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Smart Solutions for Tourism Development, Big Data Analytics & Security

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Abstract: Purpose: The purpose of this work is to develop smart solutions for tourism development, using modern technologies in order to create a smart city concept, especially under the Covid 19 pandemic conditions.

The importance of online booking solutions and traffic issues in a Smart city concept are presented and evaluated in this work, as improved scenarios for the issues related. Research Methods: Every smart device would be interconnected by the IoT. Security issues will be implemented as well. The ICT technology goes forward, Web applications grow so rapidly and there are glimpse of software tools that can help apps development, and even with a simple change we as well evaluate the app in order to show the advantages and ability of improvement in the future.

Results and Discussion: Quality of the application is measured by the security and time saving interface. It rates the Efficiency, Ease of use, Reliability, Customer loyalty, Privacy, Cost, Security concepts.

In the security page there are more information based on the voters which are presented one after the other with information about their Ip address, browser, response, country, region and city.

Implications: This work will grow in direction to implement cloud integration on this GoGreen Web App with some Cloud services, having a virtual machine which allows to run Windows or Linux in the Cloud the data will be stored in secured environment, continuous innovations will be supported like AI, Blockchain, containers and databases.

Key words: smart solutions, tourism development, big data analytics, security, internet-of-things
JEL codes: Z3, Z32

1. Introduction

The smart city concept is created to ease the way of living and to push towards greater research and Information and communication technologies (ICT) tools development for next generations. The concept of Smart City is the research groups challenging issue.

It has found its path in some highly developed regions, but yet, one has to take serious implementation in regions that lack that kind of development such as our region, the Balkans.

The Big Data Analytics is a mechanism that controls all the data flow in the smart cities. We've explained how different type of data can be analyzed, and how the big data has found its way not only working with data, but how it can help to improve the Smart City applications in terms of Tourism Development. A solution is presented here

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about our web application, solution that will help towards solving that problem of online booking and counting vehicles in Smart cities environment.

Also the concept of Security in Smart City is discussed like the biggest issue that the Smart city opposes, but also the biggest concern of the future. The challenges are discussed in terms of improving overall security.

Web applications, solutions are presented and they will help towards solving that problem of online booking in Smart cities environment.

Internet & Web programming part presents tools for developing this kind of solutions. Our Web Development & GoGreen App is presented, designed in ASP.NET MVC platform for booking electric scooters. Testing & Results are given concerning security of the web app, charts from surveys. Conclusion follows up referring the benefit of these web applications. For Future work we present the improvement towards the cloud integration for our scooter booking web applications, in order to help the concept of Smart environment. References are given in the last section of this work.

2. Literature Review

Research for smart cities is done, which explains the positive impact of smart Cities in different aspect in our everyday lives. Then there is the application that make the Smart City different from any other city and for that research we've found great help in the publications mentioned in the Reference Section. A research about the applications are presented that are responsible to run and control every aspect in the Smart city.

There are comparisons on a several different applications for online booking which take place in many cities around the world.

The citizens of Thessaloniki, Greece were among the first residents of a Mediterranean city to have the opportunity to travel around the city on rented electric scooters.

Commuters and other travelers can easily locate and unlock the scooters with the help of an application on their mobile phones. The scooters will unlock for 1 euro and there is a small additional charge of 15 cents for each minute of use. The silent, non-polluting scooters will be provided by the "smart mobility" transport company Lime.

Publications are presented as a literature review that concern the research about the security. Challenges are presented and how it can improve overall security.

In our work, the web app is presented, data analyses, testing and evaluation, and the security issues and how to deal with them is discussed, as the most common issue in the Smart City as almost all of the devices are connected on the internet, which makes them easy target for hackers.

3. Research Methodology

Big data analytics, as an emerging technology, has a huge potential to help deploying the smart city services, tourism as well. It can be of great help in collecting data that will be used further in various applications. The connection between smart cities and big data analytics is in huge favor to the residents of the smart cities, but also to the creators of such cities. Every smart device would be interconnected by the IoT. Security issues will be implemented as well.

Web programming presents to the markup and coding involved in Web development, which incorporates Web content, Web customer and server scripting and organize security. Probably the most well-known dialects utilized for Web writing computer programs are XML, HTML, JavaScript and PHP. Web writing computer programs is

unique in relation to simply programming, which requires information on the application region, customer and server scripting, and furthermore database innovation.

The customer side needs programming identified with getting to information from clients and giving data. It additionally needs to guarantee there are sufficient modules to improve client involvement with a realistic UI, including safety efforts.

The server side needs programming for the most part identified with information recovery, security and performance. A portion of the tools utilized are ASP, Lotus Notes, PHP, Java and MySQL. There are certain tools/platforms that aid in both client- and server-side programming.

Web programming enables you to turn a straightforward, static HTML page into a unique perfect work of art. It enables others to collaborate with your site and utilize the application on any PC with Internet get to. It is regularly simpler than programming applications that will run straightforwardly on the PC. It enables you to make or alter anything dynamic on your site, for example, a discussion, a guestbook, or even a structure accommodation.

At the point when you get to your page with a program, your web server will parse, or read through, your HTML page line by line and when it goes over a programming language, it will execute the code. For this situation, it works out the present date on the page and afterward sends the page back to your internet browser. Your internet browser just observes an ordinary site page with a date yet the server will produce an alternate site page when it is stacked on an alternate date.

3.1 Client Side

When we type a url like www.google.com, the browser converts it into a file containing:

• GET /HTTP/1.1 (where GET means we are requesting some data from the server and HTTP refers to protocol that we are using, 1.1 refers to version of HTTP request)

• Host: www.google.com\

• Some other information

Now this file is converted to binary code by the browser and it is sent down the wires if we are connected through Ethernet and if we are using WiFi, first it converts it to radio signal which is decoded by router in a very low level. It is converted to binary and then sent to the servers.

This information or “binary codes” go to the destination and respond if it is received by the sender only because of the IP address.

One router will send the information to another and this keeps on going until the binary codes reach the destination.

3.2 Server Side

Now the server receives the binary code and decodes it and sends the response in the following manner:

- HTTP/1.1 200 ok (where 200 ok is the status)
- Content-type:type/html
- Body of page

Now this is converted back to binary by the server and sent to the IP address that is requesting it. Once the codes are received by the client, the browser again decodes the information in the following way:

- First it checks the status
- It starts reading the document from html tag and constructs a Tree like structure.
- The html tree is then converted to corresponding binary code and rendered on the screen.

- In the end, one can see the website front-end.

All websites at their most basic are just a bunch of files that are stored on a computer called *a server*. This server is connected to the internet. You can then load that website through a browser on your computer or your phone. Your browser is also called the client in this situation.

Every time that you're on the internet, you are getting and loading data from the server, as well as submitting data back to the server. This back and forth between the client and the server present the basis of the internet.

Anything that can be access in your browser is something that a web developer built. Some examples are small business websites and blogs on the simpler side, all the way up to very complex web apps like AirBnb, Facebook and Twitter.

There comes to that idea about making online web applications for booking the rides in the modern way of transport using electric scooter, electric cars, presented in many countries & cities.

It's clear to see this as that e-scooter sharing new businesses are becoming quickly very popular on the market. There are numerous financial specialists, who are checking out these electric bike new companies and contributing a great deal of cash. All things considered, there is a major space for every one of those business visionaries and new businesses, who are intending to enter the e-scooter market and create booking application.

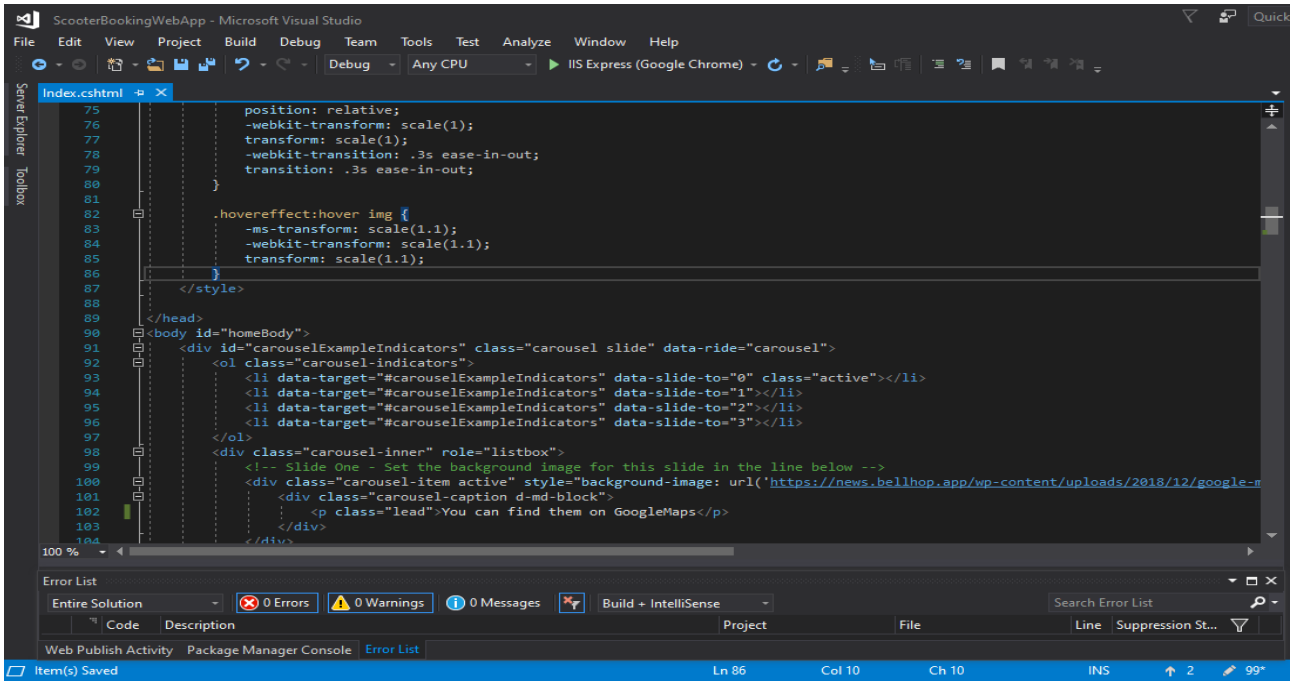

Figure 1 Code in Home Page

The web app is built with MVC which is framework on ASP.NET connected with local database on our machine from SQL Server, the concept of maintaining a database is presented and how it functions, procedures can help a developer in creating scalable data-base is explained. To make it look modern and organized Bootstrap framework is implemented, also custom written CSS and JavaScript code.

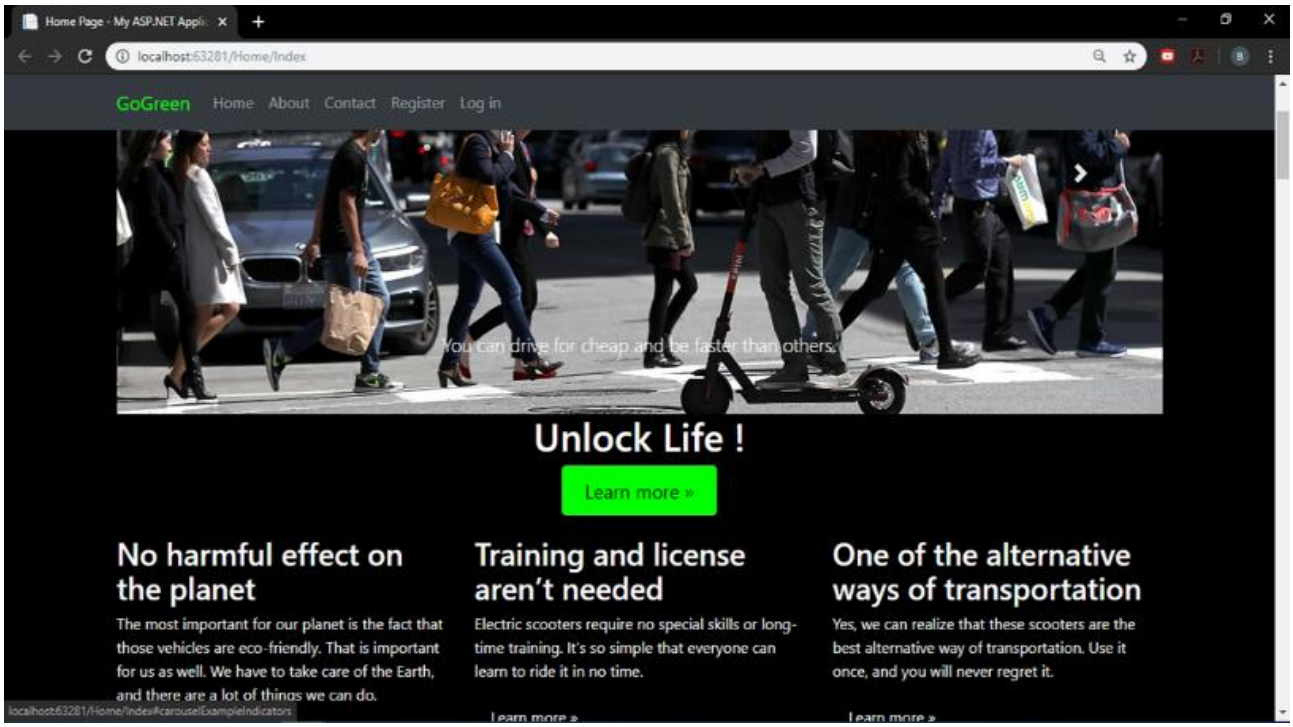

Figure 2 Home Page From Our Web App Opened in Browser

Then when new account will be created, the default given role is to be as Customer, that means in the database we created two types of roles which are Administrator or Customer. Depending on the role that you are logged in specific pages and functions are available that are designed for that type of user, which also leaves room for further expanding of different type of customers or editors for this web application.

Each account has a specific ID which is unique for every user, that helps to know which user is booking and driving the electric scooter.

The information is dynamically stored on the local database in SQL Server, those are called CRUD operations with a code first approach in an MVC application. It will create an MVC structure that will help to change in the Model Class and that change will update it in the database by itself. This means on every build of the application the database will be updated with the new changes that user has done.

When they are logged in there is a page with table of information for every scooter, there are information based on the price, speed, distance that can travel, location, etc. At the end of every row there is button for booking which leads them to another page which has space to write the location of the pickup and the location of return, also we write logic for the time of booking which is taken at the moment they press the button for booking which is also displayed and the last row will be the time that customer wants to return the scooter. After booking is done there is table of booked scooters with all information of the specific booking because they can book more than one with one account and button for returning in case they want to return in before times out.

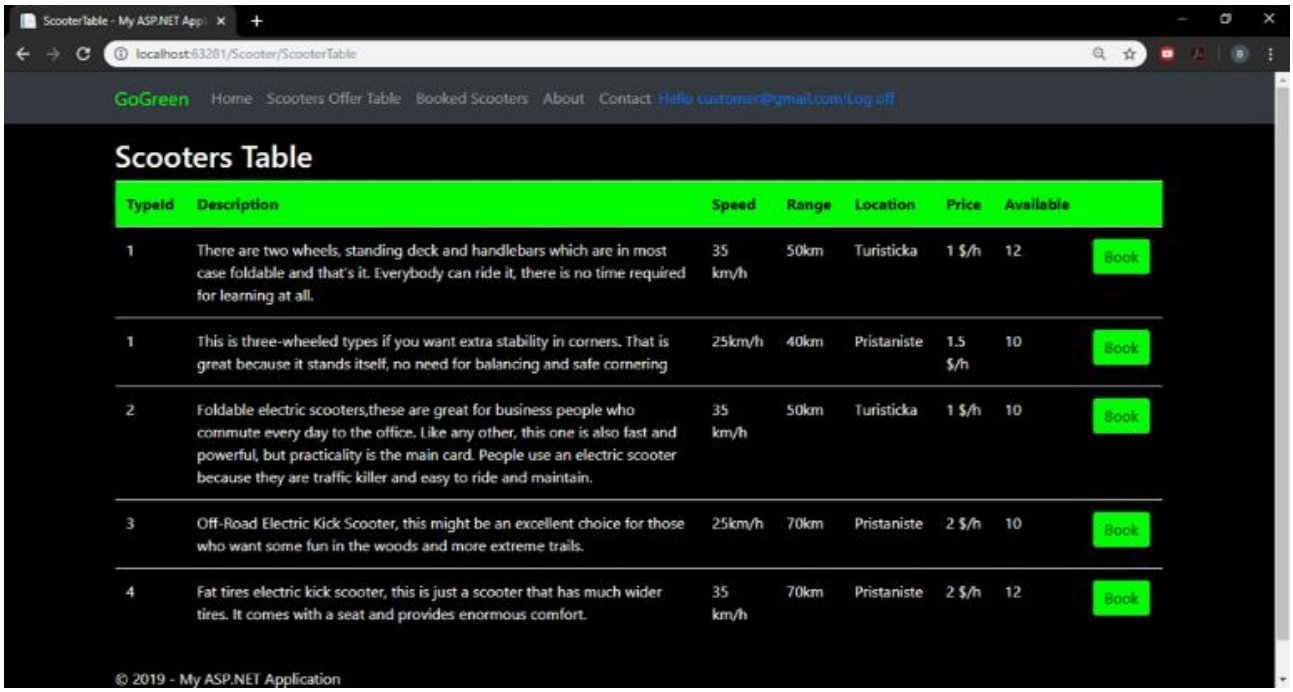

Figure 3 Screenshot of the Scooter Offer Table From Our Web App Opened in Browser

4. Findings and Analysis

Quality of the application is measured by the security and time saving interface. The point is to prevent new users from posting any data to the web site before they have been confirmed by email, a SMS text message or another mechanism.

Quality of Experience (QoE) is mostly used in the information technology that will help them to measure the difference between the user expectations and what they received at the end.

Quality of experience rates the following factors like: Efficiency, Ease of use, Reliability, Customer loyalty, Privacy, Cost, Security.

In the security page there are more information based on the voters which are presented one after the other with information about their Ip address, browser, response, country, region and city. With that one can check everything about the voters and proof if someone it's trying to fake the results or many other useful things. Clear result on the survey with 100% votes for online booking.

The results presented on Figure 1 reffers to different testing and evaluation.

It can be seen clearly on the first pie chart that 70% (7 of 10 values) will want to use electric scooter many times, only 10% (1 of 10 values) are scared of using that scooter and 20% (2 of 10 values) of them just want to try it first and then decide for that which is a very successful result if we manage to release my web application into production.

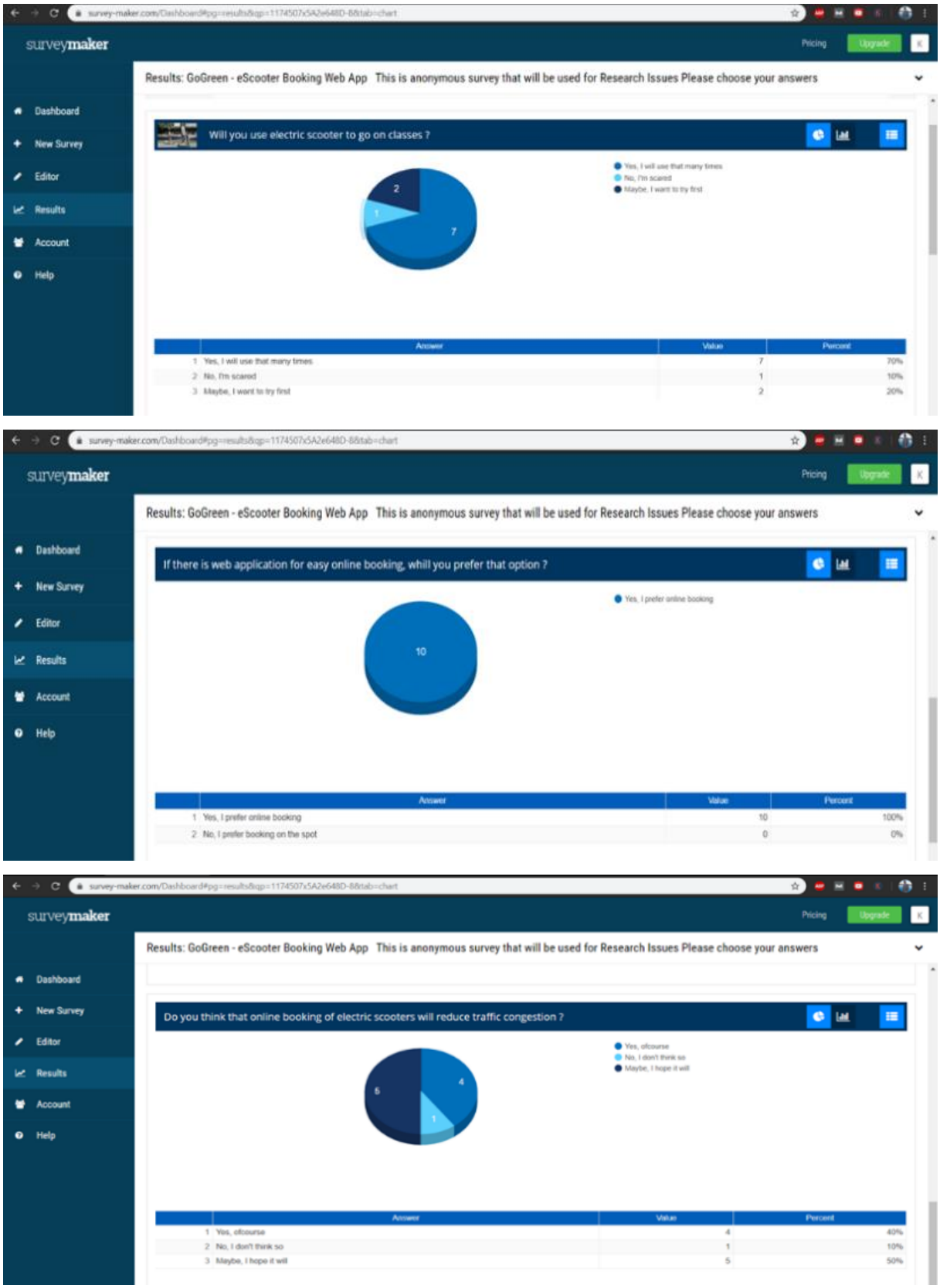

Figure 4 Online Survey Results About the Online Booking

The results from the second question on the survey follow which is perfect example that shows how technology is changing our lives and makes it accessible everywhere so that's why everyone prefer online booking instead of going into the agency for booking, especially in pandemic times in which we are living a year. Clear result on the survey with 100% votes for online booking.

The third part of the questionary refers the results about the mixed opinions of the voters based on that if web application for online booking of electric scooters can reduce the traffic congestion. Half of the voters or 50% believe that it will help and reduce the traffic, 40% of them don't believe that this will help in our situation and only 10% of them hope that maybe this will help in that situation.

5. Discussion

Quality of the application is measured by the security and time saving interface. That can save you a lot of time and make you comfortable for using that service without worrying about your personal information. That's why we created this web application with ASP.NET MVC with login that is managed by Microsoft for safe authentication, The goal is to create a secure ASP.NET MVC 5 web app with log in, email confirmation and password reset (C#).

It's a best practice to confirm the email of a new user registration to verify they are not impersonating someone else (that is, they haven't registered with someone else's email). Suppose you had a discussion forum, you would want to prevent "bob@example.com" from registering as "joe@contoso.com". Without email confirmation, "joe@contoso.com" could get unwanted email from your app. Suppose Bob accidentally registered as "bib@example.com" and hadn't noticed it, he wouldn't be able to use password recover because the app doesn't have his correct email. Email confirmation provides only limited protection from bots and doesn't provide protection from determined spammers, they have many working email aliases they can use to register.

You generally want to prevent new users from posting any data to your web site before they have been confirmed by email, a SMS text message or another mechanism. We did enable email confirmation and modify the code to prevent newly registered users from logging in until their email has been confirmed.

The testing enhances also a survey, created with few simple questions, and results are presented. It was performed with my colleagues and students at my University, at different faculties such as: Computer Science & Engineering Faculty, Communications Network and Security Faculty, Information Systems Visualization Multimedia and Animation Faculty, Faculty of Applied IT, Machine Intelligence and Robotics, as well as coupe of IT companies in Skopje and Ohrid.

This is website application that is designed to make online surveys which is very easy. It's designed for everyone to use it, which is simple way of choosing type of the question, writing the question and answers, also choosing the theme and settings for choosing key features based on the survey appearance.

When you are logged in the account there are many features that can be used like results where all the calculations are done buy them based on the votes. There can be checked for each vote from where it came from and many other useful information.

The security in Smart cities and also the security of Internet of Things application stands as major challenge for companies and administration. The placement of Internet of Things technology will give numerous security and privacy issues to the Internet of Things users and those issues have to be resolved. Smart cities have to fight all sorts of attack on the data that its citizens constantly are creating, but has also to consider the safety of its residents lives. And the security still stands one of the biggest issues why so many people refuse to accept the concept of the smart

city, because they are still not convinced of their privacy and safety.

5.1 Security Requirements in Smart City

Smart cities maybe make our life easier and help us through different aspects in our lifetime, but every ICT environment makes the smart city concept more vulnerable to security and privacy attacks. There are security requirements that will help to improve the security and privacy of the citizens: Secure Communication, Secure Booting, Secure Monitoring, Analysis and Response, System, Application and Solution Lifecycle Management, Updating and Patching, Authentication, Identification and Access Control, Data and Application Control.

Security Issues and Challenges of Smart Cities — Smart cities are composed of various networks.

ICT infrastructure and IoT devices are responsible for optimal running of the city. Not all of the IoT devices are connected through various types of network, so they are in constant security risks.

Requirements	Method	Challenge
Secure Communication	Lightweight cryptographic Methods	Heterogeneity of Network components and devices
	Distributed key management system	Geographical distribution of smart cities; Draining the embedded system's resources
Secure Booting	Cryptographic boot system	Adoption to heterogeneous IOT devices
Secure Monitoring, Analysis and Response	Cisco Security Monitoring, Analysis, and Response System (MARS)	Only applicable for Cisco network equipment
System, Application and Solution Lifecycle Management	Smart City Comprehensive Data Life Cycle model	Lack of security and privacy measurement
Updating and Patching	Microsoft and Linux patch updating	Authenticating the update package may reduce the IOT device functionalities; May not be applicable for old IOT devices
Authentication, Identification and Access Control	IBE, ABE, RBAC	Are only applicable for cloud-based IOT systems; May incur high computation cost on IOT devices
Data and Application Control	Securing IOT devices, Access permission monitoring, Securing communication links using cryptographic methods	Lack of a comprehensive framework to provide security and privacy of all layers of smart cities simultaneously

Figure 5 Security in Smart City

5.2 Cybersecurity Attacks on Smart Cities

The Internet of Things devices are capable of collecting and transferring data. Trespassers take this as their advantage to create self-programming virus to enter those networks and obtain crucial information about health care and bank credential of users. In recent years most common are Distributed denial-of-service attacks, in areas where the framework has to maintain services to the users.

Internet of Things based smart cities are very dependent on Internet of Things applications. There are numerous threats for Internet of Things smart cities and they can be classified and evaluated referring the smart city

architecture: Connected Devices and Smart Objects Issues, Data Sensing, Storing, and Transition Issues, Data Processing and Aggregation Issues.

ATTACK	KEY FEATURES	COMPROMISING			
		CONFF.	INTEGR.	AVAIL.	AUTH.
EAVESDROPPING	i) Accessing traffic networking and interfering into communication of two connected parties. ii) Despite the network type still managing to debunk details	✓	✓	✓	
CROSS-SITE REQUEST FORGERY (CSRF)	Forcing the user to access his malware on web. That will allow to perform changes such as transfer of funds and compromising whole application.				✓
SQL INJECTION ATTACK	Using the users data to insert SQL query into the application to read and modify data.	✓	✓		✓
CROSS SITE SCRIPTING (XSS)	Inserting scripts into the web pages, similar to origin policy to gain access.	✓			✓
SIDE-CHANNEL ATTACK	Using all the accessible information's to gain users key, so can gain access on his data.	✓			✓
DISTRIBUTED DENIAL OF SERVICE (DDOS)	i) Overloading a targeted resource by consuming available bandwidth. ii) Overwhelming targeted resources by using protocol flaws. iii) Overloading application services or databases with a high volume of application calls.			✓	
BRUTE-FORCE ATTACK	Using as many password as it takes to guess it and hack into the network.	✓			✓
REPLAY ATTACK	Monitoring a communication between two parties and rebroadcast it to other party to make illegal task such as false identification and authentication.				✓
SESSION HIJACKING	Exploiting a valid session key or stealing a magic cookie of an authorized user to acquiring unauthorized access to information or services.				✓
VIRTUAL MACHINE (VM) ESCAPE	Breaking out a virtual machines (VM) and interacting directly with the hypervisor to obtain access to the host operating system and other VMs running on that host.	✓			✓

Figure 6 IoT Smart City Concept

5.3 Security Solutions for Smart Cities

Security and privacy is the greatest challenge in smart cites concept, with collecting, storing and analyzing the data created inside the city. The security solutions discussed — IoT based and Cloud based.

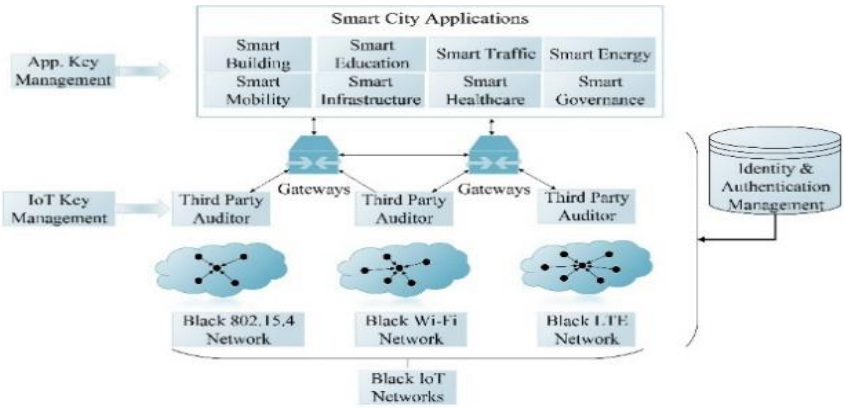

Figure 7 Security Solutions for a Smart City

Secure Authentication and Access Control for IoT-based Objects: Smart phones and sensing nodes are important in the process of gathering the data of smart cities but their work is limited by energy resources and processing power. That's why it is important to have lightweight cryptography algorithm to protect the data but will be in need of minimal computation cost.

Preventing Data Over-Collection in Smart Cities: Data over-collecting is an issue that Smart cities face, that's because mobile application often collect more data that is needed and the excess data will end up to suspicious parties. There are various ways in dealing with this problem that will help into detection and prevention.

Secure Frameworks of IoT-based Smart Cities: This architecture has four main units: Black network, Trusted SDN Controller, Unified Registry, Key Management System.

Security Frameworks of Cloud-based Smart Cities: The merge of Cloud computing and Internet of Things helps smart cities about their issues such as storing and analyzing the huge amount of data.

6. Conclusions

The Information Communication Technology ICT goes forward, web applications grow & improve rapidly. We gave a glimpse of the tools that can help apps to develop, and even with a simple change, we did evaluate the app in order to show the advantages and ability of improvement in the future.

Moreover, the toolset can be even more expanded thanks to the implementation of the Cloud Services. Some of the concepts that are presented can even increase the app responsiveness, as well as the quality of experience that our users have.

With our solution we can bring new technology and solutions in the Smart Cities Environment, which is very important for keeping ahead with the latest technology and those smart solutions can lead to many more different solutions using the same principles of improvement.

For the Future work, we will extend our work to implement cloud integration on our GoGreen web app with some cloud services. Those could services will take care of our local data needs, that means we can have a virtual machine which allow us to run Windows or Linux in the cloud and there we can migrate our data which will be stored in secured environment.

Those cloud services are extremely safe from the ground up because there are working big teams of experts, that also has benefit to be future-ready which means that continuous innovations will be supported like latest AI, blockchain, containers and databases to keep one ahead with the latest technology. Then there are benefits from the point of availability, as well as accessibility.

They can offer Backend solutions and features that support the web development, also services for API management, notification and reporting.

Smart city has been around us for two to three decades, but never so much discussed, researched, implemented as nowadays within Smart ICT solutions. All this technology has surrounded us in any kind of forms. Smart devices, autonomous cars, smart grid, smart parking have been crated to ease our way of living, but also to reduce the cost, which means two or three devices that we knew from 15 years ago are now combined in one simple device that also reduces the consumption of electricity.

The concept of Smart City, Big Data Analytics, as well as Security in Smart Solution helps out towards smarter environment, especially in Covid 19 pandemic Environment, that unfortunately we are living in today – it facilitates everyday living and helps out in fighting the pandemic.

This research is planned to perform Cloud of Things implementation, and has a goal to take the Internet of Things inside the cloud for easier access and usage of those technologies. Cloud plays a role into easing the user experience of the IoT applications, and also gives those applications endless storage, and the IoT returns the favor which allows the cloud to run its services in the real world. Other way for enabling the Cloud of Things is targeting the Sensing as a Service (SeaS) that is established on IoT platform that relies on four layers: Sensor and Sensor Owners Layer, Sensor Publishers, Extended Service Providers and Sensor Data Consumers.

We hope that these kinds of solutions will give a modest research contribution and help out the Tourism restart & further development after this hard, pandemic times. It will enrich the tourist offer and safeness, which will lead to a successful tourist season.

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