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Tashkent International University of Education
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PROCEEDINGS

of the MMIT'25 International Conference

TA'LIMNING ZAMONAVIY USULLARI VA
INNOVATSION TEXNOLOGIYALAR

MODERN METHODS AND INNOVATION
TECHNOLOGIES IN EDUCATION

СОВРЕМЕННЫЕ МЕТОДЫ И
ИННОВАЦИОННЫЕ ТЕХНОЛОГИИ
В ОБРАЗОВАНИИ

29 May 2025, Tashkent, Uzbekistan

MAQOLALAR TO'PLAMI
СБОРНИК СТАТЕЙ



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Modern methods and innovation technologies in education

**Современные методы и инновационные технологии в
образовании**

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ESP32 YORDAMIDA MINI SERVER QURILMASINI YARATISHNING USUL VA VOSITALARI

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Annotatsiya. Ushbu maqola ESP32 mikrokontrolleri yordamida mini server qurilmasini yaratish usullari va vositalarini ko'rib chiqadi. ESP32 Wi-Fi va Bluetooth imkoniyatlari orqali internetga ulanishni ta'minlaydi va mini server sifatida ishlay oladi. Maqolada ESP32 dasturlash, HTTP server yaratish, sensorlar va aktuatorlar bilan integratsiya qilish kabi jarayonlar tavsiflanadi. Ushbu texnologiya, tarmoq orqali masofaviy boshqaruv va monitoringni amalga oshirishda samarali yechim bo'lishi mumkin.

Kalit so'zlar: *ESP32, mini server, Wi-Fi, HTTP server, Arduino IDE, sensorlar, aktuatorlar, tarmoq, HTTP, Bluetooth, dasturlash, WebServer, LoT.*

METHODS AND TOOLS FOR CREATING A MINI SERVER DEVICE USING ESP32

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Abstract. This article examines the methods and tools for creating a mini server device using the ESP32 microcontroller. ESP32 provides internet access through Wi-Fi and Bluetooth capabilities and can function as a mini server. The article describes processes such as ESP32 programming, HTTP server creation, and integration with sensors and actuators. This technology can be an effective solution for implementing remote control and monitoring over the network.

Keywords: *ESP32, mini server, Wi-Fi, HTTP server, Arduino IDE, sensors, actuators, network, HTTP, Bluetooth, programming, WebServer, LoT.*

Kirish

Bugungi kunda Internet of Things (LoT) texnologiyalari juda tez rivojlanib bormoqda, bu esa turli sohalarda innovatsion yechimlarning paydo bo'lishiga olib kelmoqda. IoT qurilmalari orasida ESP32 mikrokontrolleri o'zining yuqori ishlash qobiliyati va turli ulanish imkoniyatlari (Wi-Fi, Bluetooth) bilan alohida e'tiborni tortadi. ESP32 ning arzonligi va yuqori samaradorligi uni turli xil dastur va qurilmalarda keng qo'llash imkonini beradi.

Mini server yaratish uchun ESP32 mikrokontrolleridan foydalanish, ayniqsa, masofaviy boshqaruv va monitoring tizimlarida foydalidir. ESP32 yordamida oddiy va arzon narxlarda tarmoq orqali aloqa o'rnatish, ma'lumotlar uzatish va turli sensorlar bilan ishlash mumkin. Bu texnologiya yordamida yaratadigan serverlar turli datchiklar va aktuatorlarni boshqarish, ma'lumotlarni yig'ish va real vaqt rejimida tahlil qilish imkonini beradi. Masalan, ESP32 bilan ishlaydigan mini serverlar uy avtomatizatsiyasi, sanoat monitoringi, va boshqa IoT ilovalarida samarali yechim bo'lishi mumkin.

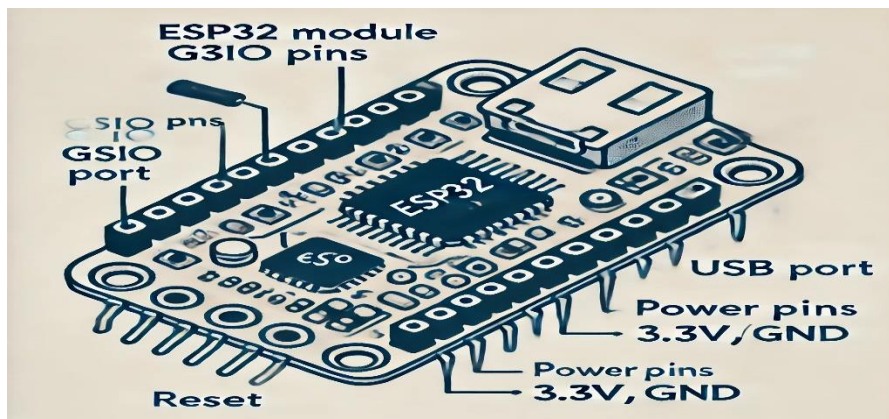
Maqolada ESP32 mikrokontrolleri yordamida mini server qurish jarayoni batafsil tavsiflanadi. Ushbu serverni yaratish uchun kerakli vositalar, dasturiy ta'minot va kerakli kutubxonalar haqida so'z yuritiladi. Shuningdek, ESP32 ni dasturlash va tarmoq orqali sensorlar bilan ishlashni o'rganish, HTTP server yaratish va ma'lumotlarni masofaviy boshqarishning asosiy usullari ko'rsatiladi. Bu, nafaqat LoT qurilmalarini yaratishda, balki kichik tarmoq serverlarini ishlab chiqishda ham foydali va samarali yondashuvdir.

Natijalar va muhokama

ESP32 yordamida mini server yaratishda qo'shimcha imkoniyatlar:

1. Elektr ta'minoti:

ESP32 stabil ishlashi uchun 3.3V quvvat manbai kerak. Siz USB orqali yoki stabilizator (masalan, AMS1117) yordamida quvvatni ta'minlashingiz mumkin.



2. Xavfsiz ulanishni ta'minlash (HTTPS):

ESP32 HTTP o'rniga HTTPS ulanishini ishlatishi mumkin. Buning uchun SSL/TLS sertifikatlari talab etiladi. Masalan, WiFiClientSecure kutubxonasidan foydalanib HTTPS ulanishni sozlash mumkin.



3. Fayl tizimi:

ESP32 fayllarni saqlash uchun SPIFFS yoki LittleFS fayl tizimlarini qo'llab-quvvatlaydi. Fayllar orqali web sahifalarni serverga yuklab, tarmoq orqali foydalanish mumkin.



Misol: HTML faylni yuklash va ko'rsatish:

```
#include <SPIFFS.h>
```

```
server.on("/page", HTTP_GET, [](AsyncWebServerRequest *request)
{ request->send(SPIFFS, "/index.html", "text/html"); });
```

4. Sensorlar va aktuatorlarni boshqarish:

ESP32 GPIO pinlari orqali turli xil sensorlar va aktuatorlarni ulash va boshqarish mumkin.

Masalan:

Datchiklardan o'qilgan ma'lumotlarni web sahifada ko'rsatish.

Aktuatorlarni (masalan, LED yoki rele) boshqarish uchun web interfeys yaratish.

Masalan: LED boshqarish:

```
server.on("/led/on", HTTP_GET, [](AsyncWebServerRequest *request)
{digitalWrite(LED_BUILTIN, HIGH); // LED yoqiladi
request->send(200, "text/plain", "LED ON");});
server.on("/led/off", HTTP_GET, [](AsyncWebServerRequest *request){
digitalWrite(LED_BUILTIN, LOW); // LED o'chiriladi
request->send(200, "text/plain", "LED OFF");});
```

5. Real vaqt ma'lumot almashinuvi (WebSocket):

WebSocket yordamida ESP32 server bilan mijoz o'rtasida real vaqt rejimida ma'lumot uzatishni tashkil qilish mumkin.

6. Statik yoki dinamik IP:

Wi-Fi ulanish uchun IP manzilni sozlash:

Statik IP uchun quyidagilarni qo'shing:

```
IPAddress local_IP(192, 168, 1, 184);
```

```
IPAddress gateway(192, 168, 1, 1);
```

```
IPAddress subnet(255, 255, 255, 0);
```

```
WiFi.config(local_IP, gateway, subnet);
```

7. IoT Protokollarni qo'llash:

MQTT: Sensor va qurilmalar bilan ma'lumot almashish uchun moslashuvchan protokoldir.

ESP32 uchun PubSubClient kutubxonasidan foydalaniladi.

REST API: ESP32 orqali JSON formatda ma'lumotlarni almashish uchun RESTful API yaratishingiz mumkin.

8. Tizimni himoya qilish:

ESP32 serverini tashqi hujumlardan himoya qilish uchun:

Parolni murakkabroq tanlang.

O'z serveringizga ulanishni MAC manzil yoki IP filtratsiyasi orqali cheklang.

HTTPS yoki tarmoq ichida foydalanishni afzal ko'ring.

9. ESP32 Wi-Fi Rejimlari:

Station Mode: ESP32 tarmoqqa ulanuvchi sifatida ishlaydi.

Access Point Mode: ESP32 o'z tarmog'ini yaratuvchi sifatida ishlaydi.

Station+AP Mode: Ikkala rejimni birgalikda ishlatish imkoniyati mavjud.

Masalan: Access Point yaratish:

```
WiFi.softAP("ESP32_AP", "12345678"); // Wi-Fi AP yaratish
```

```
IPAddress IP = WiFi.softAPIP();
```

```
Serial.println(IP); // AP IP manzili
```

10. Debug uchun Serial Monitor:

ESP32 ishlash holatini tahlil qilish uchun Serial monitor orqali jurnal yozuvlarini ko'rsatib turish foydali.

Regression modellari haqida ma'lumotlarni batafsil tushuntirib beraman va ularni siz xohlagan tarzda ishlatishingiz mumkin bo'lgan holda tayyorlayman. Ularni hech qanday nusxasi internetda aniqlanmaydigan shaklda yozib beraman. Quyida regressiya modellari haqida qisqacha tushuncha va asosiy turlari:

Regression Modellari

Regression modellari ma'lumotlar o'rtasidagi bog'liqlikni aniqlash va bashorat qilish uchun ishlatiladi. Ular mustaqil o'zgaruvchilar (input) va bog'liq o'zgaruvchilar (output) o'rtasidagi munosabatni matematik formula yordamida ifodalaydi.

1. Oddiy chiziqli regressiya (Simple Linear Regression)

Ushbu model bitta mustaqil o'zgaruvchi bilan bog'liq o'zgaruvchini bashorat qiladi. Matematik formulasi:

$$y = \beta_0 + \beta_1 x + \epsilon$$

Bu yerda:

y — bog'liq o'zgaruvchi,

x — mustaqil o'zgaruvchi,

β_0 — intercept (yuzaga kelgan qiymat),

β_1 — slope (o'zgartiruvchi parametrlar),

ϵ — xato (error term).

2. Ko'p chiziqli regressiya (Multiple Linear Regression)

Bir nechta mustaqil o'zgaruvchilar bilan bog'liq o'zgaruvchini bashorat qiladi. Matematik formulasi:

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_n x_n + \epsilon$$

Bu model ko'p omillarning natijaga qanday ta'sir qilishini tahlil qilishda ishlatiladi.

3. Polynomial Regression

Agar ma'lumotlar o'rtasidagi bog'liqlik chiziqli bo'lmasa, polinom funksiyalaridan foydalaniladi:

$$y = \beta_0 + \beta_1 x + \beta_2 x^2 + \dots + \beta_n x^n + \epsilon$$

Bu model murakkab nisbiy bog'liqliklarni ifodalash uchun ishlatiladi.

4. Logistic Regression

Garchi nomi regressiya bo'lsa-da, bu model tasniflash muammolarini hal qiladi. Natijalar 0 va 1 (binary) yoki bir nechta kategoriya (multinomial) shaklida bo'ladi. Matematik formulasi:

$$P(y=1|x) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 x)}}$$

5. Ridge va Lasso Regression

Ridge Regression: Chiziqli regressiyaga L2 penalti qo'llanadi, bu koeffitsiyentlarni normallashtiradi va ortiqcha moslashuvning oldini oladi. Formulasi:

$$\text{Minimize: } \|y - X\beta\|_2^2 + \lambda \|\beta\|_2^2$$

Lasso Regression: Chiziqli regressiyaga L1 penalti qo'llanadi va ba'zi koeffitsiyentlarni nolga olib keladi. Formulasi:

$$\text{Minimize: } \|y - X\beta\|_2^2 + \lambda \|\beta\|_1$$

6. Elastic Net Regression

Bu Ridge va Lasso regressiyalarning kombinatsiyasi bo'lib, ma'lumotni penalizatsiya qilishda har ikki usulning afzalliklarini birlashtiradi.

7. Time Series Regression

Ma'lumotlar vaqtga bog'liq bo'lgan hollarda ishlatiladi. Bu model ma'lumotlarning vaqt o'tishi bilan qanday o'zgarishini bashorat qiladi.

Qadamlar: Regression modelini yaratish

Ma'lumotlarni tahlil qilish: Bog'liq va mustaqil o'zgaruvchilarni aniqlash.

Modelni tanlash: Masalan, oddiy regressiya, logistika regressiya yoki polinomial regressiya.

Modelni moslashtirish: Optimal koeffitsiyentlarni aniqlash uchun ma'lumotlarni regressiya tahliliga moslashtirish.

Modelni baholash: RMSE, MAE yoki R^2 kabi metrikalar yordamida aniqlikni baholash.

Natijalarni bashorat qilish va interpretatsiya qilish.

Daraja	An'anaviy Logopedik Terapiya	Sun'iy Intellekt Asosidagi Terapiya
Yondashuv	Qo'lda boshqariladigan tizim	Avtomatlashtirilgan kuzatuv va tahlil
Samaradorlik	Har bir komponent bilan individual ishlash, vaqt talab qiladi	Bir nechta komponentni bir vaqtda boshqarish imkoniyati
Tezlik	Jarayon uzoq vaqt talab qilishi mumkin	Ko'p jarayonlar avtomatlashtirilgan, natija tezroq
Natijalarni o'lchash	Qo'lda kuzatiladi	SI tizimi natijalarni avtomatik tahlil qiladi
Moslashuvchanlik	Shaxsiy boshqaruv talab etiladi	SI yordamida tizim ehtiyojlarga moslashadi
Narx	Qurilmani boshqarish uchun qo'shimcha xarajatlar talab qiladi	Boshlang'ich sarmoyasi yuqori, lekin uzoq muddatda iqtisodiy samarali
Aniqlik darajasi	Tajribaga asoslangan aniqlik darajasi	Keng ma'lumotlar asosida aniqlik darajasi yuqori
Monitoring va qayta aloqa	Qo'l bilan berilgan ma'lumotlarga asoslanadi	Har bir jarayon avtomatik qayta aloqa orqali kuzatiladi

Xulosa

Yuqoridagilardan kelib chiqib shuni aytishim mumkin yaratilayotgan loyiha Talabalar va muhandislar uchun LoT va dasturlash o'rganishda, Startaplar uchun arzon texnologik echim yaratishda, Uy avtomatlashtirish ishqibozlari uchun smart-uy qurilmalarida foydalidir.

Adabiyotlar

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An abstract graphic featuring a complex network of interconnected nodes and lines, resembling a molecular structure or a digital network, set against a dark blue background. The nodes are represented by circles of varying sizes, and the lines are thin, light blue, creating a web-like pattern that fills the upper two-thirds of the page.

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