

ORGANIZATION OF CONTINUOUS LEARNING AND LEARNING IN PROGRAMMING AND ROBOTICS USING THE CONCEPT OF A PERSON'S WHOLE LIFE COURSE

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ANNOTATION

This article promotes the idea of continuous teaching of programming and robotics. From a young age of 5-6, the idea of implementing robotics exercises in Lego Mindstorms, further complicating them in further education, and practically integrating computer programs that move a real robot or machine into C++, C#, Python programming language, or the use of ready-made applications has been developed. In conjunction with organizing the entry of a teacher into the programming world by teaching robotics, it serves to provide insight into the basics of its programming and to improve programming skills. Robotics, which is taught in additional education, in turn strengthens knowledge of programming. And their continuous training together is also consistent with the implementation of the concept of "teaching a person all his life."

Keywords: robotics, programming, C++, C#, Python, concept of "learning a lifetime," additional education.

Log In

It is about the need to develop programming teaching to strengthen teaching by programming robotics, and knowing how to program Lua, C, C++, C#, Python at the time is one of the main knowledge. By having an interest in robotics, by moving the robot in a black stripe or in a white line, we can develop the knowledge of students and students on the basis of programming. Since such knowledge is not provided in schools and universities, this process can be studied and studied in additional teachings and circles. From introducing children to the environment in preschools all their lives and using them to prepare them for school, from teaching 5-6 year-olds of lego mindstorms' programs to take the first step of the Lego Mindstorms program for the first time, depending on their age, mental and psychological development, continues it at the school To assist individuals desiring to benefit the worldwide work of Jehovah's Witnesses through some form of charitable giving, a brochure entitled Charitable Planning to Benefit Kingdom Service Worldwide has been prepared.

Adaboyots assay

We have found several scientific papers, articles, written monographs, and scientific and scientific papers conducted in this area.

Looking for Internet sources, we found enough resuscitations for robotics and programming, got acquainted with the articles of scientists working in this area, analyzed them [1], [1 see: b. 17-18], [1, b.18], [1, b.19], [1, es.20-23], [see:1, b. 24-25], [see: b. 26-28], [see:1, b.29], [1, b.30], [1, b.31], [12], G.N.Yunusova, Sh. Abdullayeva, In the following works of N. Scandinavia, Kaxxarov R. [6], [9], [9, see:], [2, b.43], [2, p.44], [2, 000] b.45-46], [2, b.47], [2, b. 48], [2, b.49], [2, b.50], [23, see URL: from <https://conferencea.org/index.php/conferences/article/view/652>], [23], [see:23],[25,see:: http://staviropk.ru/attachments/article/1023/CONFERENCE-Plenary%20presentaions%20and%20Section%20topics_Namangan.pdf],] 1 dedicated to teaching teaching using platforms, including robotics and programming [1], [2], [3, p. 58], [3, see: b.56], [3, b.58-59], [3, b.60-62], [3, b. 63-70], [3, b. 71-73], [3, b.74-77], [3, b.78-80], [3, b.81-82], [3, b.83], [3, b. 84], 3, b. 85],[3, b. 86], [3, p. 87], [see: 6], [6], [see 9], [9], [10], [10] See: *Conferencea*, taken from 444-450 h.ru/archive/59/8386/], [see 10], [11, b.88], [11, b.89], [11, b. 90], [11, b.91], [12], [13], [14], [16],[17], [18], [19],[20], [21, URL:<http://library.ziyonet.uz/uz/book/121624>], [22, see: <https://confrencea.org/index.php/confrenceas/article/view/128>], [22], [22, URL: *Conferencea*, 444-450. Retrieved from <https://conferencea.org/index.php/conferences/article/view/652>], [12], [13], [14], [16], [17],[18],[19],[20],[21], [22] see: <https://confrencea.org/index.php/confrenceas/article/view/128>],[23, see URL: *Conferencea*, 444-450. Retrieved from <https://conferencea.org/index.php/conferences/article/view/652>], [24],[25],[26, See: URL: http://staviropk.ru/attachments/article/1023/CONFERENCE-Plenary%20presentaions%20and%20and%20Section%20topics_Namangan.pdf, 10th June 2020 - Namangan City, UZBEKISTAN], [26, see b.50],[26, see: 51], [26, see: 50-51], , [26, see: 52-54], [27, b.17], [27, b.18], [27, b.19], [26],[see: 28], [28].

METODOLOGIYA

The methodology of our scientific research in this area is the introduction of our President's decrees on education, programming and robotics development, the decisions of our government, the introduction of "Robo 2020" and other choices, as well as the scientific research of scientists conducting research in this area [24],[25], [26], [27],[28],[27, b.50],[27, b.51], [27, b.52], [27, b.53],[27, b.54], [28, b.17], [27, b.18], [27, b.19], [27, 19], [27, b.17-18], [27, b.18], [27, b.19], [see: 28], [see: 28].

Natijalar

As a result of scientific research, we have found that one of the main factors in the development of STEAM education is the application of technical innovations in information technology and distinguished subjects to education, so that the processes studied and other professionals, interested people, and researchers working on themselves can also improve their knowledge in this direction. The importance of remote platforms working in this direction today, their types, as well as our own platforms [6, b.12], [see: 6, b.13-15], [see: 6, b.16-18],[read: 6, b.19], [6,b.20-

22], [1, b.17],[1, b.18], [1, b.19-20],[1, b.20-31], can be achieved by working in robotics in Arduino to improve students' knowledge of programming and we're quoted in these articles [2, b.43], [2, b.44], [2, b.45-47], [2, b.48-50], [2, b.51-53], [3, b.58], [3, b.59], [3, b.60], [3, 00] b.61], [3, b.62-70], [3, b.71-74], [3, b.75-77], [3, b.78-82], [3, b.83], [3, b.84], [3, b.85-87]. The use of information technology in teaching other subjects, together with improving the development of science, contributes to the development of integrated education [see 4], [4], [4, p. 29], [4, read b.29]. The introduction of information technology [5], [5, see] not only in teaching informatics and related subjects, but also in teaching other subjects is one of the factors contributing to strengthening STEAM education. Another factor contributing to the strengthening of STEAM education contributes to the development of informatics and the science that has been separated from it in conjunction with technology and science, as well as the development of such areas as Big Data, Neural Nets, and Artificial Intelligence Systems as a result of their development. Virtual and visualizing teaching of subjects on platforms is also another reason for the development of STEAM education, in which sometimes working in a group is combined with individual work [see:7],[7],[read:7],[see:8],[8],[read:8]. Using existing platforms in education and creating new platforms, intellectual platforms [see:12, b.12],[12, b.13], [see:12, b.14], [12, b.15-18], [12, b.19], [12, b.20], [see:12, b.21], [see:12, b.22], [see : 22, b.117], [22, b.118], [22, b.119], [22, b.120], [22, b.121], [22, b.122-125], [22, b.126-128], [see: 22, b.129], [see:22, b.130], [22,b.131] It was also determined that working on steam would develop the future [9], [see:9, b.117-120], [9, 0.121-125], [see:9, b.121-125], [see:9, b.121-125], [see:9, b.121-125], [see:9, b.117-120], [see 9, b.126-128], [9, b.129-131],[see: 9,b.117-131], [see:9], [see:12], [22], [See: 26. b.50], [26, b.52], [26, b.53-54], [27, b.17], [27, b.18], [27, b19]. We can also add to our results the need to develop programming by teaching robotics , monographs developed by us [see:23-a], [see:23-a, b.1-10],[23-a, b.31-41], [23-a, b.42-52], [23-a, b.53-60], [see : 23-a, 0.61-70], [review:23-a, 0.71-81], [read: 23-a, b.82-92], [23-a, b.93-100], [23-a, b.101], [23-a, b.102], [see: 23-a], articles [see :24, b.74], [24, b.75], [24, b.76], [24, b.77], [24, b.78], [24, b.79], [24, b.80-81], [see:24, n.79-83]. The results obtained during our scientific research were reflected in the articles [25], [read :25], [see:25], scientific research by other scientists in this area is insignificant, for example, in the work of Q.Khusanov Opinions are given on integrated information technology and platforms for this [26], [26, b.50-54], [27, pp. 17-19], G.N.Yunusova and Abdullayeva SH.I. [28], [see:28], [read: 28], the introduction of new generations of information technology, science and The development of technology is a time for the development of STEAM education and its technologies [29], [see:29], [read:29], [29], [30], [read: 30], [see:30].

We would like to write several textbooks and books in this area and make them widely available. It should be noted that the Front Page program, which was popular and automated yesterday, is now becoming primitive and replaced by remote LMS, CMS systems are impossible not to see the arrival of the criby. It's not hard to see how using platforms instead of Front Page and working on platforms like Moddle, WordPress and creating the platform through the modern front end and back end became a necessity [See: URL: <http://library.ziyonet.uz/uz/book/121626>, 14, b.1-30], [14, b.31-40, URL: <http://library.ziyonet.uz/uz/book/121626>],[14, b.41-50],[14, b.41-51],[14, b.52-60],[14, b.61-70], [14, b.71-80], [14, b.90-100], [14, b.101-200], [14, b.200-220], [14, see URL:

http://library.ziyonet.uz/uz/book/121626], [14],[15, b.1-30], [15, b.31-41], [15, b.42-50], [see:15], [15, See: URL: https://hemis.namdu.uz/static/uploads/21/DqQxZpVxynvD8YsdUCO-g6XeQGjMTwLX.pdf.], [15, b.60-70], [15, b.71-80], [see:15, b.81-90], [see: 15, b.91-100], [see: 15, URL: https://hemis.namdu.uz/static/uploads/21/DqQxZpVxynvD8YsdUCO-g6XeQGjMTwLX.pdf.], [see:16],[see: 17, b.1-30],[see URL:., http://library.ziyonet.uz/uz/book/121625., 17, b.31-41], [17, b.42-45], [17, 0. 46-55], [17, n. 56-60], [17, b.61-70], [17, b.71-80], [17, b.81-90], [17], [17, b.80], [17, b.80], [17, b.80] 91-100], [see 17, b.200-250], [17, see: URL:http://library.ziyonet.uz/uz/book/121625],[18],[see:19 ,], [17], [see:17, URL:http://library.ziyonet.uz/uz/book/121625], [17, b.120-135], [17, b.136], [17, b.137], [17, b.138], [17], [17, b.139-200], [17, b.201-225], [17, b.250],[see:20, URL:], [see:21, URL:], [see:22], [see:19], [19], [see:19, b.1-12], [19, b.13-22], [19, b.23-25], [19, b.26-35], [20, b.36-40], [19, b.36-40], [19] 19,b. 41-45], [19, b. 46-50], [19], [see:19, b.51-55], [19, b.56-60], [19, b.61-70], [see:20], [20], [see:20, b.1-30],[see URL:http://library.ziyonet.uz/uz/book/121623],[20, b.31-41], [20, b.42-55], [20], [see:20, b.56-60], [20, b.61-71], [20,b.72], [20,b.73-75], [0, b.76, URL: URL : http://library.ziyonet.uz/uz/book/121623], [20, b.77], [20, b.78],[20, b.79-80],[see:21, URL: ., URL: ., URL: http://library.ziyonet.uz/uz/book/121624.], [21, b.1-10], [21, b.11-15], [21, b.16-28], [21, b.35-40],[21, b.45-50], [21, b.67-70], [21, b.71-81], [21, b.82-90], [21, b. 94-98], [21, 100-120], [21, b.122], [ko'ring:21, URL: ., URL:http://library.ziyonet.uz/uz/book/121624.], [22], [22, b.117-131].

DISCUSSION

Now we write a program that allows the assembled structure or robot, the machine, to move along the draw-line . We use a black line printed on B-trail white paper sheets.

Here's the main idea of an algorithm:

Let's have a white area with a black road drawn for our robot. The linear databases in the barn give one when they "see" the black color, the logical zero and the white one.

In a straight line, the robot must skip the trek between the sensors, that is, show 1 in both databases.

When the trajectory is turned right, the right database works on the road and begins to show logical zero. When turned left, zero means the left sensor.

So, we get a simple system with three situations:

STATE_FORWARD – must go forward

STATE_RIGHT – o'ngga burilishingiz crust

STATE_LEFT - chapga burilishingiz crust

The system receives information from sensors input. We make the following transition logic:

Chap	O'	Targeted Status
0	0	STATE_FORWARD
0	1	STATE_RIGHT
1	0	STATE_LEFT
1	1	STATE_FORWARD

Implementation in Arduino

```
LineRobot_v1.ino
```

```
Motors M1+,M1-,M2+,M2- clemmalarga ulandi
```

```
// Motor shield motorlar bilan boshqariladigan 6,5,7,4 to'rtida kontaktni qo'llaydi
```

```
#define SPEED_LEFT    6
```

```
#define SPEED_RIGHT   5
```

```
#define DIR_LEFT      7
```

```
#define DIR_RIGHT     4
```

```
#define LEFT_SENSOR_PIN 8
```

```
#define RIGHT_SENSOR_PIN 9
```

```
forward speed (0-255)
```

```
#define SPEED        35
```

```
the coefficient that enters how many times to brake (stop) the rotation wheels
```

```
// burish uchun g'ildiraklarning biri
```

```
#define BRAKE_K      4
```

```
#define STATE_FORWARD 0
```

```
#define STATE_RIGHT   1
```

```
#define STATE_LEFT    2
```

```
int state = STATE_FORWARD;
```

```
void runForward()
```

```
{
```

```
    state = STATE_FORWARD;
```

Speed s'SPEED setup accepts values from 0 to 255,
the bigger, the faster.

```
    analogWrite(SPEED_LEFT, SPEED);
```

```
    analogWrite(SPEED_RIGHT, SPEED);
```

If we pour HIGH at the yokiDIR_RIGHT at the DIR_LEFT, the engine will move the
appropriate wheel

Forward, if LOW -back.

```
    digitalWrite(DIR_LEFT, HIGH);
```

```
    digitalWrite(DIR_RIGHT, HIGH);
```

```
}
```

```
void steerRight()
```

```
{
```

```
    state = STATE_RIGHT;
```

```

// Burilishni boshlash uchun
slow down the right wheel to the left wheel account
  analogWrite(SPEED_RIGHT, SPEED / BRAKE_K);
  analogWrite(SPEED_LEFT, SPEED);
  digitalWrite(DIR_LEFT, HIGH);
  digitalWrite(DIR_RIGHT, HIGH);
}
void steerLeft()
{
  state = STATE_LEFT;
  analogWrite(SPEED_LEFT, SPEED / BRAKE_K);
  analogWrite(SPEED_RIGHT, SPEED);
  digitalWrite(DIR_LEFT, HIGH);
  digitalWrite(DIR_RIGHT, HIGH);
}
void setup()
{
  Sibnallar chiqishiga 4,5,6,7 silver chiqishlarinin sozlaymiz
  for(int i = 4; i <= 7; i++)
    pinMode(i, OUTPUT);

  We go forward quickly
  runForward();
}
void loop()
{
  Our robot moves along the white field, with a black track. Otherwise
  datchiklardan qiymatlarni invariantlash crust
  boolean left = ! digitalRead(LEFT_SENSOR_PIN);
  boolean right = ! digitalRead(RIGHT_SENSOR_PIN);

  How to move?
  int targetState;
  if (left == right) {
    everything is white or black at the bottom of the sensors
    we walk forward, move
    targetState = STATE_FORWARD;
  } else if (left) {
    // chap sensor trekga tiralib olgan
    UNI CHAPGA BURAMIZ
    targetState = STATE_LEFT;
  } else {
    targetState = STATE_RIGHT;
  }
}

```

```

}
if (state == targetState) {
    we're having all the barracks we need,
    we make measurements from another
    return;
}
switch (targetState) {
    case STATE_FORWARD:
        runForward();
        break;
    case STATE_RIGHT:
        steerRight();
        break;
    case STATE_LEFT:
        steerLeft();
        break;
}

```

we can't let a hard hook form in a straight line
 delay(50);

```

}
```

For example, at 50 speeds, the robot took the time-dependent path as follows:

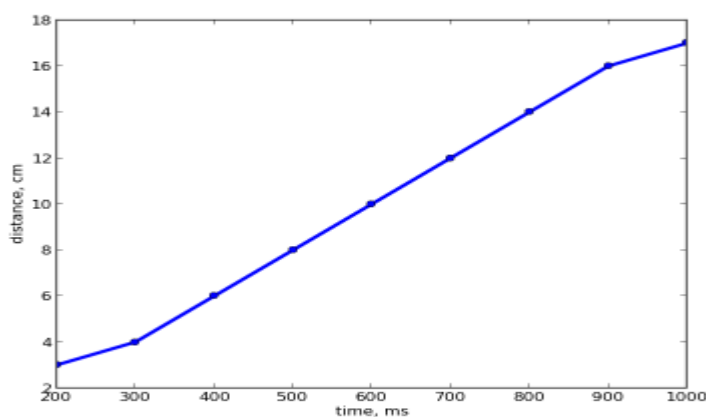
The resulting two dependencies linearly approached, then the formula was obtained so that it depended on the time required to move back to the speed before stopping.

Note that your values may be different: because of the peculiarities of the meeting or the surface, so it is generally better to do all the measurements yourself.

Responsible Behavior

Before the final experiment, let's make some more adjustments.

Firstly, we don't have to give a turn-back order before each turn, we remember that at low speed the robot does a great job even without it.



Picture 286.

The issue of inertia and its solution

However, if we make the speed of the engines higher, we will face the following problem: our robot will fly off the track, not being able to react to the turn. This is due to the inability of our engines to brake instantly.

This is easy to verify by setting up the following experiment: at a certain speed, the robot moves across the surface and at one point zero speed is set and the robot's stopping distance is measured. Allow the robot to accelerate on the monotone surface and slow down while setting up an unexpected stopping line.

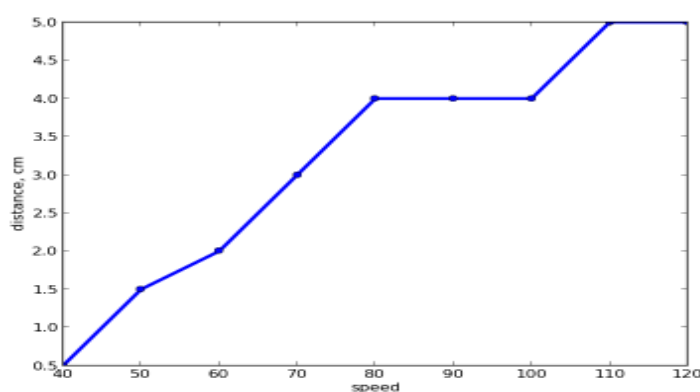
Let's experiment at different speeds. The application code for the experiment is as follows:

On the surface of the experiment, the following results were achieved:

So from a certain moment, our robot can't have the time to react and stay on track.

What to do?! After the datchiks notice a turn, you can stop and back at a certain distance, depending on the speed, before stopping. However, we can tell the robot to go at a certain speed, but we can't tell it to travel at a certain distance.

Another to understand the connection of the distance in rewinding the time



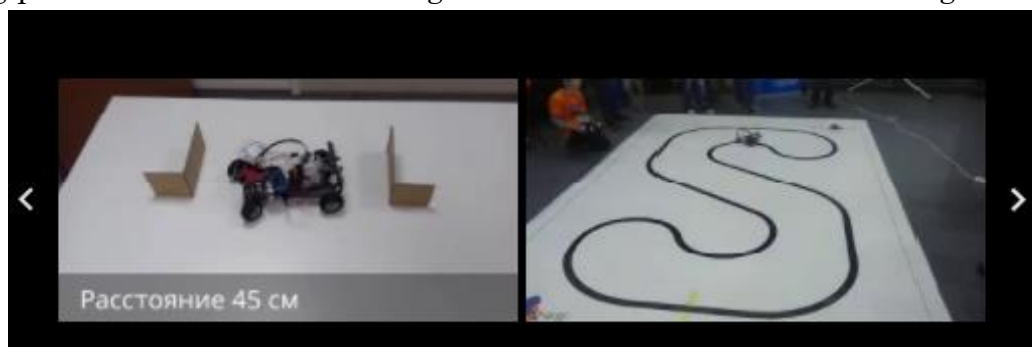
Picture 287.

Responsible Behavior

Before the final experiment, let's make some more adjustments.

Firstly, we don't have to give a turn-back order before each turn, we remember that at low speed the robot does a great job even without it. It is also good that he tried to turn around a little, rather than directly back, after all, the robot is in front of the turn.

Secondly, we need to distinguish between the state of the robot: if it moves along a straight line and nothing prevents it from accelerating; and the robot went into a turning line.



Picture 288.


```
LineRobot_v1.ino
```

```
Motors M1+,M1-,M2+,M2- clemmalarga ulandi
```

```
// Motor 6,5,7,4 to'rtta kontaktni ishlatadi
```

```
#define SPEED_LEFT    6
```

```
#define SPEED_RIGHT   5
```

```
#define DIR_LEFT      7
```

```
#define DIR_RIGHT     4
```

```
#define LEFT_SENSOR_PIN 8
```

```
#define RIGHT_SENSOR_PIN 9
```

Speed at which we move forward (0-255)

Nothing better than defeating an opponent by a second or two.

```
#define SPEED          35
```

How many times to brake the given coefficient

Burish uchun one of the g'ildiraks

```
#define BRAKE_K        4
```

```
#define STATE_FORWARD  0
```

```
#define STATE_RIGHT    1
```

```
#define STATE_LEFT     2
```

```
int state = STATE_FORWARD;
```

```
void runForward()
```

```
{
```

```
    state = STATE_FORWARD;
```

For speed birth , you can apply values of up to 0 to 255 to modulate the speed of 'SPEED'

The sooner it is, the better.

```
analogWrite(SPEED_LEFT, SPEED);
```

```
analogWrite(SPEED_RIGHT, SPEED);
```

If we write DIR_LEFT or DIR_RIGHTda HIGH, the engine will move a wheel that matches it

Forward, esli LOW - back.

```
digitalWrite(DIR_LEFT, HIGH);
```

```
digitalWrite(DIR_RIGHT, HIGH);
```

```
}
```

```
void steerRight()
```

```
{
```

```
    state = STATE_RIGHT;
```

we slow down the work of the right at the expense of the left wheel,

this is necessary to make a turn

```
analogWrite(SPEED_RIGHT, SPEED / BRAKE_K);
```

```

analogWrite(SPEED_LEFT, SPEED);
digitalWrite(DIR_LEFT, HIGH);
digitalWrite(DIR_RIGHT, HIGH);
}
void steerLeft()
{
state = STATE_LEFT;
analogWrite(SPEED_LEFT, SPEED / BRAKE_K);
analogWrite(SPEED_RIGHT, SPEED);
digitalWrite(DIR_LEFT, HIGH);
digitalWrite(DIR_RIGHT, HIGH);
}
void setup()
{
//P;ataning 4,5,6,7 chiqishlarini signallar chiqishiga sozlaymiz
for(int i = 4; i <= 7; i++)
pinMode(i, OUTPUT);

We go forward quickly
runForward();
}

void loop()
{
Our robot walks through the white field with a black trek. No need in reverse
Datchiklardan Qiymatni Invariantalashtirish Zarur
boolean left = ! digitalRead(LEFT_SENSOR_PIN);
boolean right = ! digitalRead(RIGHT_SENSOR_PIN);

What's the need to go into a state of shock?
int targetState;
if (left == right) {
everything is white or black under the sensors
Forward
targetState = STATE_FORWARD;
} else if (left) {
// chap sensor trekga tirgak sifatida turadi
// chap tomonga buramiz
targetState = STATE_LEFT;
} else {
targetState = STATE_RIGHT;
}
}

```

```

if (state == targetState) {
    we do what we need,
    we make measurements from another
    return;
}
switch (targetState) {
    case STATE_FORWARD:
        runForward();
        break;

    case STATE_RIGHT:
        steerRight();
        break;
    case STATE_LEFT:
        steerLeft();
        break;
}
we can't let a hard a slide in a straight line
delay(50);

}

```

In the first case, we really increase the robotic speed for the way to go more dynamically, in the second case, we lower the speed to a sufficient value for a successful turn, and we keep that speed for a while. .

As a result, our code looks like this:

Robot_v02.ino

Motors M1+,M1-,M2+,M2- clemmalarga ulandi

Shield engine uses 6,5,7,4 to control four contacts

```
#define SPEED_LEFT    6
```

```
#define SPEED_RIGHT   5
```

```
#define DIR_LEFT      7
```

```
#define DIR_RIGHT     4
```

```
#define LEFT_SENSOR_PIN 8
```

```
#define RIGHT_SENSOR_PIN 9
```

Forward speed we move(0-255)

```
#define SPEED          100
```

Speed to go through complex processes

```
#define SLOW_SPEED     35
```

```
#define BACK_SLOW_SPEED 30
```

```
#define BACK_FAST_SPEED 50
```

Coefficient that determines how many times it is necessary to brake

```
// burish uchun g'ildiraklarning biri
#define BRAKE_K      4
#define STATE_FORWARD  0
#define STATE_RIGHT   1
#define STATE_LEFT    2
#define SPEED_STEP    2
#define FAST_TIME_THRESHOLD  500
int state = STATE_FORWARD;
int currentSpeed = SPEED;
int fastTime = 0;
void runForward()
{
    state = STATE_FORWARD;
    fastTime += 1;
    if (fastTime < FAST_TIME_THRESHOLD) {
        currentSpeed = SLOW_SPEED;
    } else {
        currentSpeed = min(currentSpeed + SPEED_STEP, SPEED);
    }
    analogWrite(SPEED_LEFT, currentSpeed);
    analogWrite(SPEED_RIGHT, currentSpeed);
    digitalWrite(DIR_LEFT, HIGH);
    digitalWrite(DIR_RIGHT, HIGH);
}
void steerRight()
{
    state = STATE_RIGHT;
    fastTime = 0;
    // burishni boshlash uchun chap g'ildirakni,
    // reduce the movement at the expense of the right wheel
    analogWrite(SPEED_RIGHT, 0);
    analogWrite(SPEED_LEFT, SPEED);
    digitalWrite(DIR_LEFT, HIGH);
    digitalWrite(DIR_RIGHT, HIGH);
}
void steerLeft()
{
    state = STATE_LEFT;
    fastTime = 0;
    analogWrite(SPEED_LEFT, 0);
    analogWrite(SPEED_RIGHT, SPEED);
    digitalWrite(DIR_LEFT, HIGH);
    digitalWrite(DIR_RIGHT, HIGH);
}
```



```

}
void stepBack(int duration, int state) {
  if (! duration)
    return;
  We make a non-kata turn when moving back depending on the direction of rotation
  we turn
  int leftSpeed = (state == STATE_RIGHT) ? BACK_SLOW_SPEED : BACK_FAST_SPEED;
  int rightSpeed = (state == STATE_LEFT) ? BACK_SLOW_SPEED : BACK_FAST_SPEED;
  analogWrite(SPEED_LEFT, leftSpeed);
  analogWrite(SPEED_RIGHT, rightSpeed);
  wheel reverse
  digitalWrite(DIR_RIGHT, LOW);
  digitalWrite(DIR_LEFT, LOW);
  delay(duration);
}
void setup()
{
  // Signallarni chiqishiga 4,5,6,7 platalarning chiqishini to'g'irlaymiz
  for(int i = 4; i <= 7; i++)
    pinMode(i, OUTPUT);
  We go forward quickly
  runForward();
}

void loop()
{
  Our robot is moving along a white field with black tracks
  no need to invariate values from databases
  boolean left = ! digitalRead(LEFT_SENSOR_PIN);
  boolean right = ! digitalRead(RIGHT_SENSOR_PIN);

  How to move?
  int targetState;

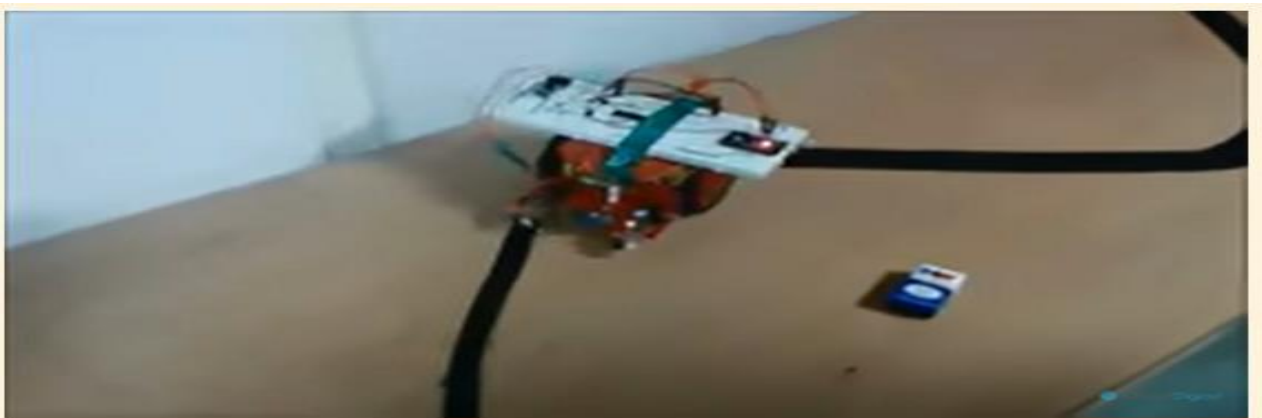
  if (left == right) {
    everything is white or black under the sensors
    Forward
    targetState = STATE_FORWARD;
  } else if (left) {
    // chap sensor trekga tiralgan
    // chapga buramiz
    targetState = STATE_LEFT;
  } else {

```

```
targetState = STATE_RIGHT;
}
if (state == STATE_FORWARD && targetState != STATE_FORWARD) {
    int brakeTime = (currentSpeed > SLOW_SPEED) ?
        currentSpeed : 0;
    stepBack(brakeTime, targetState);
}
switch (targetState) {
    case STATE_FORWARD:
        runForward();
        break;
    case STATE_RIGHT:
        steerRight();
        break;
    case STATE_LEFT:
        steerLeft();
        break;
}
}
```



Rasm1. Robotning harakari.



Picture 2. The movement of the robot along the black line. A robot that walks on a black line.

The movement of the Arduino robot along the black line

Assembling an Arduino robot to move along a black line

In this article we will explain how to program adruino mobile robot to follow the black line. For the Arduino robot to move along the black line, two light sensors must be connected, the light sensors connecting chart is shown in the picture.



Picture 3. The application will be written on the Arduino plate and on the controller.

Natijalar

Such research can help us determine the following results:

1. Teaching robotics as a fan depends on programming, and it can be a ground for improving the knowledge of programming.
2. Robototexnika dasturlashtirishga asolangan.
3. Robotics is done through robotics propulsion programs.
4. Moving the robot is carried out at its time using C++,Python applications.
5. The process of performing the robot's movement in a black line and a white line is carried out in C++.
6. Robottotics and programming of children from a young age is carried out using the Lego Mingstorms program.
7. Lego Mindstorms are taught in preschool, schools, and universities, depending on the ease and complexity of their projects and according to the specification of the student.
8. When Taught C++ in higher education, it is intended to develop robotic computer programs to show that it is taught in Scratch, Arduino environments.
9. In higher education, we recommend the use of computer programs dedicated to the basics of student programming and the movement of a robot in C++, Python along a straight line, in the white line, and in the black line, in the fields of "Informatics and Teaching Methodology", "Object-Oriented Programming".

Hulosa

Inson can study programming and robotics in Lego Mindstorms during his preschool age all his life, and assignments can be distinguished by age. It is necessary to teach their complexes in school education, even more complex ones in higher education, and more in the programming language of C++, C#, Python. That is, a person can learn from programming robotics throughout

his life by reading and learning. Continuous education, on the other hand, needs to be carried out not only through basic education but also through additional education, so it is extremely necessary for children to study in additional education and mountains. (Galatians 5:22, 23) Jehovah's Witnesses would be pleased to discuss these answers with you. Hito, Germany, Singapore, India, It is impossible to say that the teaching of children in large areas of robotics and programming in Korea and other goods has not affected the development of the economy of countries [see, 14], [14], [14], [14, see: URL: <http://library.ziyonet.uz/uz/book/121626>], [15], [15], see: URL: <https://hemis.namdu.uz/static/uploads/21/DqQxZpVxynvD8YsdUCO-g6XeQGjMTwLX.pdf>], [17, see: URL: <http://library.ziyonet.uz/uz/book/121625>], [17], [see17], [24, 000-84], [see:24], [24], [28].

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