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mavzusidagi Respublika ilmiy-texnik anjuman materiallari to‘plami

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Respublika miqyosidagi ilmiy-texnik anjuman materiallarida zamonaviy kompyuter ilmlari va muhandislik texnologiyalari sohasidagi innovatsion tadqiqotlar aks etgan.

Globallashuv sharoitida davlatimizni yanada barqaror va jadal sur’atlar bilan rivojlantirish bo‘yicha amalga oshirilayotgan islohotlar samarasini yaxshilash sohasidagi ilmiy-tadqiqot ishlariga alohida e’tibor qaratilgan. Zero iqtisodiyotning, ijtimoiy sohalarni qamrab olgan modernizatsiya jarayonlari, hayotning barcha sohalarini liberallashtirishni talab qilmoqda.

Ushbu ilmiy ma’ruza tezislari to‘plamida mamlakatimiz va xorijlik turli yo‘nalishlarda faoliyat olib borayotgan mutaxassislar, olimlar, professor-o‘qituvchilar, ilmiy tadqiqot institutlari va markazlarining ilmiy xodimlari, tadqiqotchilari, magistr va talabalarning ilmiy-tadqiqot ishlari natijalari mujassamlashgan.

Mazkur to‘plamga kiritilgan ma’ruza tezislarining mazmuni, undagi statistik ma’lumotlar va me’yoriy hujjatlarning to‘g‘riligi hamda tanqidiy fikr-mulohazalar, keltirilgan takliflarga mualliflarning o‘zlari mas’uldirlar.

2) $(n)^{k+1}$ - $(n-1)^{k+1}$= n^{k+1} - $\left[(n)^{k+1} - (k+1)\,n^{k} + \frac{(k+1)^{k}}{2!}n^{k-1} - \cdots\right]$

3) n^{k+1} -n^{k+1} +$(k+1)\,n^{k}$- $\frac{(k+1)^{k}}{2!}n^{k-1}$+…=$(k+1)\,n^{k}$ –O(n^{k-1})

(Bu yerda O(n^{k-1}) belgisi darajasi k-1 va undan kichik bo'lgan hadlar yig'indisini anglatadi).

4)

$$\lim_{n\to\infty}\frac{n^k}{(k+1)n^k-\frac{(k+1)^k}{2}n^{k-1}+\cdots}=\lim_{n\to\infty}\frac{1}{(k+1)-\frac{(k+1)^k}{2n}+\cdots}$$

5)

$$\frac{1}{(k+1)-0+0\ldots}=\frac{1}{k+1}$$

$$\lim_{n\to\infty}\frac{n^k}{n^{k+1}-(n-1)^{k+1}}=\frac{1}{k+1}$$

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REVIEW AND TAXONOMY OF UAV GUIDANCE

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Abstract. Unmanned aerial vehicles (UAVs) require advanced guidance systems to perform complex missions in dynamic environments. This paper presents a structured review and taxonomy of UAV guidance approaches, classifying them based on objectives, control strategies and information sources. Classical methods, such as geometric and kinematic guidance, are discussed alongside modern techniques including optimal, robust, adaptive, and intelligent approaches.

1. Introduction

UAVs have experienced rapid development over the past two decades, driven by their expanding role in both civilian and military applications. These systems are now widely utilized in areas such as environmental monitoring, precision agriculture, infrastructure inspection, surveillance, and autonomous logistics. The increasing complexity of UAV missions has necessitated significant advancements in guidance, navigation, and control (GNC) systems, which collectively enable autonomous and reliable flight operations.

Among these components, guidance systems play a central role in determining the desired motion of a UAV to achieve mission objectives. Specifically, guidance algorithms generate reference trajectories or paths that the vehicle must follow, while accounting for mission constraints, environmental conditions, and system limitations. As UAV applications continue to diversify, the requirements for guidance systems have evolved from simple waypoint navigation to sophisticated real-time decision-making in dynamic and uncertain environments.

Early UAV guidance approaches were primarily based on geometric and kinematic principles, such as line-of-sight and proportional navigation methods. These classical techniques remain relevant due to their simplicity and computational efficiency; however, they are often limited in their ability to handle complex constraints and uncertainties. To overcome these limitations, modern research has increasingly focused on advanced methodologies, including optimal control, robust and adaptive strategies, and intelligent approaches based on machine learning and artificial intelligence. In particular, theoretical frameworks such as Pontryagin's Minimum Principle have enabled the formulation of guidance problems as optimization tasks, providing systematic ways to achieve performance objectives.

Given the breadth and rapid evolution of this field, there is a clear need for a structured understanding of UAV guidance methodologies. While numerous studies have addressed specific aspects of guidance, a comprehensive taxonomy that organizes these approaches based on their objectives, design principles, and information sources is essential for identifying trends, challenges, and research gaps.

Therefore, this paper presents a systematic review and taxonomy of UAV guidance systems.

2. Taxonomy of UAV Guidance

2.1. Guidance objectives

Early research primarily focused on path-following guidance, where the UAV tracks a predefined geometric path without strict timing constraints. Classical approaches such as line-of-sight (LOS) guidance and vector field methods have been widely studied due to their simplicity and robustness (Beard & McLain, 2012; Nelson et al., 2007). These methods are particularly effective for surveillance and mapping missions.

In contrast, trajectory tracking guidance requires adherence to time-parameterized trajectories, which introduces additional complexity. Studies have shown that trajectory tracking is essential for aggressive maneuvers and coordinated missions, such as formation flying (Richards & How, 2002; Hoffmann et al., 2008).

Another important category is target tracking and pursuit guidance, widely used in defense and interception applications. Classical techniques such as proportional navigation have been extensively analyzed and remain relevant due to their effectiveness and low computational cost (Zarchan, 2012).

2.2. Control strategies in guidance design

Classical guidance laws based on geometric and kinematic relationships formed the foundation of early UAV systems. However, modern research has increasingly shifted toward optimal guidance, where control inputs are derived by minimizing a performance index. Methods based on Pontryagin's Minimum Principle and dynamic programming have been widely applied to UAV trajectory optimization problems (Bryson & Ho, 1975; Betts, 2010).

To address uncertainties and disturbances, robust guidance methods have been developed. Techniques such as H-infinity control and sliding mode control provide resilience against model inaccuracies and environmental disturbances (Zhou & Doyle, 1998; Utkin, 1992).

In parallel, adaptive guidance approaches adjust system parameters in real time to cope with changing dynamics and uncertainties. These methods are particularly useful in environments where precise modeling is difficult (Ioannou & Sun, 2012).

More recently, intelligent guidance systems based on artificial intelligence have gained significant attention. Neural networks, fuzzy logic systems, and reinforcement learning have been employed to enable UAVs to learn from data and operate in complex, uncertain environments (Sutton & Barto, 2018; Kiumarsi et al., 2018). These approaches are especially promising for fully autonomous UAV operations.

2.3. Information Sources and Sensor Integration

Guidance systems can also be categorized based on the type of information they utilize. Model-based guidance relies on accurate mathematical representations of UAV dynamics, but its performance degrades in the presence of modeling errors (Stevens & Lewis, 2003).

To overcome this limitation, sensor-based guidance systems incorporate real-time measurements from onboard sensors such as GPS, inertial measurement units (IMUs), and air data systems. These systems improve accuracy and adaptability in dynamic environments (Grewal et al., 2013).

A specialized subset is vision-based guidance, which uses cameras and image processing algorithms for tasks such as obstacle avoidance and autonomous landing. Advances in computer vision have significantly enhanced the capabilities of UAV guidance systems in GPS-denied environments (Kendoul, 2012).

Furthermore, multi-sensor fusion techniques, often implemented using Kalman filtering and its variants, combine data from multiple sources to improve robustness and accuracy (Maybeck, 1979; Simon, 2006). Sensor fusion has become a cornerstone of modern UAV guidance, navigation, and control (GNC) systems.

2.4. System Architectures and Multi-UAV Guidance

With the increasing use of multiple UAVs, research has expanded into distributed and cooperative guidance systems. Unlike centralized approaches, distributed systems enable UAVs to make decisions based on local information while coordinating with other agents (Olfati-Saber et al., 2007).

Swarm guidance represents an advanced form of cooperative control, inspired by biological systems. These approaches allow large groups of UAVs to perform complex tasks such as area coverage and search-and-rescue missions (Brambilla et al., 2013).

3. Conclusion

In summary, the taxonomy of UAV guidance systems reflects a progression from simple geometric methods to sophisticated, intelligent, and autonomous systems. The integration of optimization, robustness, and learning-based techniques is shaping the next generation of UAV guidance technologies, with significant implications for both civilian and military applications.

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PROBIOTIK MIKROORGANIZMLAR VA QISQA ZANJIRLI YOG' KISLOTALARINING DIABETDA TA'SIRI BO'YICHA QIYOSIY TAHLILAR

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So'nggi yillarda ichak mikrobiotasining metabolik kasalliklar, shu jumladan qandli diabet patogenezidagi o'rni tobora ko'proq ilmiy qiziqish uyg'otmoqda. Ichak mikroflorasining tarkibiy va funksional o'zgarishlari energiya almashinuvi, glyukoza gomeostazi, shuningdek immun javob mexanizmlariga samarali ta'sir ko'rsatishi hamda qandli diabet kasalligining kelib chiqish sabablari, qisqa zanjirli yog' kislotalari, oziq-ovqat ratsioni va mikrobiota o'zaro ta'siri, *firmicutes-bacteridetes,* probiotik bakteriyalar l*actobacillus* hamda *bifidobacteriyalarning* diabet kasalligiga ta'siri, samaradorligini aniqlash bo'yicha mavjud bo'lgan ilmiy ma'lumotlar tizimli tahlil qilinadi.

Kalit so'zlar: Qandli diabetning 2-tipi, probiotik bakteriyalar, l*actobacillus*, *bifidobacterium, firmicutes*, *bacteridetes,* qisqa zanjirli yog' kislotalari, butirat kislota, glikozillangan gemoglobin.

Dunyoda keng tarqalayotgan metobolik kasalliklar ustida yillar davomida turli tadqiqotlar ishlari amalga oshirilib, ushbu olib borilayotgan say harakatlar evaziga vujudga kelayotgan kasalliklarga aniq yechimlar ishlab chiqilmoqda. Jumladan, Patrick J. McMurdie va boshqalar olib borgan tadqiqotlarda 2-tip diabetga chalingan bemorlarda probiotik aralashmaning metabolik ta'siri o'rganilib chiqilgan. Tadqiqot davomida probiotik qo'llanilgandan keyin bemorlarning qon plazmasida qisqa zanjirli yog' kislotasi bo'lgan butirat darajasi sezilarli darajada oshgani aniqlangan bo'lib, ursodeoksixolat kabi ikkilamchi o't kislotalarining ham miqdori ortgani aniqlangan. Bu o'zgarishlar ichak mikrobiotasining probiotik ta'sirida faol o'zgarishini ko'rsatgan. Tadqiqot natijalari probiotiklar ichak mikroorganizmlarining metabolik faoliyatini kuchaytirib, metabolik muvozanat va glyukoza almashinuviga ijobiy ta'sir ko'rsatishi mumkinligini ko'rsatib bergan. Jumladan, probiotik terapiya diabet bilan bog'liq metabolik