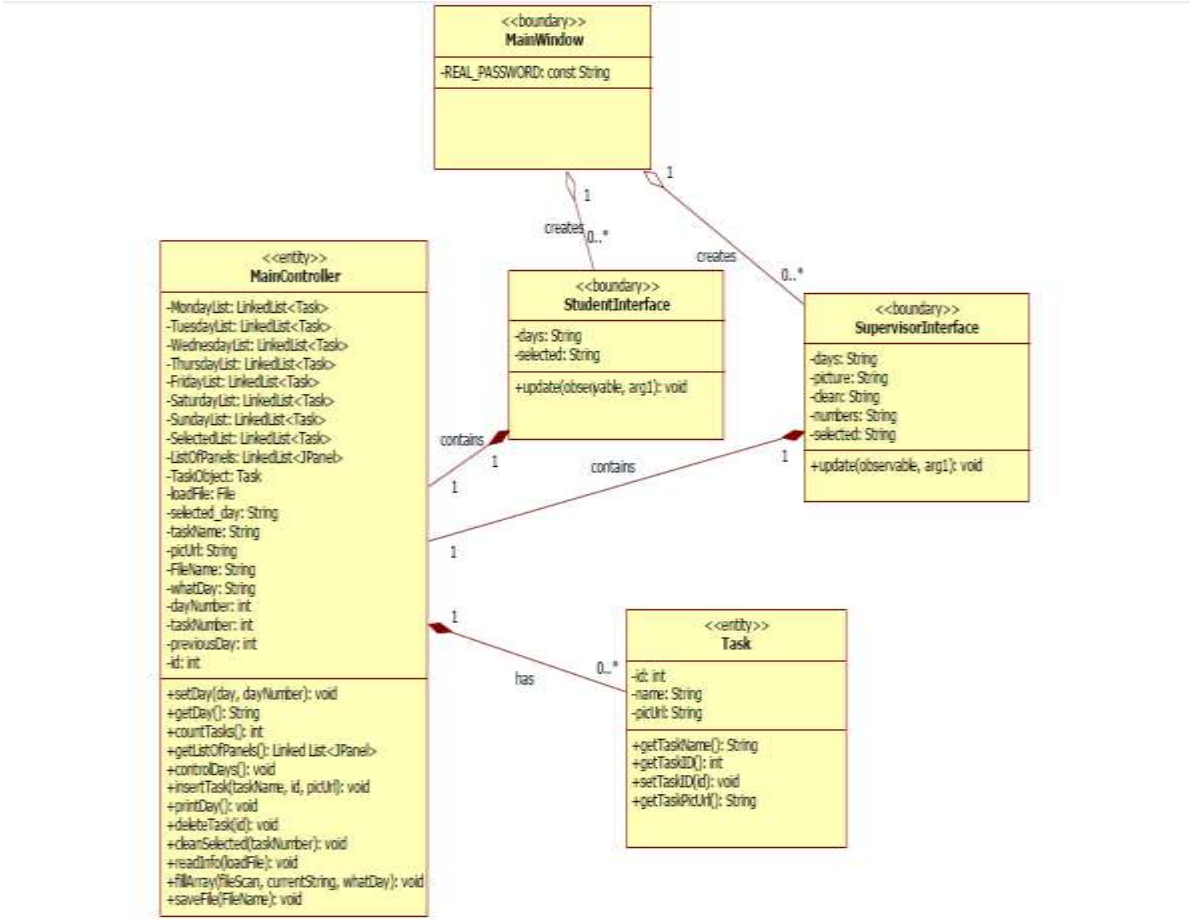


Figure 16: The UML diagram of my system.

As can be seen from the two class diagrams, the structure of the software changed dramatically. The biggest change is that the software went from 4 entity classes to only 2. This change was possible with the use of having linked list for each day and then one that acted like a temporary storage while the list was being used in some way. The class Main Controller does almost all the work in this program from being the main storage for the linked lists to containing all the methods to manipulate the linked lists. The class Task works exactly like the class Action was meant to do except that it contains now a url for a picture as well. As long as the main class exists, the user can create as many instances of the other classes as he wants. There is no particular change in the boundary classes except with a deletion of the class supervisorInterface2.

Chapter 4: System Design implementation

This chapter emphasizes on how the intended software is going to be implemented in terms of system design, architecture and class modeling.

4.1 System design

The software that is currently under construction will be programmed in the programming language java. Java was selected since we had already acquired most of the knowledge that will be needed to program the software. Java is also one of the most used programming language that are used today for software design, which means that any additional knowledge needed for the software implementation should be easy to acquire. The software will be programmed in NetBeans 8.0 IDE programming environment because of our good previous experience with it.

4.2 System architecture

The system will be split into two components (two tier architecture): 1) model and 2) view. It is an architecture that is very similar to the well known MVC (three tier architecture) and is in fact a simplified version of it. The MVC architecture is split into three components which are the following:

1) Model – These are the classes which provide the functionality of the system,
2) View – These are the classes which provide the graphical user interface to the user and
3) Controller – These are the classes which handle the input from the user and send messages to the other two components.

The intended software will be divided into the same components as the MVC architecture but instead of having special class which handles the control classes, they will be joined to the model classes for simplicity reasons.

4.3 Screenshots

4.31 Main Log In Menu

Here below are images that can give some idea of how the system will finally look like. Note that it is possible that some changes will happen on this look during time. Here below on figure 7 is the log in screen. A person can either log in as **a student** or a **supervisor** by clicking on one of the two available buttons that are displayed on the screen.

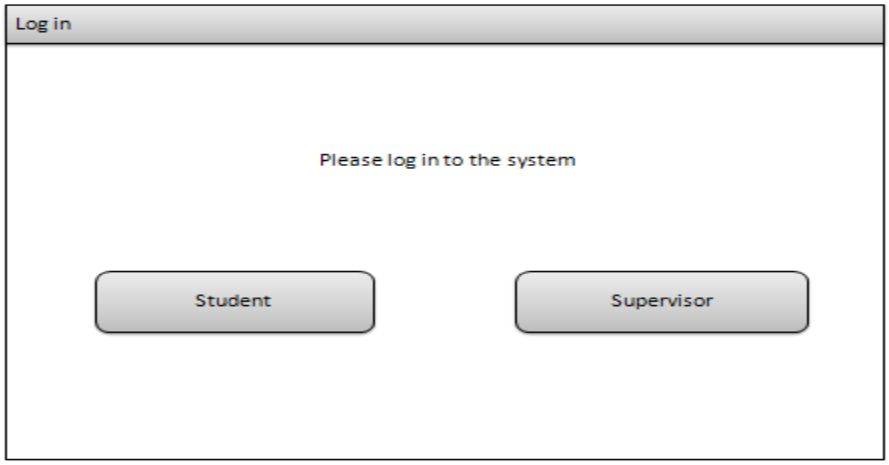


Figure 7: The log in (main menu).

4.32 Select Day Screen

Here below on figure 8 is the screen which appears when a person has either logged in as a student or a supervisor. The person can **select a day of the week** by clicking on a button. There is one button for each day of the week. The person can also load an old schedule by clicking on the load button below.

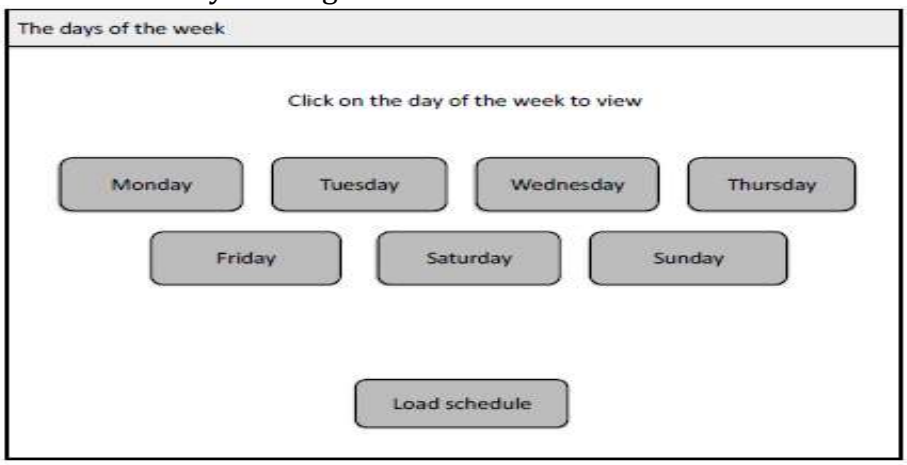


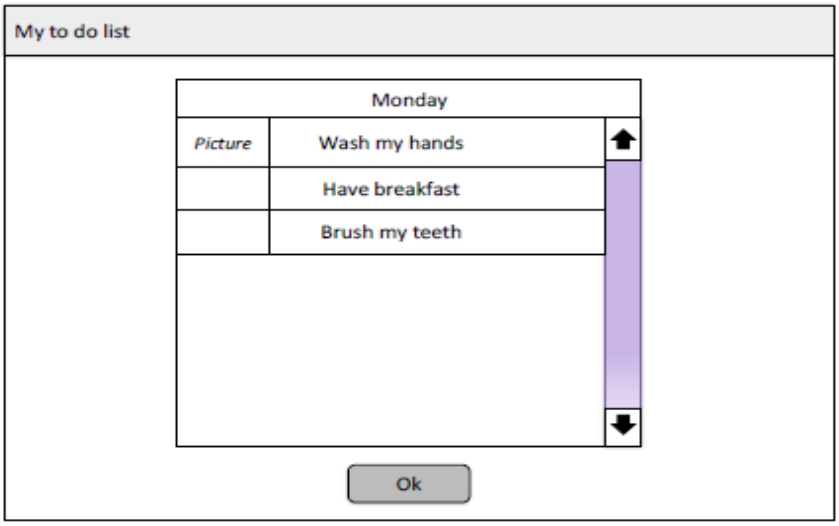
Figure 8: Select day screen.

The days of the week Click on the day of the week to view Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday. Load schedule.

Figure 8: Select day screen.

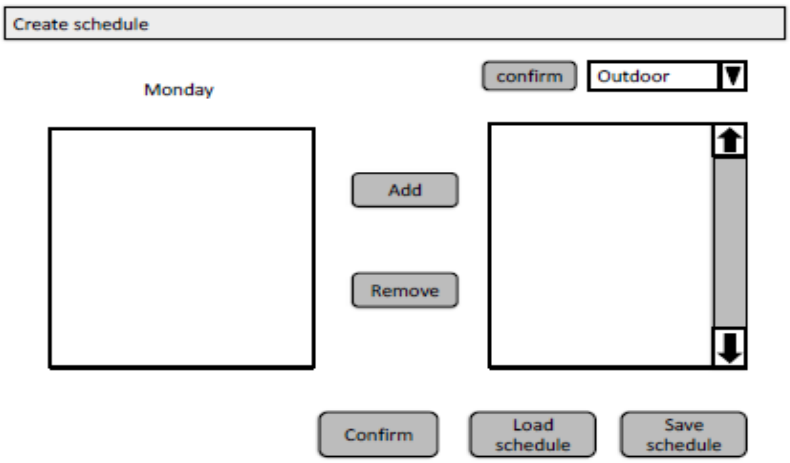
4.33 List of Actions

Here below on figure 9 is the screen which appears when the student has selected a day of the week. The **student sees a list of actions that his supervisor has created for him** for some particular day of the week. Next to each action there is a picture which represents the action in some way. This window screen can be scrolled down if there happens to be too many actions scheduled for the day.



My to do list Monday Ok, Wash my hands, Have breakfast, Brush my teeth, Picture
Figure 9: See schedule screen (student view).

Here below on figure 10 is the screen that appears when the supervisor has finished selecting a day. This is the screen where **he can create a schedule for a student**. There are two windows on the screen. One window is for the day which is currently being scheduled and the other contains a list of many activities which can be moved to the other window and vice versa. There is a dropdown list on top of the screen and the supervisor can select an activity group and every action which the group contains will be displayed in the window below. At the bottom of the screen are three buttons. The supervisor can save and load his schedule and one confirm button which can be pressed when the day is ready. After clicking the confirm button, the select screen will be displayed which is shown in figure 8.



4.34 Create Schedule (Supervisor View)

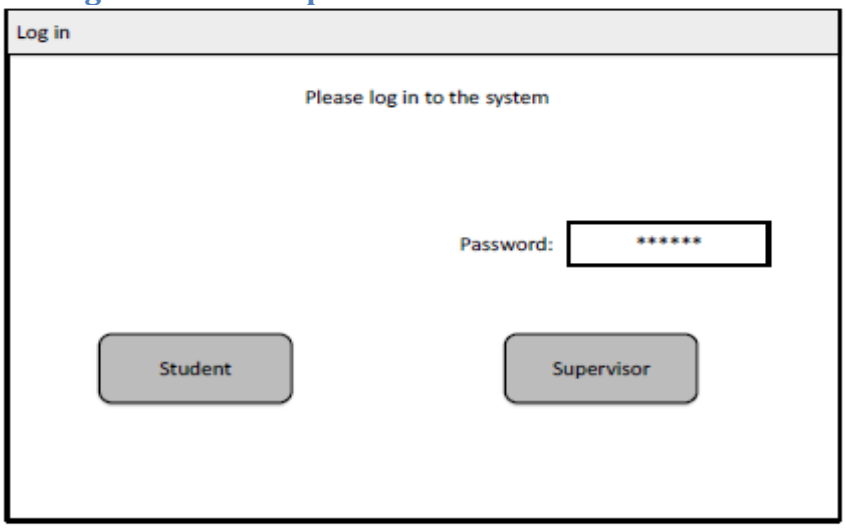
Create schedule Add Remove Monday Confirm Outdoor confirm Load schedule Save schedule

Figure 10: Create schedule (supervisor view).

4.2.4 Screenshots revised

Here is a revised version of the storyboard which will introduce some graphical changes to the software. The reason for most of these changes is because of programming limitations. Some ideas had to be changed because it was much easier in terms of programming and it was also more efficient in some cases. A cognitive walkthrough was made on this version of the storyboard and it can be seen in the next section of this chapter.

4.35 Log in Student-Supervisor

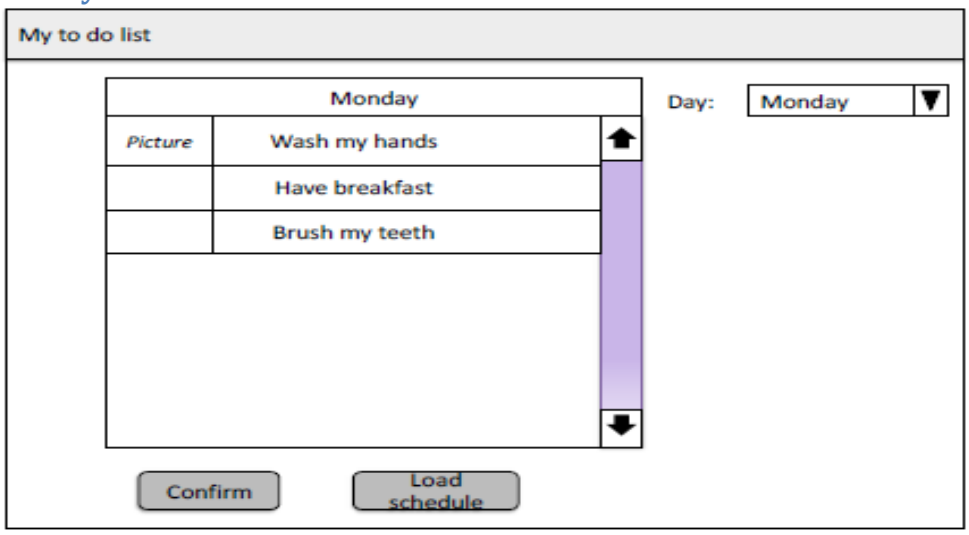


Log in Student Supervisor Please log in to the system ****** Password:

Figure 11: The log in screen.

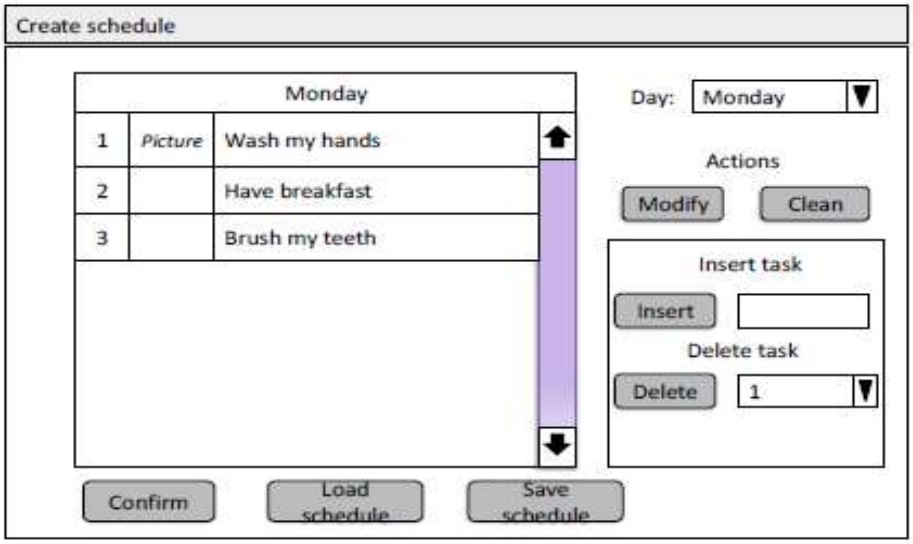
This is the revised log in screen of the software. It works just as the previous version of the log in screen but a password field has been added. This means that if a user wants to get access to the supervisor part of the software, he is going to have to insert the correct password into the password field.

4.36 My to do list



My to do list Confirm Wash my hands Have breakfast Brush my teeth Picture MondayLoad schedule Monday Day:
Figure 12: The student interface.
This is the revised student interface of the software. A Combo Box has been added to it which allows the user to select a day within the interface itself.

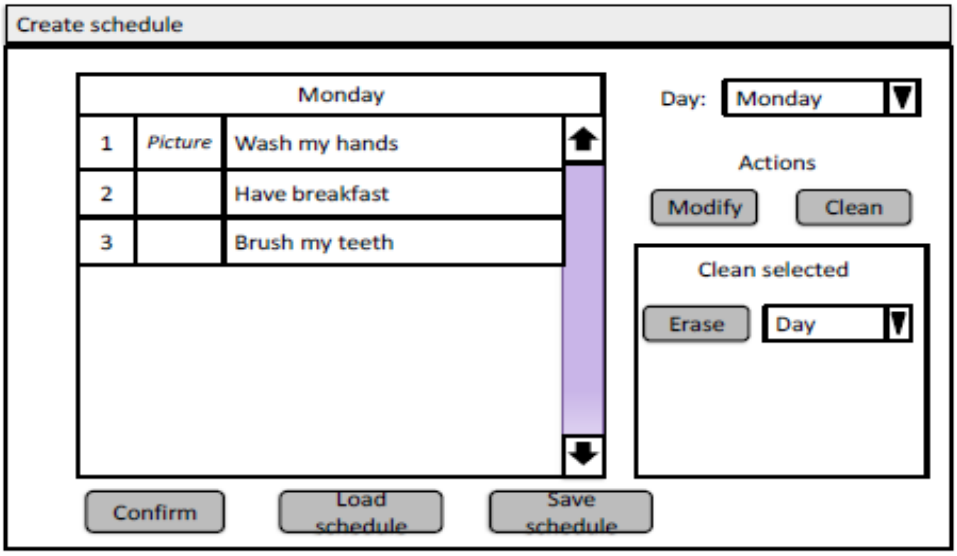
4.37 Create schedule



Create schedule Monday Day: Confirm Load schedule Save schedule Modify Clean Actions Insert task InsertDelete task Delete 1 Wash my hands Have breakfast Brush my teeth Picture Monday 123

Figure 13: The supervisor interface part 1.
This is the supervisor interface part 1 of the software. It has the same Combo Box added to it as the student interface. Now it has only one screen for the schedule making and next to it is a JPanel that contains some available editing commands. Above this JPanel are two buttons called modify and clean. These buttons allows the user to switch between JPanels that contain different editing commands. The modify JPanel is displayed on the part 1 and it contains an insert and a delete option. The insert option allows the user to create a task by writing it into a text field and then clicking the insert button will insert it into the schedule. The delete option allows the user to delete an existing task in the schedule. The task number is selected in a Combo Box and is deleted by clicking the delete button. If no task with the selected number exists, then a pop-up window appears saying that it is impossible to delete a non-existing task.

4.38 Create Schedule II



Create schedule Monday Day: Confirm Load schedule Save schedule Modify Clean Actions Clean selected Erase Day Wash my hands Have breakfast Brush my teeth Picture Monday 123
Figure 14: The supervisor interface part 2.
This is the supervisor interface part 2 of the software. It is identical to part 1 except it contains the clean JPanel which is displayed if the user selects the clean button above. This clean option allows the user to totally empty one whole day or the entire week of tasks. The user selects an option via a Combo Box and then pressing the erase button right next to it.

CHAPTER FIVE: BUDGET ESTIMATE AND PROJECT PLAN

4.1 Budget estimate

The following budgetary plan is deemed appropriate for the accomplishment of the proposed study.

Sn	Required Item	Unit	Quantity	Unit Price	Total Price
3	Compact disk (CD)	Each	3	30	**600**
4	Wireless modem	Each	1	2,000	**2,000**
5	Internet usage charge	Monthly	6	2,000	**12,000**
6	Jdk software				**Free**
7	NetBeans IDE 8.0 software				**Free**
10	Note book	Each	2	300	**100**
12	Reportprinting and binding	Each	6	100	**600**
15	**TOTAL COST**				**15,500**

Table 1: Budget estimate

4.2 Project plan

The schedule of the Computerized autism approach software comprises the following activities and their corresponding periods in the course of the study.

The various activities to be performed are:

1. Requirement gathering
2. Analysis and design of the system
3. Coding and debugging
4. Testing
5. Analysis and interpretation of the results
6. Documentation (Report writing)
7. Submission of the final Report

The above activities are illustrated in the Gantt chart below.

4.21 Gantt chart:

ACTIVITY		PERIOD: YEAR 2014/2015											
SN	**ITEM**	**JAN**		**FEB**		**MAR**		**APR**		**MAY-JUNE**		**JULY**	
1	Requirement gathering												
2	Analysis and design of the system												
3	Coding and debugging												
4	Testing												
5	Analysis and interpretation of result												
6	Documentation												
7	Submission of final report												

Chart 1: Activities schedule

6.1 REFERENCES

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