Vol.2, No.2, 124-129 (2010)
http://dx.doi.org/10.4236/ns.2010.22021

Natural Science

ALICE as a tool for programming at schools

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Received 7 November 2009, revised 24 November 2009, accepted 5 January 2010.

ABSTRACT

We present some possible application of ALICE in the context of a possible attraction of pupils (especially girls) in early programming course. Our examples presented in the paper are fully explained on the base of [1].

Keywords: Interactive 3D Graphics; Animation Authoring Tools

1. INTRODUCTION

Alice is an innovative 3D programming environment that makes it easy to create an animation for telling a story, playing an interactive game, or a video to share on the web. Alice is a teaching tool for introductory computing. It uses 3D graphics and a drag-and-drop interface to facilitate a more engaging, less frustrating first programming experience. In Alice's interactive interface, students drag and drop graphic tiles to create a program, where the instructions correspond to standard statements in a production oriented programming language, such as Java, C++, and C#.

This information was found at www site: www.alice.org.

A free ALICE 2.2 programme may be found there, together with some other introductory materials.

Alice allows students to immediately see how their animation programs run, enabling them to easily understand the relationship between the programming statements and the behaviour of objects in their animation. By manipulating the objects in their virtual world, students gain experience with all the programming constructs typically taught in an introductory programming course.

Our aim is to point out that in our opinion this programme may be very useful as a tool for teaching in the Middle schools to attract pupils (especially girls) in: early programming, making short videos with MP3 music and adding some pieces of translations of that music, for example. Other possible applications at school is useful for learning foreign languages, especially English or German and other subjects as well. We intend to explain our ideas on three examples. These examples were examined on a group of pupils with a positive result.

It is not the purpose of this paper to publish statistical results on an application of the methods proposed but to show how a short presentation at school can be made in order to attract pupils in programming simple videos with their favourite MP3 music or with their own recordings of poems in their own or foreign language. In the third we use special effects. It is obvious that these three simple methods combined together presents a possibility of early introductory into programming in the Middle schools.

2. AN EXAMPLE OF PRESENTING MP3 MUSIC WITH A DOMESTIC OR FOREIGN TEXT

The author of [4] mentioned that: "Women are currently underrepresented in Computer Science". In the opinion of the author of [3] and many others: "middle school is a critical age, during which may girls turn away from scientific and mathematical pursuits, including Computer Science. By giving middle school girls a positive first programming experience, we may be able to increase girl's participation in Computer Science".

Also the opinion above has been made in USA, we have observed that the situation is quite similar in Poland and some other EU countries. In middle schools girls are less interested in Computer science as boys. As the result we observe that girls constitute a minority on Technical Faculties in our Technical Universities (including Opole University of Technology), on Informatics studies, while mathematical studies in Poland, surprisingly, are sometimes occupied by girls (for example at the University of Opole). Despite that fact, we have observed many times, that the scientific way for women, very often, is much more complicated and difficult as for men. However, this is not a topic of that article. Our goal is to concentrate on the particular problem of a possibility of increasing an interest of pupils in Computer Sciences in Middle schools, using the particular programme, namely ALICE. To achieve this goal, we present three possible ways of:

1) implementing MP3 popular songs using ALICE,
2) implementing poems via ALICE,
3) using special effects and sounds.

We have observed that, programming short 1-3 minutes videos with MP3 music is very interesting for pupils, because one may learn programming and train its imagination at the same time, learn the text of the song plus English (or other language) by the way, Therefore we present here an example of a presentation of a piece of one popular song in Germany.

Our translation is a sample of possible texts which may appear in such video. First we present some pictures from the video then a possible code of such presentation, made with ALICE programme.

Example 1.

We present a photo made from a scene of our video: Party.mv by ALICE:

It's party time!

Diagram 1. A photo from video Party.mov.

Party's Code made for a 3 minutes video with MP3 music in German.

Party's Code
Created by: Ewa Graczyńska

World
Events

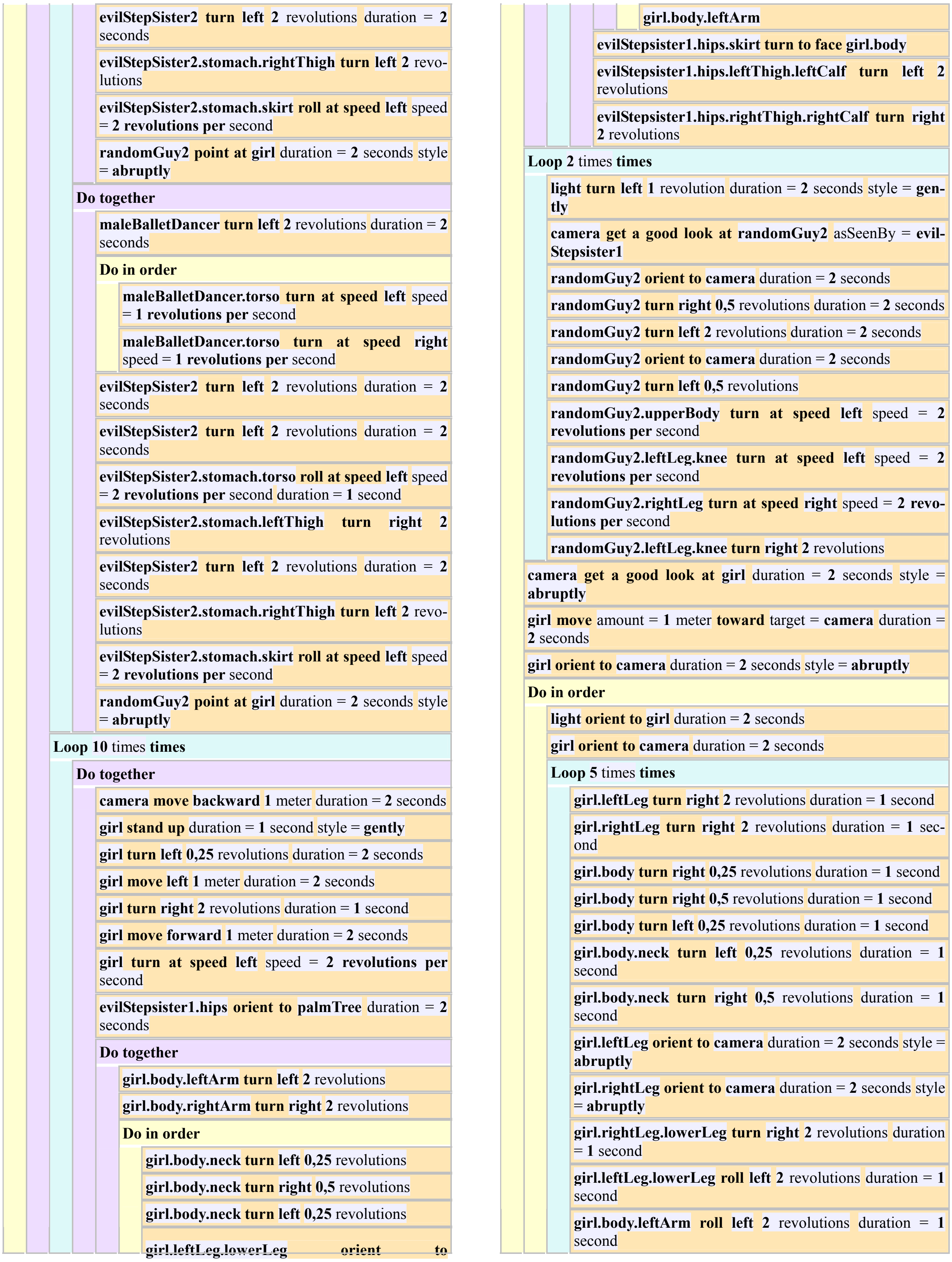
```
When the world starts
  Do: world.music

When A is typed
  Do: ground.dance1

Let move Any Object

When 1 is typed
  Do: world.dialog1

When 2 is typed
  Do: girl.dialog2
```

Methods

```
world.music( )
No variables
    palmTree play sound world.10-AudioTrack 10 (3:44,896) duration = 150 seconds

world.dialog1 ( )
No variables
    evilStepsister1 say It's party time! duration = 2 seconds

world.dialog3 ( )
No variables
    randomGuy2 say You are super! duration = 2 seconds
```

Ground
Meyhods

```
ground.dance1 ( )
No variables
    Do in order
        light resize 2 duration = 2 seconds
        evilStepsister1 move right 5 meters duration = 1 second
        evilStepsister1 turn left 2 revolutions duration = 1 second
        Do together
            evilStepSister2 turn right 2 revolutions duration = 1 second
            palmTree.leaf2 point at evilStepSister2 duration = 2 seconds
        evilStepSister2 move amount = 0,25 meters toward target = camera duration = 1 second
        Do together
            palmTree.leaf6 point at evilStepSister2
            evilStepsister1 move left 1 meter duration = 2 seconds
            evilStepSister2 move left 1 meter duration = 2 seconds
            maleBalletDancer move left 5 meters duration = 2 seconds
    Do together
        Loop 10 times times
            Do together
                maleBalletDancer turn left 2 revolutions duration = 2 seconds
                Do in order
                    maleBalletDancer.torso turn at speed left speed = 1 revolutions per second
                    maleBalletDancer.torso turn at speed right speed = 1 revolutions per second
                evilStepSister2 turn left 2 revolutions duration = 2 seconds
                evilStepSister2 turn left 2 revolutions duration = 2 seconds
                evilStepSister2.stomach.torso roll at speed left speed = 2 revolutions per second duration = 1 second
                evilStepSister2.stomach.skirt turn left 2 revolutions duration = 2 seconds
                evilStepSister2.stomach.leftThigh turn right 2 revolutions
```



```
        evilStepSister2 turn left 2 revolutions duration = 2 seconds
        evilStepSister2.stomach.rightThigh turn left 2 revolutions
        evilStepSister2.stomach.skirt roll at speed left speed = 2 revolutions per second
        randomGuy2 point at girl duration = 2 seconds style = abruptly
      Do together
        maleBalletDancer turn left 2 revolutions duration = 2 seconds
        Do in order
          maleBalletDancer.torso turn at speed left speed = 1 revolutions per second
          maleBalletDancer.torso turn at speed right speed = 1 revolutions per second
        evilStepSister2 turn left 2 revolutions duration = 2 seconds
        evilStepSister2 turn left 2 revolutions duration = 2 seconds
        evilStepSister2.stomach.torso roll at speed left speed = 2 revolutions per second duration = 1 second
        evilStepSister2.stomach.leftThigh turn right 2 revolutions
        evilStepSister2 turn left 2 revolutions duration = 2 seconds
        evilStepSister2.stomach.rightThigh turn left 2 revolutions
        evilStepSister2.stomach.skirt roll at speed left speed = 2 revolutions per second
        randomGuy2 point at girl duration = 2 seconds style = abruptly
    Loop 10 times times
      Do together
        camera move backward 1 meter duration = 2 seconds
        girl stand up duration = 1 second style = gently
        girl turn left 0,25 revolutions duration = 2 seconds
        girl move left 1 meter duration = 2 seconds
        girl turn right 2 revolutions duration = 1 second
        girl move forward 1 meter duration = 2 seconds
        girl turn at speed left speed = 2 revolutions per second
        evilStepsister1.hips orient to palmTree duration = 2 seconds
        Do together
          girl.body.leftArm turn left 2 revolutions
          girl.body.rightArm turn right 2 revolutions
          Do in order
            girl.body.neck turn left 0,25 revolutions
            girl.body.neck turn right 0,5 revolutions
            girl.body.neck turn left 0,25 revolutions
            girl.leftLeg.lowerLeg orient to
            girl.body.leftArm
        evilStepsister1.hips.skirt turn to face girl.body
        evilStepsister1.hips.leftThigh.leftCalf turn left 2 revolutions
        evilStepsister1.hips.rightThigh.rightCalf turn right 2 revolutions
  Loop 2 times times
    light turn left 1 revolution duration = 2 seconds style = gently
    camera get a good look at randomGuy2 asSeenBy = evilStepsister1
    randomGuy2 orient to camera duration = 2 seconds
    randomGuy2 turn right 0,5 revolutions duration = 2 seconds
    randomGuy2 turn left 2 revolutions duration = 2 seconds
    randomGuy2 orient to camera duration = 2 seconds
    randomGuy2 turn left 0,5 revolutions
    randomGuy2.upperBody turn at speed left speed = 2 revolutions per second
    randomGuy2.leftLeg.knee turn at speed left speed = 2 revolutions per second
    randomGuy2.rightLeg turn at speed right speed = 2 revolutions per second
    randomGuy2.leftLeg.knee turn right 2 revolutions
  camera get a good look at girl duration = 2 seconds style = abruptly
  girl move amount = 1 meter toward target = camera duration = 2 seconds
  girl orient to camera duration = 2 seconds style = abruptly
  Do in order
    light orient to girl duration = 2 seconds
    girl orient to camera duration = 2 seconds
    Loop 5 times times
      girl.leftLeg turn right 2 revolutions duration = 1 second
      girl.rightLeg turn right 2 revolutions duration = 1 second
      girl.body turn right 0,25 revolutions duration = 1 second
      girl.body turn right 0,5 revolutions duration = 1 second
      girl.body turn left 0,25 revolutions duration = 1 second
      girl.body.neck turn left 0,25 revolutions duration = 1 second
      girl.body.neck turn right 0,5 revolutions duration = 1 second
      girl.leftLeg orient to camera duration = 2 seconds style = abruptly
      girl.rightLeg orient to camera duration = 2 seconds style = abruptly
      girl.rightLeg.lowerLeg turn right 2 revolutions duration = 1 second
      girl.leftLeg.lowerLeg roll left 2 revolutions duration = 1 second
      girl.body.leftArm roll left 2 revolutions duration = 1 second
      girl.body.neck.head orient to camera duration = 2 seconds style = gently
      girl.body.leftArm.forearm roll left 2 revolutions duration = 1 second
      girl.rightLeg roll right 2 revolutions duration = 1 second
      girl.body.rightArm.forearm roll right 2 revolutions duration = 1 second
      girl.body.neck turn left 0,25 revolutions duration = 1 second
      girl turn left 2 revolutions duration = 1 second style = abruptly
      light orient to girl
      girl orient to camera duration = 1 second style = gently
    Do together
      randomGuy2 stand up duration = 1 second style = gently
      camera get a good look at randomGuy2 duration = 1 second
    Do together
      camera get a good look at randomGuy2 duration = 2 seconds
      randomGuy2 point at girl duration = 2 seconds
    camera get a good look at girl duration = 2 seconds
    light orient to girl duration = 2 seconds
    camera get a good look at girl.body duration = 2 seconds
    light orient to girl.body duration = 2 seconds style = gently
    girl orient to camera duration = 2 seconds style = gently
    Do together
      camera get a good look at randomGuy2 duration = 2 seconds
      Do in order
        randomGuy2 say Hey! duration = 2 seconds
        randomGuy2 say You are super! duration = 2 seconds
```

evilStepSister2
Methods

```
evilStepSister2.dialog2 ( )
 No variables
  girl say We are dnacing and dancing. duration = 2 seconds
```

girl
Methods

```
girl.dialog2 ( )
No variables
  girl say We are dancing! duration = 2 seconds
```

Diagram 2. Party's Code

We explain that in the code, MP3 music was arranged to play for 230 seconds. This time may be changed accordingly. "Sounds" are presented in ALICE as "seldom used properties". However, our experience led us to the conclusion that this kind of attracting pupils in making videos with ALICE work perfectly and gives many positive results.

3. AN EXAMPLE OF PRESENTING OWN RECORDING

Example 2.

Video Plato.mov may be considered for teachers in middle schools as another possibility to attract pupils in combining programming videos using ALICE and adding own sound, for example singing a song. This exercise in fact is quite difficult for beginners, as one should record its own graphical presentation of a poem (or a song) together with the voice suitably implemented. As our group of girls have practiced that to make a good recording via ALICE of a short poem or a song needs sometimes many tries. During these multiple repetitions, girls usually were able to learn to recite the poem which gave them additional advantage. Especially if the poem or a song was in a foreign language. Expressing the ides of a poem as a video was another positive experience which gave pupils a possibility to express more fully their emotions via colourful visualization. For some of them it was really a great pleasure to express thoughts in an animation powered with a piece of music or own declamation.

Diagram 3. A photo from video Plato.mov.

Plato's CodePlato's Code
Created by Ewa Graczyńska

World
Events

```
When 1 is typed
 Do: world.metoda1
```

```
When 2 is typed
```

```
Do: plato.metoda2

When 3 is typed
Do: plato.metoda3

Methods
world.metoda1 ( )
 No variables
    plato resize 2

plato
Methods
plato.metoda2 ( )
No variables
    plato play sound plato.plato1 (0:04,650) duration = Full
    Length

plato.metoda3 ( )
 No variables
   Do together
      light set point of view to plato.body duration = 2 seconds
      plato.body.neck turn right 0,25 revolutions duration = 2
      seconds
      plato.body.rightArm turn right 0,25 revolutions duration = 2
      seconds
   Do in order
      plato.body.rightArm.rightForeArm constrain to face cam-
      era
      plato.body.rightArm.rightForeArm.rightHand turn right 1
      revolution duration = 2 seconds
      plato.body.rightArm.rightForeArm point at light duration =
      2 seconds
      plato.body.rightArm.rightForeArm turn left 0,5 revolutions
      duration = 2 seconds
      plato.body.rightArm.rightForeArm.rightHand turn left 0,5
      revolutions duration = 2 seconds
      plato.body.leftArm point at light duration = 2 seconds
      plato.body.rightArm.rightForeArm.rightHand turn left 0,5
      revolutions duration = 2 seconds
      plato.body.rightArm.rightForeArm.rightHand.playDoe
      point at light duration = 2 seconds
   light orient to plato.body.leftArm.leftForearm duration = 2
   seconds
   plato.leftLeg.leftShin.leftFoot turn left 0,25 revolutions duration
   = 2 seconds
   camera get a good look at plato duration = 2 seconds
```

Diagram 4. Plato's Code

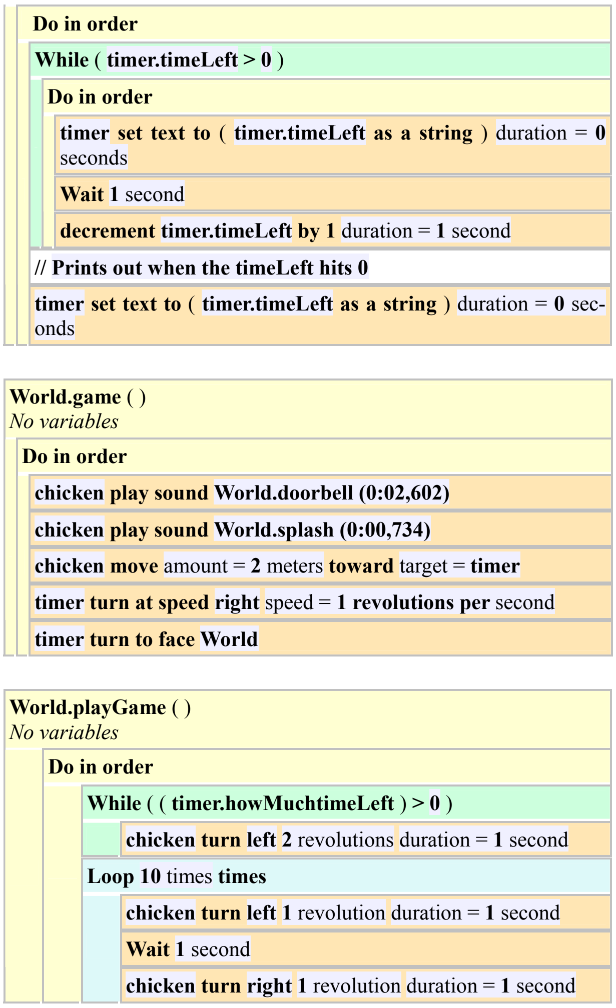
4. AN EXAMPLE OF PRESENTING SPECIAL EFFECTS

We studied monograph [1] to find some more possibilities for examples.

Example 3.

It presents a method of combining implementing sounds with special effects, as fire animations, to attract the presentation, based on Example 1 of [1], p. 307 where a class level variable timeLeft has been created to illustrate how a block of a possible game instructions can be controlled by a timer.

```
TIMER1's Code
Created by: Ewa Graczyńska
World
Events
When the world starts
Do: World.playGame

When the world starts
Do: World.my first method

When the world starts
Do: chicken.metoda1

Let move Any Object

When C is typed
Do: cloud.claud1

When F is typed
Do: fire.fire1

When G is typed
Do: fire.spin like crazy

When the world starts
Do: chicken.metoda2

When H is typed
Do: fireAnimation.fire2

Methods
World.my first method ( )
No variables
    timer.initialize amountOfTime = 30
    Do together
       World.playGame
       timer.countDown

World.countdown ( )
 No variables
```



```
Do in order
  While ( timer.timeLeft > 0 )
    Do in order
      timer set text to ( timer.timeLeft as a string ) duration = 0 seconds
      Wait 1 second
      decrement timer.timeLeft by 1 duration = 1 second
  // Prints out when the timeLeft hits 0
  timer set text to ( timer.timeLeft as a string ) duration = 0 seconds

World.game ( )
No variables
  Do in order
    chicken play sound World.doorbell (0:02,602)
    chicken play sound World.splash (0:00,734)
    chicken move amount = 2 meters toward target = timer
    timer turn at speed right speed = 1 revolutions per second
    timer turn to face World

World.playGame ( )
No variables
  Do in order
    While ( ( timer.howMuchtimeLeft ) > 0 )
      chicken turn left 2 revolutions duration = 1 second
    Loop 10 times times
      chicken turn left 1 revolution duration = 1 second
      Wait 1 second
      chicken turn right 1 revolution duration = 1 second
```

Diagram 5. Timer1'st Code.

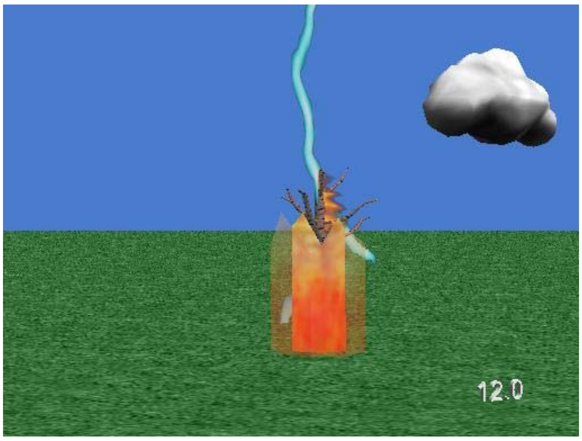


Diagram 6. A photo from video Timer1.mov.

We used instructions in Example 1 on p. 307 of [1] to create a timer that counts down in seconds. This exercise was exiting for pupils, as they used some new animations from the CD attached to the monograph [1]. Some pupils were very satisfied with that kind of programming as an early exercise before programming a more complicated game. During our short course of programming in Alice with a use of [1], in the group, the growth of an interest in programming games and also several other subjects was noted. Among them there were foreign languages, especially those in which the MP3 music was listened (English or German) or in which the poems were declaimed. A possibility of a computer visualization of ideas or some natural phenomenon was highly appreciated by the pupils as an additional effect of their experiments.

5. ACKNOWLEDGEMENTS

The author is very grateful to the referee for her/his valuable comments during the preparation of this paper. Due thanks are expressed to Wanda Dann for her early help to the author with Alice.

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Three files: Party.mov and Plato.mov and Timer1.mov are available at: www.egracz.po.opole.pl.