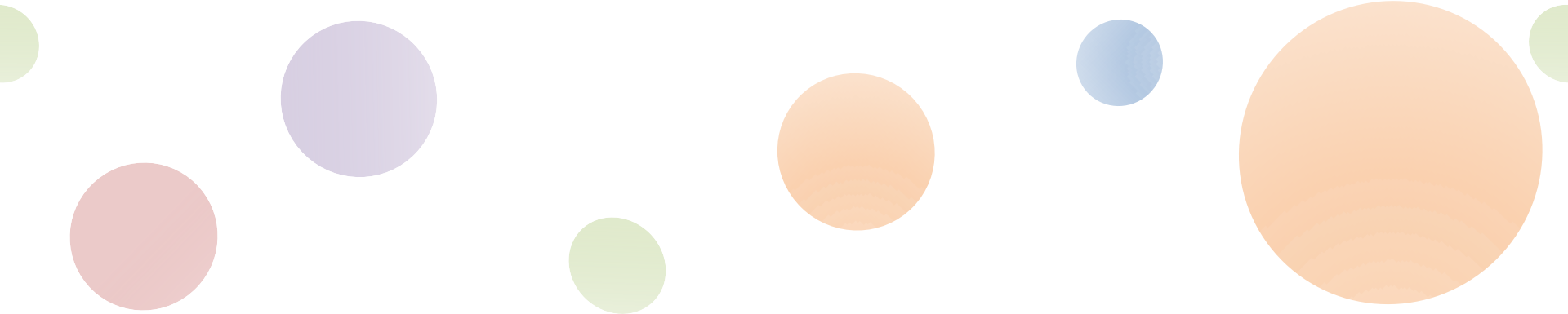# Educational Software with Interactive Robot Platform

FYP13002 Supervised by Dr. Vincent Lau

Chan Chun Pong (Steve)
Cheung Chan Teng (Kaka)
Fung Ying Wa (Eva)
Szeto Wing Yan (Catherine)

Agenda

1. Introduction of the project

2. Overview of the application

3. Program structure

4. Demonstration & explanation

5. Conclusion

Introduction

Introduction

- Traditional learning tools
  - story books, word cards, puzzles
- NEW?
  - Use of technology in learning
  - E-book
  - Tablet with Andriod/ iOS platform

Market needs for education software

- recent research done by London School of Economics in 2013

- *"Over the last five to six years there has been a substantial increase in internet usage by children under nine years old."*

- *"Children under nine years old enjoy a variety of online activities, including watching videos, playing games, searching for information, doing their homework and socialising within children's virtual worlds. The range of activities increases with age."*

- *"There is an emerging trend for very young children (toddlers and pre-schoolers) to use internet connected devices, especially touchscreen tablets and smartphones."*

- It also suggests that
- *"Touchscreen technologies lend themselves to the sensorimotor stage of very young children who readily pick them up and press the buttons and icons with little direction or modelling from adults (Valkenburg, 2004). This ease of use allows a greater of degree of independence for young children who can explore and play with touchscreens relatively unaided, especially in contrast to laptops or PCs, which usually require the assistance of older users to work the keyboard or mouse."*

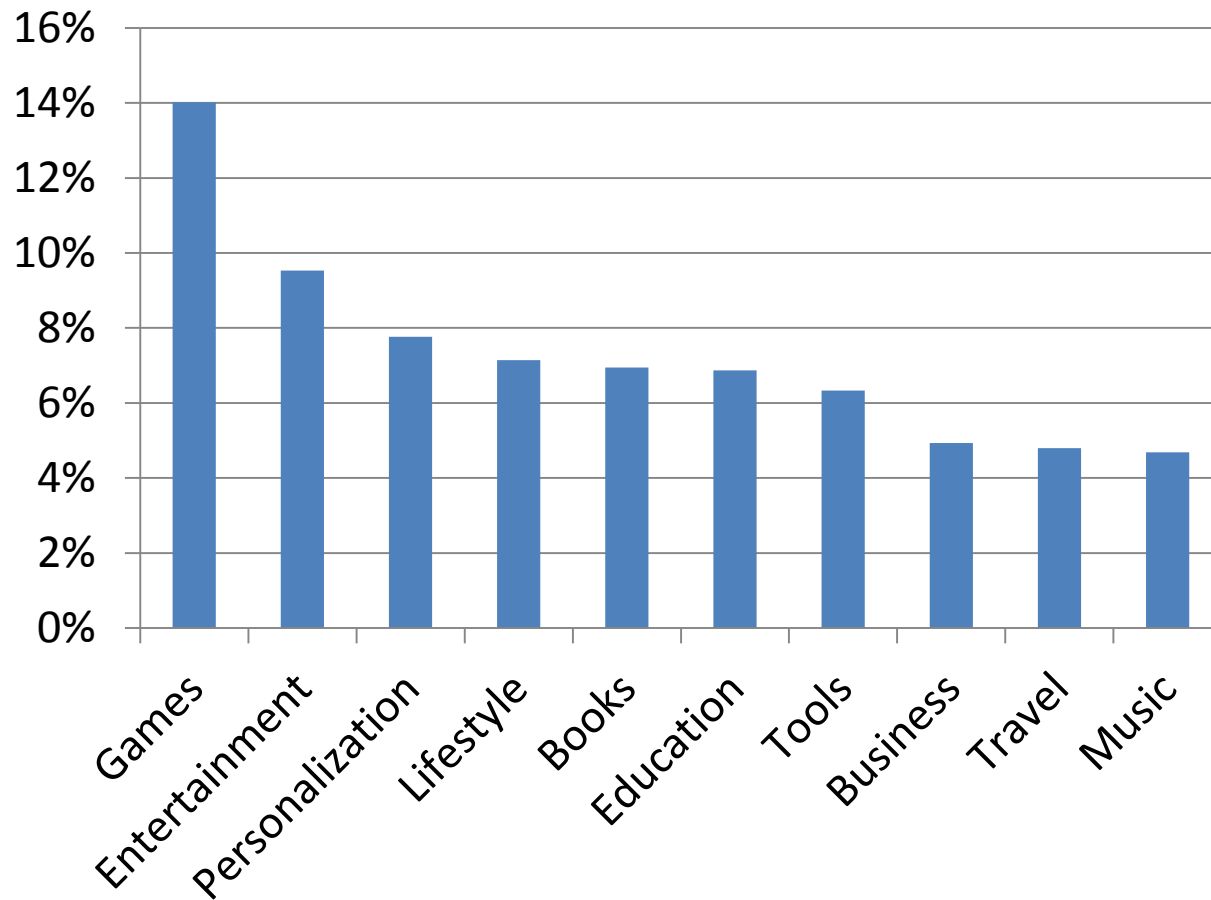# Percentage of children aged 0-8 that used digital devices
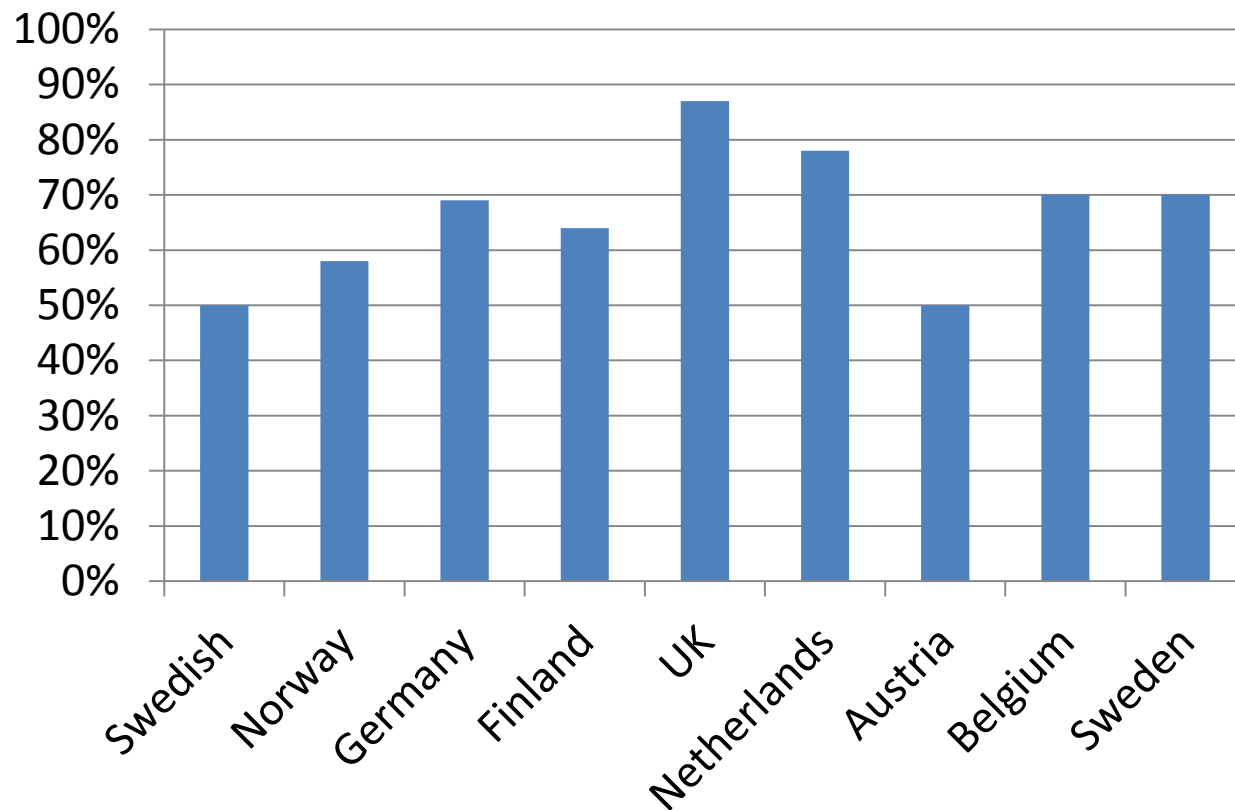
*Approximately 1/3 of them are using touchscreen devices

Most popular Apple App Store categories
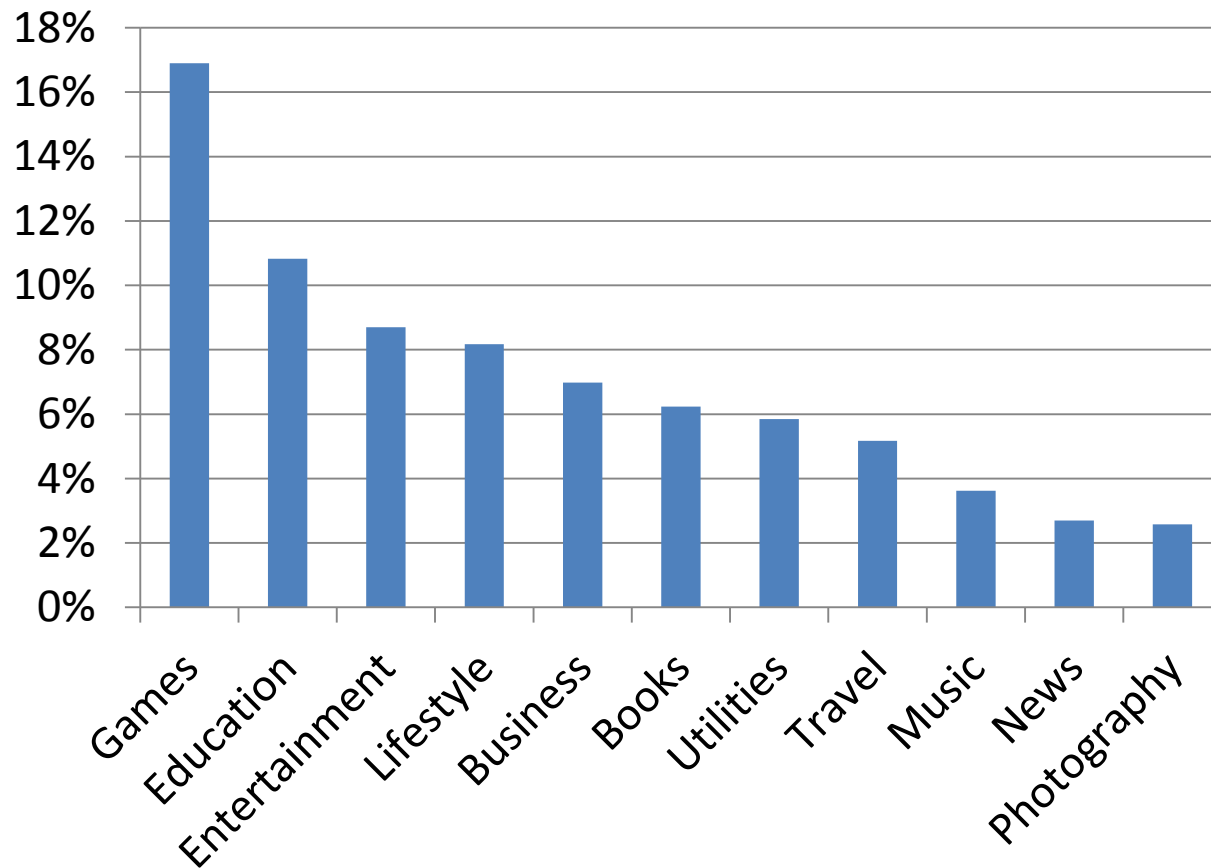
Most popular Android Market categories

- Education app is only a small portion
- most popular education apps mainly are foreign language learning, flash card and drawing.
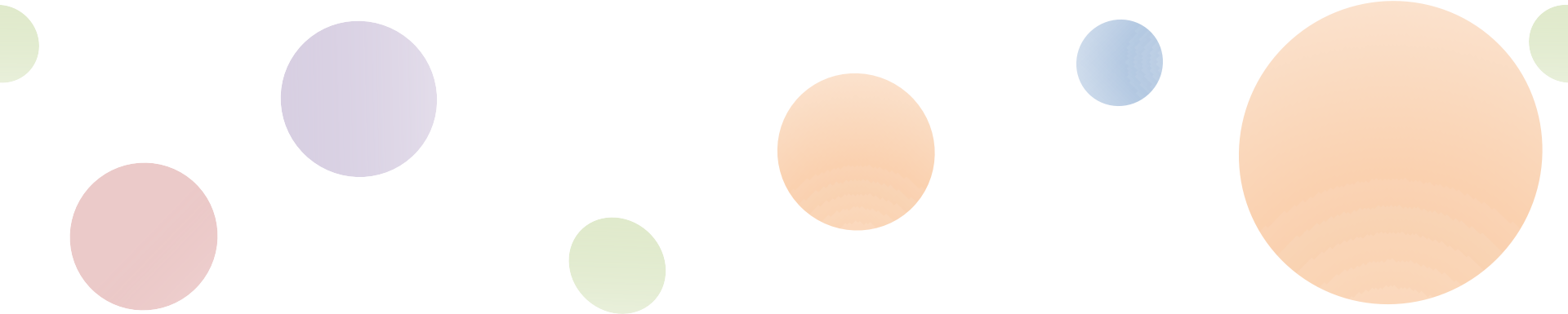- not all are designed for children and learning

Related Works

Apps for disability to learn

- limited apps
- Mostly are
  - color blindness test
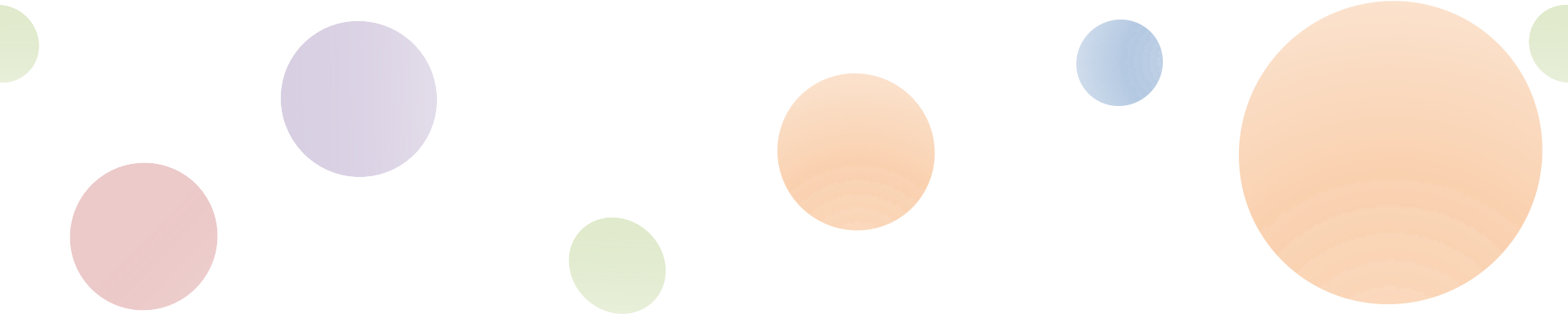 - Speech-to-text translator

Our Vision

Vision

- Current market:
  - Lack of multi-function application
  - Lack of education application with assistance to hearing impaired and color blindness children
- Therefore, we hope to develop an application to satisfy the needs using our knowledge

Our Objective

Objective

- Develop educational software
  - To develop multi-platform educational software, which support iOS and android devices, with interactive robot platform to aid children in learning
- Design for the hearing impaired and color blindness
  - To provide hearing impaired children an interactive platform to learn at home and to provide a better visual image for color blind children
- Enhance children-parents bond
  - To enhance the connection between children and parents, especially working parents, with the aid of communication and monitoring features

How to achieve?

- By integrating software application and robotic car

- Use of different technologies

- With the sound and visual effects

- Additional assistive features for disabilities

- communication and monitoring features

Development platform
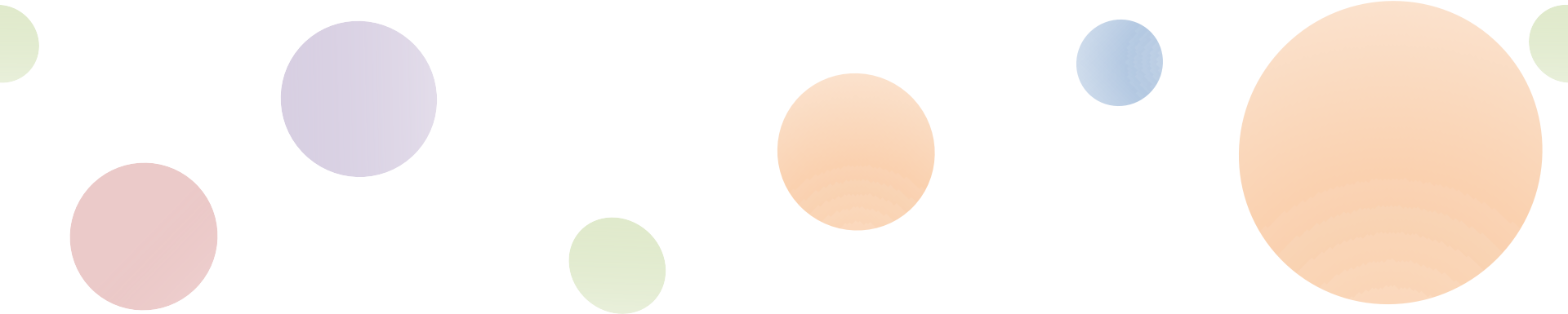
Development Platform

- Eclipse, Visual Studio and Unity

Eclipse

- an integrated development environment
- written mostly in Java
- Support other programming languages with various plug-ins
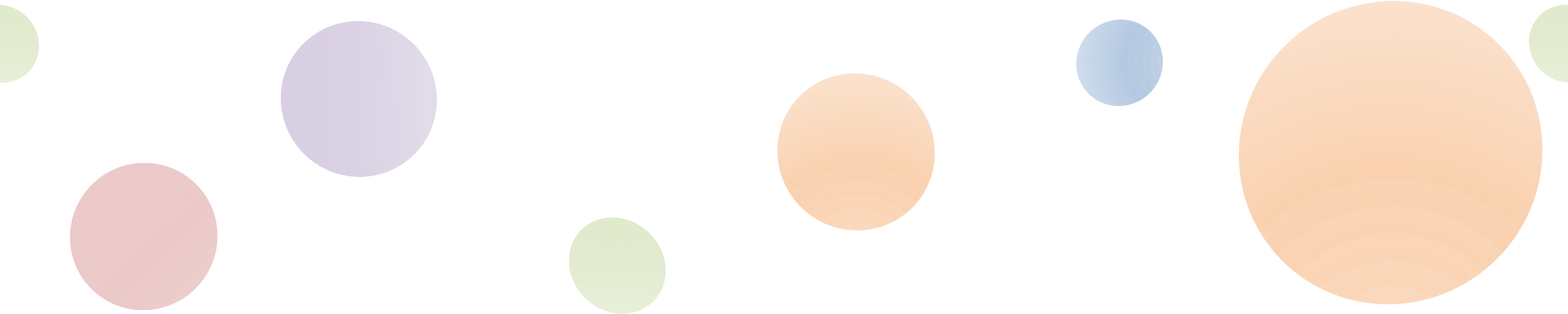
Visual Studio

- an integrated development environment
- built-in languages include C/C++, VB.NET, C#, F#
- support other programming language by means of language services

Unity

- cross-platform engine with a built-in IDE
- Supports development for iOS, Android, Windows, BBlackBerry 10, OS X, Linuz and so on
- Support C# programming language

	Unity	Eclipse	Visual Studio
VUFORIA (AR)	★ ★ ★	★ ★ ★	
Multi-platform	★ ★ ★	★	★
Voice recognition	★ ★ ★	★ ★	★ ★ ★
3D	★ ★ ★	★	★

Our Application

Our Application

- UI design
  - User friendly for children

- Special features
 - User friendly for hearing impaired & color blindness

disabilities friendly features

- For hearing impaired
  - Provide high pitch voice
  - Slow learning progress
  - Weaker in reading & maths

- For color blind people
  - provide them a better visual image using the different color scale
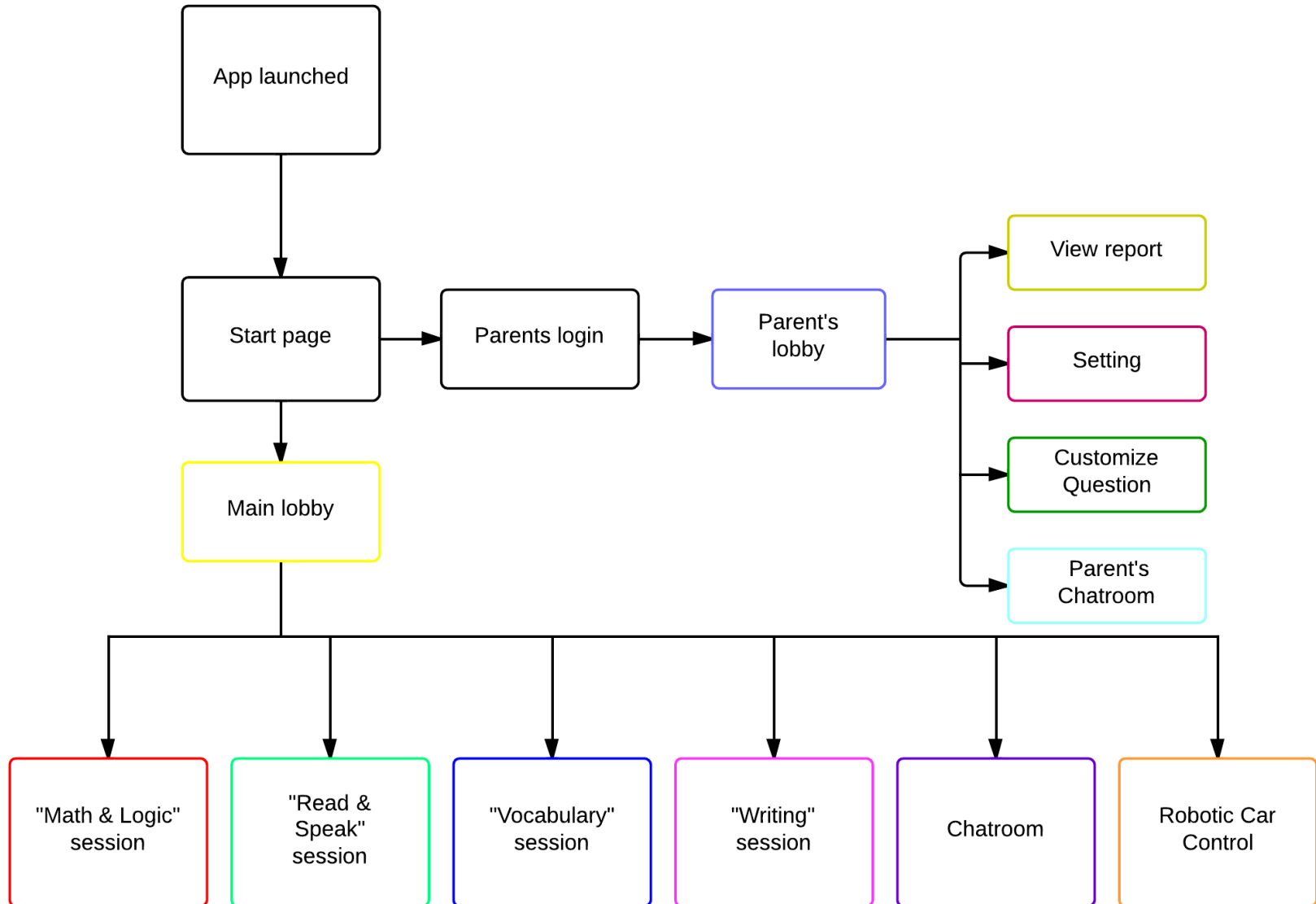
4 main session

- Maths & Logic, Read & Speak, Vocabulary, Writing
- Maintain consistency throughout the whole application with similar UI design and buttons
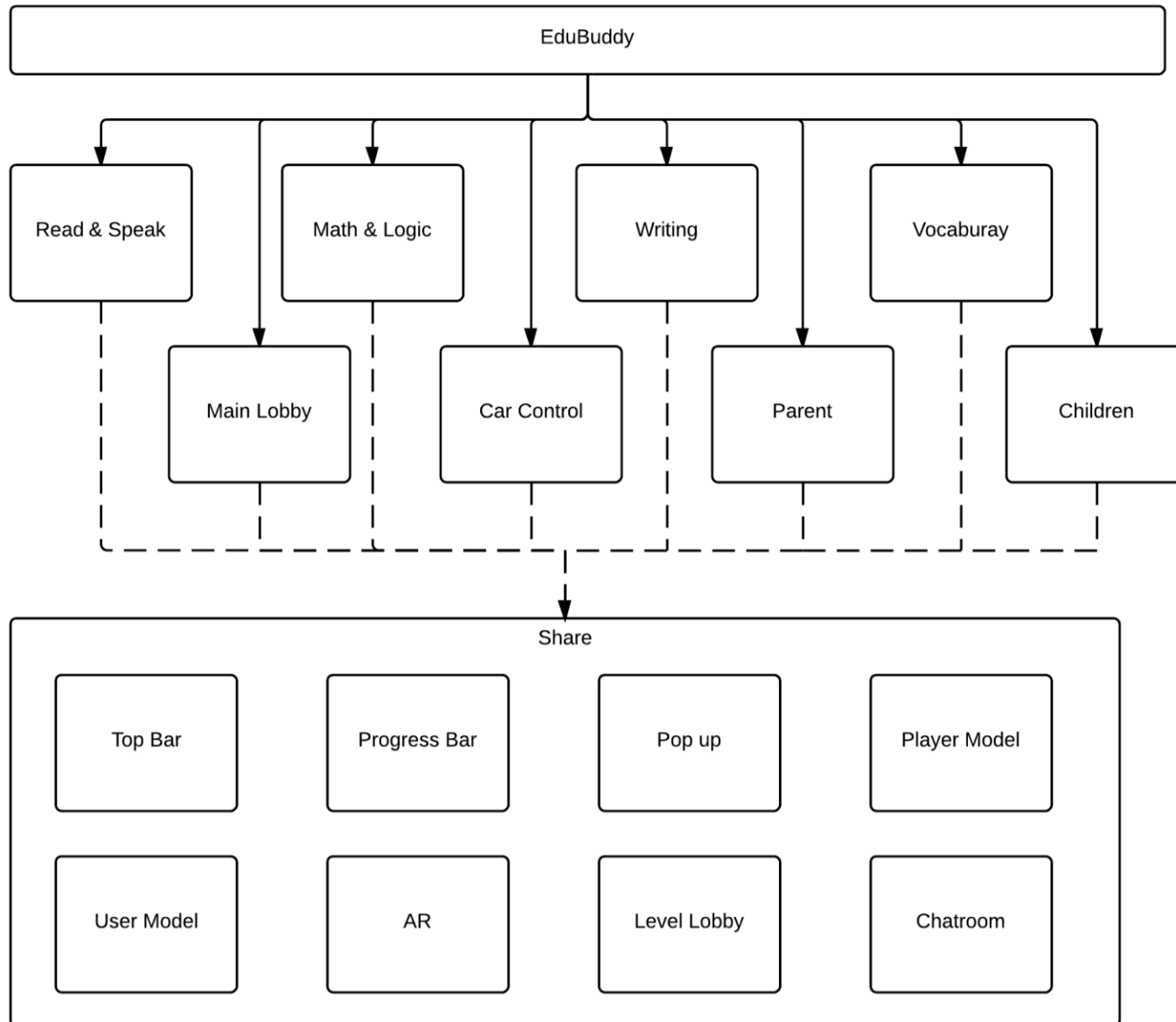
Program Structure
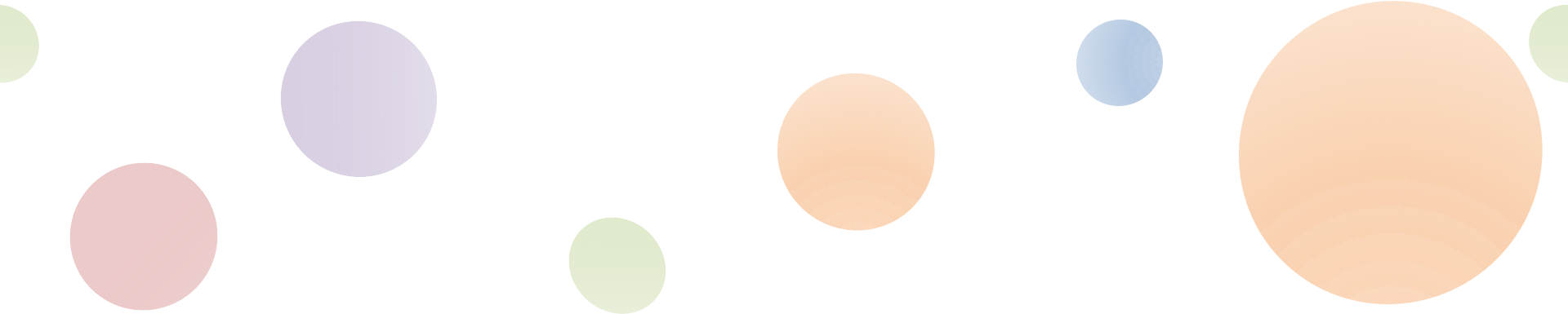
Program Structure

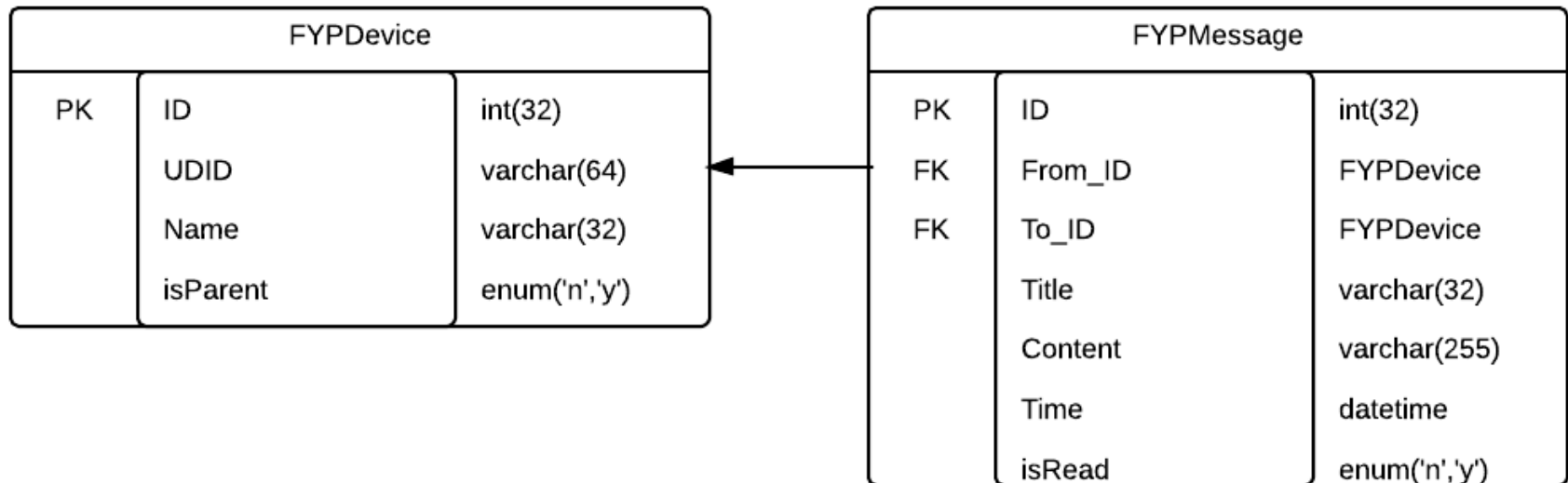- Simplified main flow:

Use of MVVM

Block diagram

Advantage of MVVM

- Optimize performance (keep minimal views running)
- Proper layering and code separation

Database Structure

- ER-diagram:

FYPDevice		
PK	ID	int(32)
	UDID	varchar(64)
	Name	varchar(32)
	isParent	enum('n','y')

FYPMessage		
PK	ID	int(32)
FK	From_ID	FYPDevice
FK	To_ID	FYPDevice
	Title	varchar(32)
	Content	varchar(255)
	Time	datetime
	isRead	enum('n','y')

Use of NGUI

- Next-Gen UI Kit
- Powerful UI framework for Unity
- Written in C#
- Advantage:
  - code is short, clean and easy-understandable
  - Keep complex UIs simple
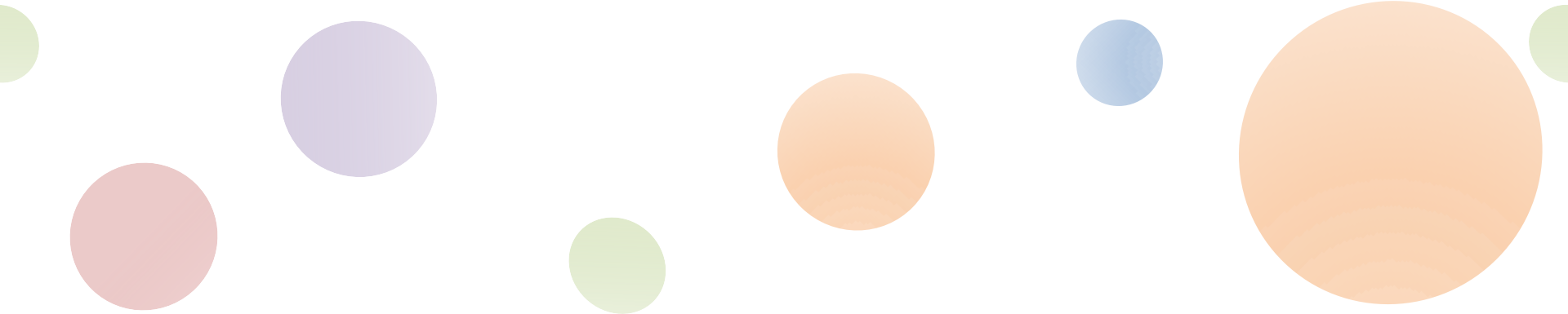 - Can be used to create and modify atlases (graphic) directly in the editor

Use of VUFORIA

- enables augmented realities (AR) app experience
- provides features
  - virtual button and video playback
- Support Unity

Use of HOTween

- A fast and powerful tween engine
- Support Unity

Demonstration

Four main sessions

- Math & Logic (AR, speech)
  - Use of AR to visualize the concept (3D, direction, etc..)
- Read & Speak (Voice recognition, speech)
  - Record and analysis the voice
- Writing (writing panel, animation)
  - Animation and writing panel will be switch according to left/right hand user
- Vocabulary (AR, speech)
  - Use of AR to visualize the word and allow the use of virtual button

Other features

- Robotic Car
  - Use of infra red
  - Special page that allow children play with the car
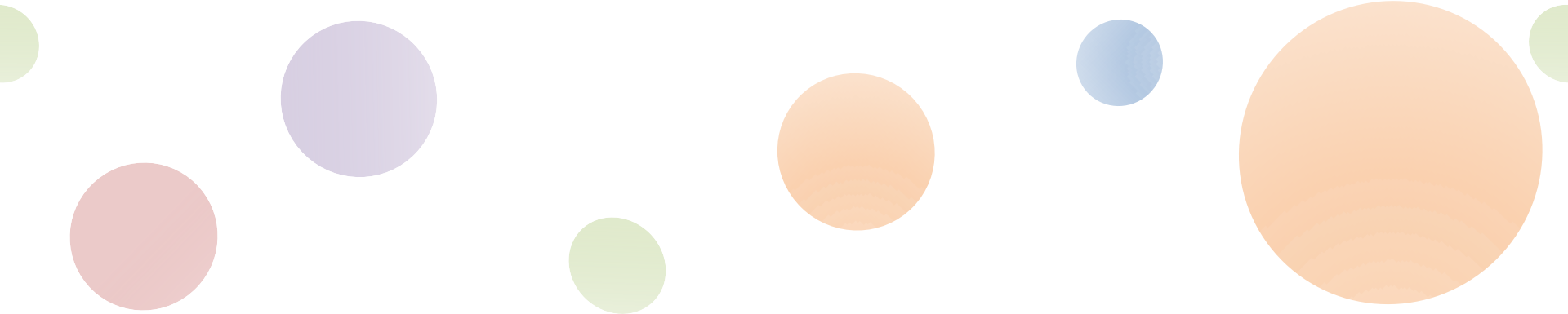 - Robotic Car will be used to give some feedback

- Result
  - display the number of correct answer in each question sets
  - Children
    - Use Medal to represent their result
    - 3 Medal: Gold, Silver, Bronze
  - Parents:
    - Result report are available

- Parent Account
  - Password protected
  - For monitoring of their child progress
  - For communication with their child

- Chatroom
  - read/ leave a message
  - Between devices or children-parents

Conclusion

Our Progress

Completed	Under Development	To be implemented
Main Lobby	Car Control	Point System
Level Lobby	Parent Report	Coins System
Parent Lobby	4 Main Learning Areas	Disabilities Friendly Features
Chatroom	Animation	Customize Questions
Volume Control		
Left/Right Hand Setting		
UI Design		
Server		

Our Schedule

Jan	Interim Report
Feb	Implementation
March	Testing & Debug
April	Preparation for final presentation
May	FYP Exhibition

Possible Difficulties

- Voice Recognition

- Car Control

- AR

- Hand Writing Recognition