# *Національний технічний університет України*

# *«Київський політехнічний інститут»*

#### ***Факультет інформатики та обчислювальної техніки***

## Лабораторна робота №1

*з курсу "****Комп’ютерна графіка****"*

***Виконав:***

*Бедь А.М.*

***Група*** *ІО-12,*

***Номер варіанту*** *1202*

***Київ - 2012р.***

Вибраний варіант: спірограф.

Формула спірограма:

x = (a - b) \* *cos*(t) + d \* *cos*(f \* t);

y = (a - b) \* *sin*(t) - d \* *sin*(f \* t);

f = a / b;

a, b, d – параметри спірограма;

a

a

a

b

d

Лістинг коду:

**package** com.com.androidspirograph;

**import** android.app.Activity;

**import** android.content.Intent;

**import** android.content.SharedPreferences;

**import** android.content.pm.ActivityInfo;

**import** android.graphics.Color;

**import** android.os.Bundle;

**import** android.preference.PreferenceManager;

**import** android.view.View;

**import** android.view.View.OnClickListener;

**import** android.view.Window;

**import** android.view.WindowManager;

**import** android.widget.LinearLayout;

**import** android.widget.SeekBar;

**import** android.widget.SeekBar.OnSeekBarChangeListener;

**import** android.widget.TextView;

**public** **class** MainActivity **extends** Activity **implements** OnClickListener,

OnSeekBarChangeListener {

SharedPreferences preferences;

LinearLayout llAnimation;

SeekBar sbA;

SeekBar sbB;

SeekBar sbD;

SeekBar sbScale;

SeekBar sbMult;

TextView tvA;

TextView tvB;

TextView tvD;

TextView tvScale;

Animation animation;

@Override

**protected** **void** onCreate(Bundle savedInstanceState) {

**super**.onCreate(savedInstanceState);

setRequestedOrientation(ActivityInfo.*SCREEN\_ORIENTATION\_PORTRAIT*);

getWindow().addFlags(WindowManager.LayoutParams.*FLAG\_FULLSCREEN*);

requestWindowFeature(Window.*FEATURE\_NO\_TITLE*);

setContentView(R.layout.*settings\_body*);

preferences = PreferenceManager.*getDefaultSharedPreferences*(**this**);

sbA = (SeekBar) findViewById(R.id.*sbA*);

sbA.setOnSeekBarChangeListener(**this**);

sbB = (SeekBar) findViewById(R.id.*sbB*);

sbB.setOnSeekBarChangeListener(**this**);

sbD = (SeekBar) findViewById(R.id.*sbD*);

sbD.setOnSeekBarChangeListener(**this**);

sbScale = (SeekBar) findViewById(R.id.*sbScale*);

sbScale.setOnSeekBarChangeListener(**this**);

tvA = (TextView) findViewById(R.id.*tvA*);

tvB = (TextView) findViewById(R.id.*tvB*);

tvD = (TextView) findViewById(R.id.*tvD*);

tvScale = (TextView) findViewById(R.id.*tvScale*);

llAnimation = (LinearLayout) findViewById(R.id.*llAnimation*);

animation = **new** Animation(**this**, 15, 10, 5, 0.005);

animation.setScale(sbScale.getProgress());

animation.setClickable(**true**);

animation.setId(0x7f081119);

animation.setOnClickListener(**this**);

llAnimation.addView(animation);

tvA.setText(String.*valueOf*(animation.getA()));

tvB.setText(String.*valueOf*(animation.getB()));

tvD.setText(String.*valueOf*(animation.getD()));

tvScale.setText(String.*valueOf*(animation.getScale()));

}

@Override

**public** **void** onClick(View v) {

**switch** (v.getId()) {

**case** 0x7f081119:

startActivity(**new** Intent(**this**, Settings.**class**));

}

}

@Override

**public** **void** onProgressChanged(SeekBar seekBar, **int** progress,

**boolean** fromUser) {

**switch** (seekBar.getId()) {

**case** R.id.*sbA*:

animation.setA(seekBar.getProgress());

tvA.setText(String.*valueOf*(animation.getA()));

**break**;

**case** R.id.*sbB*:

animation.setB(seekBar.getProgress());

tvB.setText(String.*valueOf*(animation.getB()));

**break**;

**case** R.id.*sbD*:

animation.setD(seekBar.getProgress());

tvD.setText(String.*valueOf*(animation.getD()));

**break**;

**case** R.id.*sbScale*:

animation.setScale(seekBar.getProgress());

tvScale.setText(String.*valueOf*(animation.getScale()));

**break**;

}

}

@Override

**public** **void** onStartTrackingTouch(SeekBar seekBar) {

}

@Override

**public** **void** onStopTrackingTouch(SeekBar seekBar) {

}

@Override

**protected** **void** onResume() {

**super**.onResume();

animation.setAnimation(preferences.getBoolean("isAnimate", **false**));

String string = preferences.getString("color", "Синій");

**if** (string.equals("Синій")) {

animation.setColor(Color.*BLUE*);

animation.setBl(1);

animation.setR(0);

animation.setG(0);

}

**if** (string.equals("Зелений")) {

animation.setColor(Color.*GREEN*);

animation.setBl(0);

animation.setR(0);

animation.setG(1);

}

**if** (string.equals("Червоний")) {

animation.setColor(Color.*RED*);

animation.setBl(0);

animation.setR(1);

animation.setG(0);

}

}

}

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**package** com.com.androidspirograph;

**import** java.util.Random;

**import** android.annotation.SuppressLint;

**import** android.content.Context;

**import** android.graphics.Canvas;

**import** android.graphics.Color;

**import** android.graphics.Paint;

**import** android.util.Log;

**import** android.view.SurfaceHolder;

**import** android.view.SurfaceView;

@SuppressLint("ViewConstructor")

**public** **class** Animation **extends** SurfaceView **implements** SurfaceHolder.Callback {

**private** AnimationThread thread;

**private** SurfaceHolder holder;

Paint paint;

**private** **int** x;

**private** **int** y;

**private** **int** dx;

**private** **int** dy;

**private** **int** scale;

**private** **int** i;

**private** **int** di = 1;

**private** **int** a;

**private** **int** b;

**private** **int** d;

**private** **double** m;

**private** **double** f;

**private** **double** t;

**private** **double** dt;

**private** **double** maxT;

**private** **int** color;

**private** **boolean** isAnimation;

Random random = **new** Random();

**private** **int** g = 1;

**private** **int** r = 0;

**private** **int** bl = 0;

**public** Animation(Context context, **int** a, **int** b, **int** d, **double** dt) {

**super**(context);

**this**.a = a \* 5;

**this**.b = b \* 5;

**this**.d = d \* 5;

**this**.dt = dt;

m = 1.0 \* b / nod(a, b);

f = 1.0 \* a / b;

**this**.t = 0;

**this**.maxT = 2 \* Math.*PI* \* m;

**this**.i = 1;

paint = **new** Paint();

thread = **new** AnimationThread(**this**);

holder = getHolder();

holder.addCallback(**this**);

color = Color.*BLUE*;

}

@Override

**public** **void** surfaceDestroyed(SurfaceHolder holder) {

Log.*d*("MyLog", "surfaceDestroyed");

**boolean** retry = **true**;

thread.setRunning(**false**);

**while** (retry) {

**try** {

thread.join();

retry = **false**;

} **catch** (InterruptedException e) {

}

}

}

@Override

**public** **void** surfaceCreated(SurfaceHolder holder) {

Log.*d*("MyLog", "surfaceCreated");

thread = **new** AnimationThread(**this**);

thread.setRunning(**true**);

thread.start();

dx = getWidth() / 2;

dy = getHeight() / 2;

}

@Override

**public** **void** surfaceChanged(SurfaceHolder holder, **int** format, **int** width,

**int** height) {

}

**public** **void** move() **throws** CloneNotSupportedException {

}

**public** **void** onDraw(Canvas canvas) {

canvas.drawColor(Color.*BLACK*);

m = 1.0 \* b / nod(a, b);

f = 1.0 \* a / b;

**this**.t = 0;

**this**.maxT = 2 \* Math.*PI* \* m;

**while** (t <= maxT) {

draw();

**if** (isAnimation)

paint.setColor(Color.*argb*(255, i % 255 \* r, i % 255 \* g, i

% 255 \* bl));

**else**

paint.setColor(color);

canvas.drawLine(x + dx, y + dy, dx, dy, paint);

}

}

**private** **void** draw() {

x = (**int**) (((a - b) \* Math.*cos*(t) + d \* Math.*cos*(f \* t)) \* scale);

y = (**int**) (((a - b) \* Math.*sin*(t) - d \* Math.*sin*(f \* t)) \* scale);

t = t + dt;

i = (i + di) % Integer.*MAX\_VALUE*;

}

**private** **int** nod(**int** a, **int** b) {

**while** (a != 0 && b != 0) {

**if** (a >= b)

a = a % b;

**else**

b = b % a;

}

**return** a + b;

}

**public** **void** setScale(**int** scale) {

**this**.scale = scale + 1;

}

**public** **void** setA(**int** a) {

**this**.a = a \* 5;

}

**public** **void** setB(**int** b) {

**this**.b = b \* 5;

}

**public** **void** setD(**int** d) {

**this**.d = d \* 5;

}

**public** **int** getA() {

**return** a;

}

**public** **int** getB() {

**return** b;

}

**public** **int** getD() {

**return** d;

}

**public** **int** getScale() {

**return** scale;

}

**public** **void** setColor(**int** color) {

**this**.color = color;

}

**public** **void** setAnimation(**boolean** isAnimation) {

**this**.isAnimation = isAnimation;

}

**public** **void** setG(**int** g) {

**this**.g = g;

}

**public** **void** setR(**int** r) {

**this**.r = r;

}

**public** **void** setBl(**int** bl) {

**this**.bl = bl;

}

}

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**package** com.com.androidspirograph;

**import** android.graphics.Canvas;

**public** **class** AnimationThread **extends** Thread {

**private** Animation animation;

**private** **boolean** runFlag;

**public** AnimationThread(Animation animation) {

**this**.animation = animation;

runFlag = **false**;

}

**public** **void** setRunning(**boolean** runFlag) {

**this**.runFlag = runFlag;

}

**public** **void** run() {

**super**.run();

**long** ticksPS;

**long** startTime;

**long** sleepTime;

**while** (runFlag) {

ticksPS = 1000 / 6;

Canvas canvas = **null**;

startTime = System.*currentTimeMillis*();

**try** {

canvas = animation.getHolder().lockCanvas();

**synchronized** (animation.getHolder()) {

animation.onDraw(canvas);

animation.move();

}

} **catch** (CloneNotSupportedException e) {

e.printStackTrace();

} **finally** {

**if** (canvas != **null**) {

animation.getHolder().unlockCanvasAndPost(canvas);

}

sleepTime = ticksPS - (System.*currentTimeMillis*() - startTime);

**try** {

**if** (sleepTime > 0)

*sleep*(sleepTime);

**else**

*sleep*(10);

} **catch** (InterruptedException e) {

// **TODO** Auto-generated catch block

e.printStackTrace();

}

}

}

}

}

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**package** com.com.androidspirograph;

**import** android.content.pm.ActivityInfo;

**import** android.os.Bundle;

**import** android.preference.PreferenceActivity;

**import** android.view.Window;

**import** android.view.WindowManager;

**public** **class** Settings **extends** PreferenceActivity {

@Override

**protected** **void** onCreate(Bundle savedInstanceState) {

setRequestedOrientation(ActivityInfo.*SCREEN\_ORIENTATION\_PORTRAIT*);

getWindow().addFlags(WindowManager.LayoutParams.*FLAG\_FULLSCREEN*);

requestWindowFeature(Window.*FEATURE\_NO\_TITLE*);

**super**.onCreate(savedInstanceState);

~~addPreferencesFromResource~~(R.xml.*pref*);

}

}

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Ресурси:

<?xml version=*"1.0"* encoding=*"utf-8"*?>

<LinearLayout xmlns:android=*"http://schemas.android.com/apk/res/android"*

android:layout\_width=*"match\_parent"*

android:layout\_height=*"match\_parent"*

android:background=*"#000000"*

android:clickable=*"true"*

android:orientation=*"vertical"* >

<LinearLayout

android:id=*"@+id/llAnimation"*

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_weight=*"40"*

android:clickable=*"true"*

android:orientation=*"vertical"* >

</LinearLayout>

<LinearLayout

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_weight=*"1"*

android:orientation=*"vertical"* >

<LinearLayout

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"* >

<TextView

android:id=*"@+id/tvAT"*

android:layout\_width=*"wrap\_content"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginLeft=*"10dp"*

android:text=*"@string/a\_res"*

android:textColor=*"#ffffff"* />

<TextView

android:id=*"@+id/tvA"*

android:layout\_width=*"wrap\_content"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginLeft=*"10dp"*

android:text=*"TextView"*

android:textColor=*"#ffffff"* />

</LinearLayout>

<SeekBar

android:id=*"@+id/sbA"*

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_margin=*"5dp"*

android:max=*"10"*

android:progress=*"3"* />

</LinearLayout>

<LinearLayout

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_weight=*"1"*

android:orientation=*"vertical"* >

<LinearLayout

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"* >

<TextView

android:id=*"@+id/tvBT"*

android:layout\_width=*"wrap\_content"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginLeft=*"10dp"*

android:text=*"@string/b\_res"*

android:textColor=*"#ffffff"* />

<TextView

android:id=*"@+id/tvB"*

android:layout\_width=*"wrap\_content"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginLeft=*"10dp"*

android:text=*"TextView"*

android:textColor=*"#ffffff"* />

</LinearLayout>

<SeekBar

android:id=*"@+id/sbB"*

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_margin=*"5dp"*

android:max=*"10"*

android:progress=*"2"* />

</LinearLayout>

<LinearLayout

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginBottom=*"10dp"*

android:layout\_weight=*"1"*

android:orientation=*"vertical"* >

<LinearLayout

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"* >

<TextView

android:id=*"@+id/tvDT"*

android:layout\_width=*"wrap\_content"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginLeft=*"10dp"*

android:text=*"@string/d\_res"*

android:textColor=*"#ffffff"* />

<TextView

android:id=*"@+id/tvD"*

android:layout\_width=*"wrap\_content"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginLeft=*"10dp"*

android:text=*"TextView"*

android:textColor=*"#ffffff"* />

</LinearLayout>

<SeekBar

android:id=*"@+id/sbD"*

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_margin=*"5dp"*

android:max=*"10"*

android:progress=*"1"* />

</LinearLayout>

<LinearLayout

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginBottom=*"10dp"*

android:layout\_weight=*"1"*

android:orientation=*"vertical"* >

<LinearLayout

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"* >

<TextView

android:id=*"@+id/tvScaleT"*

android:layout\_width=*"wrap\_content"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginLeft=*"10dp"*

android:text=*"@string/scale"*

android:textColor=*"#ffffff"* />

<TextView

android:id=*"@+id/tvScale"*

android:layout\_width=*"wrap\_content"*

android:layout\_height=*"wrap\_content"*

android:layout\_marginLeft=*"10dp"*

android:text=*"TextView"*

android:textColor=*"#ffffff"* />

</LinearLayout>

<SeekBar

android:id=*"@+id/sbScale"*

android:layout\_width=*"match\_parent"*

android:layout\_height=*"wrap\_content"*

android:layout\_margin=*"5dp"*

android:layout\_marginBottom=*"5dp"*

android:max=*"29"*

android:progress=*"5"* />

</LinearLayout>

</LinearLayout>

<?xml version=*"1.0"* encoding=*"utf-8"*?>

<resources>

<string name=*"app\_name"*>AndroidSpirograph</string>

<string name=*"hello\_world"*>Hello world!</string>

<string name=*"menu\_settings"*>Settings</string>

<string name=*"a\_res"*>Виберіть параметр A</string>

<string name=*"b\_res"*>Виберіть параметр B</string>

<string name=*"d\_res"*>Виберіть параметр D</string>

<string name=*"scale"*>Масштаб</string>

<string name=*"scaleParam"*>Множник параметрів x</string>

<string name=*"animation\_text"*>Анімація</string>

<string-array name=*"entry"*>

<item>Синій</item>

<item>Зелений</item>

<item>Червоний</item>

</string-array>

<string name=*"color\_line"*>Колір</string>

</resources>

Маніфест файл:

<?xml version=*"1.0"* encoding=*"utf-8"*?>

<manifest xmlns:android=*"http://schemas.android.com/apk/res/android"*

package=*"com.com.androidspirograph"*

android:versionCode=*"1"*

android:versionName=*"1.0"* >

<uses-sdk

android:minSdkVersion=*"8"*

android:targetSdkVersion=*"15"* />

<application

android:allowBackup=*"true"*

android:icon=*"@drawable/ic\_launcher"*

android:label=*"@string/app\_name"*

android:theme=*"@style/AppTheme"* >

<activity

android:name=*"com.com.androidspirograph.MainActivity"*

android:label=*"@string/app\_name"* >

<intent-filter>

<action android:name=*"android.intent.action.MAIN"* />

<category android:name=*"android.intent.category.LAUNCHER"* />

</intent-filter>

</activity>

<activity android:name=*"Settings"*></activity>

</application>

</manifest>

Висновок. Було реалізовано програму під операційну систему android, в якій в інтерактивному режимі можна задавати параметри спірографа і зразу бачити результат. Реалізовано меню налаштувань де можна вибрати колір ліній для малювання, а також фляжок для вмикання та вимикання простої анімації. Діапазон можливих значень параметрів від 0 до 50 з кроком 5. Також присутній повзунок для масштабування зображення. Зображення будувалося на основі примітивів.