In the last years, the population of the metropolitan area of Cluj-Napoca has grown significantly, especially the population of Floresti and Baciu. This led to more and more people using their cars to get to work, which led to bigger and bigger traffic jams. Having traffic jams, means that those people would be late for work, get stressed and angry because of it and some of them will even break the rules to get in front of the other cars. Another aspect of this is the fact that in order to be able to get to work in time, people have to leave their homes at least one hour before starting work, in order to have time to go through the traffic jams. Sometimes even the one hour margin is not enough, especially for people that have to go for example from Floresti until Muncii Boulevard, which is in the opposite end of the city. The same thing happens in the other end of the day, when people come back from work. Currently, the traffic lights on these roads work by a fixed schedule, and do not have the capacity to adapt to real-time traffic situations. Another important factor to consider is the pollution caused by these traffic jams, as there are a lot of cars in a small area, for example on a side street, waiting to enter the main road. “Urban air pollution has been classified by the World Health Organisation (WHO) among the top ten health risks humans face.” The main goal is to upgrade the traffic system in order to reduce the amount of time that people waste in traffic, as this will also reduce the number of cars that will travel at the same time because if the time wasted in traffic is reduced, it means that the traffic jams will also be reduced, meaning that less people would have to leave their houses at the same time. This would reduce the waiting times, increase the cars fuel efficiency and lead to a better air quality. People would not have to take one hour in advance in order to make it to work in time or to leave their children at school in time. The solution for this situation, is, among others, a smart traffic lights system that relies on real-time data in order to manage the waiting times at each traffic light. Smart traffic lights can detect the amount of cars passing through and adjust the timers for the green or red light accordingly. Currently, researchers are finding new and innovative methods to make smart traffic lights more efficient and solve the traffic problem. There are multiple ways to gather data for these smart traffic lights, which vary from induction loops, to cameras, lasers and microwave radars. “The primary, reliable and most common traffic light sensors are induction loops. Inductive loops are coils of wire that have been embedded on the surface of the road to detect changes in inductance and convey them to the sensor circuitry in order to produce signals.” These are also called inductive-loop traffic detectors. When a vehicle passes through the loop or stops inside the loop, the vehicle induces eddy currents in the wire loops that reduce their inductance. The decreased inductance controls the electronics unit output relay or solid-state optically isolated output that sends a pulse to the traffic signal controller indicating the vehicle’s passage or presence. These induction loops are immune to weather, because they are placed in the asphalt, and are the most accurate vehicle detectors. However, the disadvantage of these loops is they may not read bicycles, as bicycles do not have a large amount of metal in their composition. Another way to manage these lights is with microwave radar sensors. These sensors can detect stopped bicycles at the stop bar and distinguish between a vehicle and a bike. The basic method for distinguishing bicycles from vehicles is the measurement of the width of the radio frequency signal returned. Bicycles produce relatively small values in width, while vehicles generate small and large values depending on the location of the vehicle. In this case, the most efficient way of implementing the smart traffic light system is by using the second...
method described. It is more cost efficient and has the ability to distinguish bicycles from cars. Microwave radar systems are also easier to install than inductive-loops because it is not necessary to install the radars under the asphalt. The radar sensors can not only detect vehicles, but they can also detect pedestrians, making it easier to manage the lights for the pedestrians. Siemens’ so-called Heimdall system relies on above-ground radar based technology to detect vehicles and pedestrians. “At the heart of each detector is a technologically-advanced planar radar antenna system and a sophisticated digital signal processing engine. Developed by Siemens, these incorporate patented features that enable Heimdall to offer excellent pedestrian and vehicle detection, count and occupancy performance as well as good ‘gap’ detection capabilities”. This system is immune to changing environmental conditions, including shadow, snow or fog. Heimdall’s radar technology eliminates false detection due to changes in the light level and the effect of shadows and continues to work equally well in both bright and completely dark areas. The first step for implementing such a system would be a collaboration between the mayors of the metropolitan area and the mayor of Cluj-Napoca, in order to implement the system both on the territory of Cluj-Napoca and the territories of each part of the metropolitan area. The second step would be to contract a team of experts to make a cost analysis and see what exactly is needed for the system. The next step would be to access EU funds for the financing of the system. The final step would be after the funds are approved, to contract a company, Siemens for example to implement and configure the system properly. Depending on the amount time needed for the project to be approved for EU funds, such a system could be functioning somewhere between six months and one year after applying for the EU funds. The advantages of such a system include reducing the pollution and increasing fuel efficiency for the cars. Another big advantages would be the systems’ ability to distinguish types of vehicles, which means it is able to distinguish cars from buses, which can make it easier to give an advantage to the bus to go faster through the intersections. The system will also reduce the waiting time at the red lights, which increases air quality and reduces both travel times and traffic jams, by being able to detect the amount of cars waiting or passing through a sensor Another advantage of the radar system is the low cost of maintenance and the ability to work properly regardless of the weather and light conditions. Having such a system would benefit both the people that are commuting from the metropolitan areas and the people that live in the city, as it would reduce the waiting times, therefore making the traffic more fluent. The disadvantage would be the time needed for the agreement on the cooperation and the project between the mayor of the city and the mayors of the metropolitan area because of the current framework of Romania regarding metropolitan areas.