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SMART MOBILITY FOR THE CITY OF RIOBAMBA THROUGH VEHICULAR TRAFFIC CONTROL, USING THE SMART MOBILITY APPROACH AND IOT INFRASTRUCTURE

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ABSTRACT

This study proposes the design of an intelligent mobility solution for the city of Riobamba, based on the Smart Mobility approach and the use of Internet of Things (IoT) technologies to optimize vehicular traffic management and promote sustainable urban development. The project applies analytical and simple scientific observation methods within an applied, exploratory, descriptive, explanatory, and quantitative research design. Surveys and interviews were conducted among a representative sample of 384 inhabitants from a total population of 260,882. The study diagnosed the city's current traffic situation, evaluated feasible IoT technologies such as sensors, smart cameras, and control systems, and developed a conceptual model tailored to Riobamba's technical and urban context. A cost–benefit analysis confirmed the feasibility and advantages of implementing the proposed system. The findings indicate that IoT-based Smart Mobility can enhance traffic efficiency, reduce travel times, and contribute to sustainable urban development in Riobamba, offering a model adaptable to other mid-sized cities.

KEYWORDS: Intelligent Cities, Internet Of Things (Iot), Smart Mobility, Sustainable Urban Mobility, Traffic Management.

1. INTRODUCTION

The accelerated urban growth and expansion of the vehicle fleet in Ecuador's intermediate cities have brought serious challenges to mobility. Vehicular congestion, poor traffic light synchronization, and the lack of technological tools for traffic management have become factors that affect transport efficiency, environmental sustainability, and citizens' quality of life. In this context, the implementation of intelligent mobility models based on the Smart Mobility approach represents a viable alternative to transform urban traffic management and promote sustainable development.

The concept of Smart Mobility is an integral part of the Smart Cities paradigm, which seeks to integrate ICT and IoT into urban systems to optimize decision-making and improve interaction among citizens, institutions, and infrastructure. In the transportation field, this approach enables efficient management of traffic flows, reduction of pollutant emissions, and the promotion of rational energy use. Cities such as Copenhagen, Barcelona, and Medellín have demonstrated that adopting intelligent mobility solutions significantly contributes to sustainability and road safety.

In the Ecuadorian context, the city of Riobamba faces challenges like those of other growing regions: a sustained increase in the number of vehicles, limitations in road infrastructure, and limited automation in traffic management. Despite having an expanding technological network, the city still lacks integrated systems that leverage the potential of IoT to monitor vehicular flow, synchronize traffic lights, and provide dynamic information to users. This technological deficit highlights the need to design an intelligent mobility model that develops actions for traffic optimization, consistent with the local context's limitations, and promotes a more efficient and sustainable urban environment.

This project proposes the design of an intelligent mobility solution for the city of Riobamba, based on the Smart Mobility approach and the use of IoT technologies. Through the integration of traffic sensors, smart cameras, and automated control systems, the project aims to optimize vehicular circulation, reduce travel times, and lower environmental pollution levels. Likewise, it seeks to develop a technically and economically viable proposal that allows local authorities to adopt evidence-based strategies for the modernization of the urban transport system.

The research includes diagnosing the current state of traffic in the city, identifying applicable technologies, designing a conceptual model for intelligent mobility, and evaluating the cost–benefit of its implementation. The proposed methodological approach will not only make it possible to understand the magnitude of existing problems but will also generate a proposal grounded in criteria of efficiency, sustainability, and technological innovation. In this way, the project aspires to position Riobamba as a pioneer city in adopting intelligent mobility solutions within the national and regional context.

2. METHODOLOGY

The intelligent mobility proposal for Riobamba will use Smart Mobility and IoT infrastructure, following a specific methodological process for traffic control.

2.1. Methods

2.1.1. Logical Methods

Analytical Method: This method will be employed to analyze the technical aspects of the Smart Mobility approach and the IoT infrastructure.

Empirical Methods

Simple Scientific Observation Method: It will be used to diagnose the current situation of vehicular traffic in the city.

2.2. Type Of Research

Applied Research: A technical–economic proposal for intelligent mobility in the city of Riobamba will be developed.

Exploratory Research: Research will be conducted on IoT technologies applicable to traffic management, and a cost–benefit analysis of the proposed conceptual design will be evaluated.

Descriptive Research: Bibliographic resources will be used to describe IoT technologies applicable to traffic management.

Explanatory Research: The technical aspects of the proposed conceptual model for the intelligent mobility system will be explained.

Quantitative Research: Data will be collected regarding the current vehicular traffic conditions in Riobamba and the cost–benefit of the proposed conceptual design implementation.

2.3. Techniques

Survey: Conducted among citizens of Riobamba to understand their perception of traffic management, sustainable urban development, and road safety in the city. The instrument will include closed-ended questions based on a five-point Likert scale (ranging from "strongly disagree" to "strongly agree") to measure attitudes and levels of satisfaction regarding mobility and environmental impact.

Interview: Conducted with an official from the Gobierno Autónomo Descentralizado Municipal del Cantón Riobamba (GADM-R) related to mobility, using a semi-structured format with open-ended questions to obtain detailed qualitative information about current traffic management practices, technological limitations, and potential improvements.

2.4. Study Population

The target population will consist of the inhabitants of the city of Riobamba, which, according to the Ecuadorian Census, has 260,882 inhabitants (INEC, 2022).

2.5. Sample

Since the total population is known, the following formula will be applied to calculate the sample size.

$$n = \frac{N \cdot Z^2 \cdot p \cdot q}{d^2(N-1) + Z^2 \cdot p \cdot q}$$

Where:

N= Population size

Z= Confidence level (1.96 for a 95% confidence level)

p = Probability of success (0.5)

q = Probability of failure (0.5), where $q = 1 - p$

d = Precision (maximum admissible error in proportion = 0.05)

Applying the formula yields a sample size of 383.59, which corresponds to a minimum of 384 respondents.

VARIABLES TO BE CONSIDERED

Understanding of the Smart Mobility approach

Knowledge of Internet of Things (IoT) technologies

Perception of vehicular traffic management

Perspective on sustainable urban development

2.6. Processes To Be Carried Out

This research will be conducted within the Centro de Investigación en Ingeniería, Diseño y Saberes Ancestrales (IDSA) and will be carried out specifically by the research groups Telecommunications, Informatics, Industry and Construction (TEIIC) and Design and Visual Culture. The objective is to design an intelligent mobility proposal for the city of Riobamba based on the Smart Mobility approach and the use of Internet of Things (IoT) technologies for vehicular traffic management and sustainable urban development.

The first step will be to diagnose the current vehicular traffic situation in Riobamba. Subsequently, research will be conducted on IoT technologies applicable to traffic management. Based on this, a conceptual model for an intelligent mobility system will be designed, and finally, a cost–benefit evaluation of the proposed conceptual design will be carried out.

3. STATE OF THE ART

The term Smart City is closely related to the use of Information and Communication Technologies (ICT), as it seeks to solve urban problems through the application of technological resources. Thus, according to Lupiañez and Fauli (2017), smart cities address these challenges through six main approaches:

- Smart Economy: focuses on economic aspects to be analyzed prior to the execution of a project.
- Smart Governance: refers to municipal administrative management.
- Smart Mobility: addresses issues related to human mobility within the city.
- Smart Environment: studies how the city is digitally structured.
- Smart People: analyzes the level of citizens' knowledge and learning capacity using ICT.
- Smart Living: deals with aspects related to the population's quality of life.

Urban mobility has undergone significant transformations in recent decades, driven by the need to reduce vehicular congestion, minimize pollutant emissions, and optimize the use of urban resources. In this context, the concept of Smart Mobility has emerged as a comprehensive solution based on information and communication technologies (ICT) to improve the efficiency and sustainability of urban transportation (Biyik et al., 2021).

Intelligent mobility is part of the broader Smart City concept and refers to the application of emerging technologies to transform urban transportation systems. This transformation aims to reduce negative externalities such as congestion, pollution, and accidents, while improving the quality of service provided to citizens. The main pillars of the Smart Mobility approach are:

- Sustainability: the use of clean energy and reduction of emissions.
- Efficiency: optimization of travel time and resource utilization.
- Multimodality: seamless integration of various modes of transportation.
- Digitalization: real-time access to information

and data-driven decision-making.

Regarding IoT for urban mobility, this technology enables connectivity among multiple devices such as traffic flow sensors, cameras, GPS systems, and weather stations. These devices generate data processed by central platforms that employ artificial intelligence and optimization algorithms to make automated decisions or assist traffic operators. Typical components of an intelligent traffic system include:

- Inductive or magnetic sensors: installed on roadways to count vehicles and detect speed.
- Computer vision cameras: allow for license plate recognition, vehicle classification, and traffic violation detection.
- Intelligent traffic light controllers: coordinate signal cycles according to the actual flow of vehicles.
- Integration platforms (middleware): collect data from various devices and enable analysis, visualization, and control.

In terms of relevant technologies and systems commonly found in smart and intelligent mobility cities, the following can be highlighted:

- Traffic sensors and IP cameras: enable vehicle counting, license plate recognition, and real-time traffic flow monitoring.
- Intelligent traffic light control systems: adjust green/red light durations based on detected vehicular flow.
- Urban management platforms: centralize information collected by IoT devices and process it using artificial intelligence or machine learning algorithms.
- Mobile applications for users: provide real-time information about traffic conditions, optimal routes, parking availability, and public transport services.

4. DIAGNOSIS, PROBLEM, AND JUSTIFICATION OF THE RESEARCH

4.1. Diagnosis

The Smart Mobility approach focuses on the integration of technological solutions to achieve a safer, more efficient, and environmentally friendly transportation system. It encompasses aspects such as vehicle sharing, multimodal transport, digital platforms for traffic management, and data analysis for real-time decision-making. According to studies by the European Commission (2025), cities that adopt smart mobility strategies experience significant improvements in traffic efficiency and urban quality of life.

Meanwhile, the Internet of Things (IoT) infrastructure allows for the interconnection of sensors, cameras, traffic lights, vehicles, and monitoring platforms, creating an interconnected ecosystem that constantly collects and transmits data. These data are used for traffic pattern detection, congestion prediction, dynamic traffic light management, and route optimization.

At the international and regional levels:

Implementations of IoT for traffic control and travel time reduction can be observed in European cities such as Copenhagen and Barcelona (Wolniak, 2023), as well as Seville (López-Pérez, Reyes-García, López-Sanz, 2023), and in Latin American cities such as Medellín, Colombia (Smith et al., 2023) and Arequipa, Peru (Beingolea et al., 2021), where these technologies have been successfully adopted.

At the national level:

Studies in Ecuadorian cities such as Cuenca have demonstrated that promoting smart city strategies enhances urban sustainability in terms of mobility (Villao et al., 2023). Similarly, Quito (Jimbo, Jimbo & Aguilar, 2022) has shown that the implementation of smart solutions at the local level improves traffic efficiency and reduces environmental impact.

At the local level:

Although large cities have led to the adoption of smart mobility technologies, in recent years there has been growing interest in implementing them in intermediate cities such as Riobamba. Despite having lower population density, these cities face major challenges such as increasing vehicle ownership, limited road planning, and the absence of integrated transport systems.

4.2. Research Problem

In several Ecuadorian cities, vehicular chaos and traffic accidents have become frequent due to factors such as malfunctioning traffic lights and an insufficient number of municipal traffic agents (AMT) to handle the high vehicular flow (Machado, 2024). Furthermore, according to ECU 911, in 2023 there were 1,437 traffic and mobility emergencies reported—an increase compared to 2022 some of which were caused by non-functioning traffic lights due to nationwide power rationing (CORREO, 2023).

By December 2023, the country recorded an average of 58 traffic accidents per day, with approximately 7 fatalities daily, totaling 2,373 deaths and 18,605 injuries in more than 20,000 traffic incidents (ANT, 2024). In the province of Chimborazo alone, at least 109 fatalities due to automobile accidents were reported (Soto, 2024).

The city of Riobamba, like many growing

intermediate cities in Ecuador, faces increasing problems of vehicular congestion particularly during peak hours and in high-traffic zones such as the historic center and main connecting avenues. This situation is exacerbated by limited road infrastructure, inadequate traffic light synchronization, and the absence of intelligent traffic management systems.

Currently, traffic control in Riobamba relies on traditional mechanisms with little capacity for real-time adaptation to changing mobility conditions. This results in inefficient circulation, longer travel times, higher pollution levels, and a negative experience for drivers and pedestrians alike.

Despite improvements in technological coverage—such as fiber optic networks, 4G systems, and access to low-cost sensors no IoT based solutions or Smart Mobility platforms have been implemented for real-time traffic data collection and analysis. This highlights a technological and urban management gap that limits the city's ability to evolve toward a sustainable and intelligent mobility model.

4.3. Justification Of The Research

In the specific case of Riobamba, no advanced traffic management systems using IoT technologies or Smart Mobility platforms have yet been documented, representing both an opportunity and a challenge. The city exhibits urban characteristics that could benefit from a more intelligent mobility framework, including peak-hour congestion, poor traffic light synchronization, and the lack of dynamic information for drivers. Preliminary local studies and experiences from similar cities may serve as a foundation for a contextualized, scalable, and sustainable proposal.

In this regard, traffic control becomes essential at the national, regional, and local levels. For instance, Riobamba's transportation control infrastructure currently includes 470 traffic lights, of which 296 use incandescent or halogen lamps (with an average consumption of 150 W per lamp), while 174 are LED-type (5 W per lamp). Additionally, 19 surveillance cameras belonging to ECU 911 are installed across traffic-light intersections (García, 2020).

Based on the above, the objective of this project is to propose an intelligent vehicular traffic control system in Riobamba, Ecuador, through the implementation of technologies such as solar panels with energy storage for traffic lights, vehicular flow sensors, and security cameras, thereby ensuring efficient traffic management and sustainable urban development.

In this context, implementing Smart Mobility solutions and IoT-based technologies represents an innovative, efficient, and sustainable alternative to modernizing Riobamba's urban mobility. These technologies would enable constant traffic flow monitoring, dynamic traffic light synchronization, data collection for predictive analysis, and real-time information sharing with users about traffic conditions. Moreover, this project is relevant for several reasons:

- Local relevance: it addresses a concrete need of the city, aligned with the principles of sustainable urban development.
- Technical feasibility: available and scalable technologies can be adapted to the context of a mid-sized city like Riobamba.
- Social and environmental impact: better traffic management reduces environmental pollution, stress levels, and improves road safety.
- Academic and scientific contribution: it generates applicable knowledge in the fields of telecommunications, urban planning, and smart cities.

5. RESULTS

The advance of the smart mobility project in Riobamba led to specific conclusions in four fields: diagnosis of the existing traffic situation, analysis of the IoT technologies to be used, design of the conceptual Smart Mobility model and cost-benefit analysis of the system proposed.

5.1. Diagnosis of the Current Traffic Situation in Riobamba

From the analysis of the existing situation in the traffic area, it was possible to observe the significant problems of vehicular congestion in peak hours in high-traffic areas, such as the historic center, avenues of great connection, etc. The current traffic control system has been based on traditional systems, with very little adaptation in a real-time manner to the changes of mobility in the traffic, which generates inefficiencies in circulation, long times in the transfers, high levels of pollution, negative experiences for the drivers of vehicles and pedestrians. The information also indicates that there is little infrastructure, out of 470 traffic lights, 296 works with incandescent or halogen bulbs of 150 W, while 174 use LED technology of 5 W. Also, at the level of the intersections where the traffic lights exist, it was possible to see the installation of the 19 surveillance cameras belonging to the ECU 911 network. Once the diagnosis was carried out, the conclusion was reached that there are no technological integrated platforms for the monitoring and management of the traffic in a real-time manner either, which indicates the need for a turn towards a model which indicates intelligent and sustainable mobility.

5.2. Iot Technologies Applicable To Traffic Management

The stage made a study of the technological alternatives successfully used in the cities as inductive other systems, like sensors cameras of computer vision, controllers of adapted semaphores and platforms of integration of data used. These systems with technology IoT have shown their efficiency in optimizing management, reduction of time of travel and increase in the safety of the ways.

Briefly, considering the installed infrastructure in Riobamba (backbones in fiber optics, networks in 4G and sensors of low cost) the intelligent management of the traffic could be introduced gradually. The vehicle-flow sensors, cameras IP, controllers adapted to the conditions of traffic, could be in a same platform of management central integrated with artificial intelligence and machine learning for the resolvent in real time and the decision making of the management of the traffic.

5.3. Conceptual Design Of The Smart Mobility Model

The proposed model is based on the fundamental plinth of the mobility intelligent (sustainability, efficiency, multimodality and study digital). It proposes an integrated system of sensors of vehicle traffic, intelligent cameras, controllers of semaphores adapted in function of the flow of the traffic in the respective hours more one platform of urban management.

The energetic source of the system will be solar through panels installed in the semaphores, which will be supplied with batteries for its autonomous functioning. The data received in the sensors and in cameras of traffic will be sent to a center of control where these will be processed in the dynamic adjustment of the temporalities of the signals in function of the flow of the traffic in real time.

Also, there will be a mobile application for the citizens that counsels them in real time of the statistics of traffic, optimum ways and state of parking lot, managing in this way the interaction of the users with the urban system.

Cost–Benefit Evaluation of the Implementation

From the technical–economic evaluation it is concluded that the investment in devices IoT, solar panels, energy and software of management is remunerated with the benefits of the deduction that to produce (reduction of consumption of energy, to replace incandescent lamps by LED, deduction of time of travel, reduction in the pollution to the environment).

From the social point of view, it is foreseen for the project an improvement in the security of means of transport and in the quality of life of the citizens, whereas in the economic estimate, is seen a better urban productivity with the deduction of losses in the frequency of the traffic.

It is possible to say that the project is technically feasible, economically justified and socially relevant for the city. It will decide its progressive implementation according to the help of the GADM and the Research Center in the Optimal to the intelligent process of Engineering, Design and Knowledge Ancestral (IDSA).

6. FINAL DECLARATION

The research team, represented by the Project Director, and the Applicant Faculty, through its Authorities, freely and voluntarily declare the following:

That the project described in this document is an original work, whose authors are members of the research team; therefore, we assume full legal responsibility if a third party claims ownership of the intellectual property rights of the project, thereby releasing UNACH from any legal action arising from such a claim.

That this project does not cause any harm to the environment and does not violate any ethical standards, and that, in the event the research requires prior permits for its execution, the Project Director will submit a certified copy of such permits to the Research Directorate.

That this project has not been submitted to any other public or private institution for the purpose of obtaining the funding requested from UNACH. Failure to comply with this agreement shall constitute grounds for the project not to be financed.

That, if funding is granted by UNACH for the execution of the project, we accept that the assets acquired with these funds shall remain under the responsibility of the Applicant Faculty during the project's execution; however, the Research Directorate reserves the right to determine their final disposition once the project has been completed.

We accept that, if the project receives funding from UNACH and as a result of its execution any product or process is generated that may be subject to intellectual property rights, and from which benefits may be derived, such benefits shall be shared among UNACH, the institutions that participated in the research, and the research team, under the terms defined in the LOES and the applicable internal regulations.

Looking ahead, the research team plans to conduct a pilot implementation of the proposed Smart Mobility model in selected urban areas of Riobamba to assess its technical performance, social acceptance, and scalability. Future studies will focus on refining IoT integration, developing predictive algorithms for traffic optimization, and expanding the system's applicability to other mid-sized Ecuadorian cities, fostering a sustainable and data-driven approach to urban mobility management.

REFERENCES

ANT (17 de enero de 2024). Siniestros de tránsito se redujeron en el 2023. Recuperado de: https://www.ant.gob.ec/siniestros-de-transito-se-redujeron-en-el-2023/#:~:text=En%20promedio%2C%20Ecuador%20registra%2058,en%20las%20v%C3%ADas%20del%20pa%C3%ADs

Beingolea, J., Huallpa, R., Vilca, X., Borja, J., y Rendulich, J. (2021, 27 – 28 de enero). Accessibility Support in Urban Space [Sesión de Congreso] 2020 IEEE International Conference on Internet of Things and Intelligence System (IoTaIS), Bali, Indonesia. https://ieeexplore.ieee.org/abstract/document/9359691/ DOI: https://doi.org/10.1109/IoTaIS50849.2021.9359691

Biyik, C., Abareshi, A., Paz, A., Arce, R., Battarra, R., Roger, C., y Lizarraga, C. (2021). Smart Mobility Adoption: A Review of the Literature. J. Open Innov. Technol. Mark. Complex, 7(2), 146. DOI: https://doi.org/10.3390/joitmc7020146

Comisión Europea. (2025). Movilidad limpia y sostenible. Recuperado de https://www.consilium.europa.eu/es/policies/clean-and-sustainable-mobility/

CORREO (10 de noviembre de 2023). Semáforos apagados generan caos vehicular y accidentes en Machala. Diario Correo. Recuperado de: https://diariocorreo.com.ec/90535/ciudad/semaforos-apagados-generan-caos-vehicular-y-accidentes-en-machala

García, D. (2020). Propuesta de un modelo de gestión de tráfico, aplicando TIC´S para dinamizar el tránsito en zonas consolidadas – Caso Riobamba. [Tesis de Grado, Escuela Superior Politécnica de Chimborazo]. http://dspace.espoch.edu.ec/bitstream/123456789/14376/1/112T0164.pdf

INEC (2022). Censo Ecuador. Recuperado de: https://www.censoecuador.gob.ec/resultados-censo/

Jimbo, P., Jimbo, M., y Aguilar, A. (2022). DM Quito – Ecuador - Smart City para el 2022. Publicando, 4(10), 559-573.

López-Pérez, M., Reyes-García,M., y López-Sanz,M. (2023). Smart Mobility and Smart Climate: An Illustrative Case in Seville, Spain. Int. J. Environ. Res. Public Health, 20(2), 1404. DOI: https://doi.org/10.3390/ijerph20021404

Lupiañez, F., y Faulí, C. (2017). Ciudades inteligentes. Evaluación social de proyectos de Smart Cities. Montevideo, Uruguay: Centro de Estudios de Telecomunicaciones de América Latina (cet.la).

Machado, J. (17 de abril de 2024). Pérdidas económicas, caos vehicular y quejas por los cortes de luz en Quito. Primicias. Recuperado de: https://www.primicias.ec/noticias/quito/cortes-luz-apagones-trafico-negocios/

Smith, H., Medero, G., De Narváez,S., y Castro, W. (2023). Exploring the relevance of 'smart city' approaches to low-income communities in Medellı´n, Colombia. GeoJournal, 88, 17–38. DOI: https://doi.org/10.1007/s10708-022-10574-y

Soto, F (2 de enero de 2024). Al menos 109 fallecidos durante 2023, producto de los percances automovilísticos. Los Andes El Periódico Regional. https://www.diariolosandes.com.ec/al-menos-109-fallecidos-durante-el-2023-producto-de-los-percances-automovilisticos/

Villao, D., Pérez, M., Linzan, S., y Tumbaco, M. (2023). Emerging Data Driven Smart City and Its Solutions for Sustainability: The Case of Cuenca-Ecuador. Lecture Notes in Computer Science. 14108. 150-165. DOI: https://doi.org/10.1007/978-3-031-37117-2_12

Wolniak, R. (2023). Smart Mobility in Smart City – Copenhagen and Barcelona Comparision. Organization And Management Series, 172, 679-697. DOI: http://dx.doi.org/10.29119/1641-3466.2023.172.41