STUDIES HAVE SHOWN THAT **21%** **OF FATAL ACCIDENTS** ARE CAUSED BY **A DROWSY DRIVER.**

Alarmate

Ramy Rouss

Have you ever driven back home after a long day, and felt yourself slowly fading into your dreams behind the wheel?

You might not be aware of the consequences of drowsy driving, however the numbers are there: According to AAA foundation, studies have shown that 21% of fatal accidents are caused by a drowsy driver. As a matter of fact, drowsy driving and sleep deprivation have the same effects on the driver as being under the influence. And while it is legally possible to eradicate drunk driving, there is no legal means to pull over a driver who is falling asleep, which is why we took it upon ourselves as a team of 3 'Electrical and Computer Engineering' and 'Computer and Communications Engineering' students at the Maroun Semaan Faculty of Engineering and Architecture (MSFEA) at AUB to tackle this matter as part of our final year project (FYP).

The team consists of Marilynn Berberi, Nadine Raad, and myself, Ramy Rouss. Our advisor is the wonderful Dr. Lama Hamandi who has been providing us with constant support and advice since day one. We also took part in the FYP accelerator program organized by MSFEA, and Mrs. Mona Itani as well as Mr. Elias Boustani, to whom we specifically want extend our sincerest gratitude.

The program helped us realize that we can develop our final year project into a startup enabling us, simultaneously, to own our business, and reach more people, leading to a big societal impact as a result. The program is designed in such a way to help us first realize what a startup really is by allowing entrepreneurs to share their journey and experience with the students. Once we embarked upon the FYP accelerator program, we found out that the program covers all aspects of what is needed for our startups to be up and running: from customer analysis to design thinking and business modelling. Furthermore, it also teaches us how to pitch and more importantly gives us the chance to sell our projects to a jury for a chance to win up to $30000, funds to invest in turning our project into a startup. On a more technical note, the device – named Alarmate - operates based on a hybrid technology that combines image processing and heart rate detection using a camera placed on the dashboard and a heart rate sensor embedded in the driver's seat belt. The image processing algorithm uses machine learning on a Raspberry Pi 3 to detect the eyes of the driver and calculates the eye aspect ratio (ratio of longitudinal and latitudinal diagonals of the eye) to check whenever it becomes below 0.25 (which means eyes are almost fully closed) for 2.5 seconds or more (which signifies drowsiness and danger) and alerts the driver via an alarm sound. On the other hand, the heart rate detection studies the low frequency (LF) vs the high frequency (HF) of the heart and whenever

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the heart rate enters the region where the LF is less than 60% and the HF is more than 40%, it means the driver is getting drowsy and after a few seconds into that region, the device will also sound an alarm to alert them. We tested the device in a car while driving and it yielded satisfactory results and response times. After two semesters' work and the accelerator's experience, we feel confident enough to move forward with our project and reach new heights. From a technical side, we intend to use a NVIDIA Jetson X2 module and GPU programming which is more advanced than the Raspberry Pi we have been using. We also plan on using a much more advanced heart rate sensor to allow for a more accurate and reliable performance once we have a budget that allows us to. Furthermore, a couple of incubators approached us at IDEAS 2019, which was organized by MSFEA, to adopt out project and help us financially to launch it. Finally, a special gratitude and acknowledgement to the MSFEA faculty and ECE department for supporting entrepreneurship initiatives taken by students and equipping them with the necessary tools to develop abstract projects into a reality.

We express our sincerest gratitudes to Dr. Lama Hamandi who truly stood by us through the hard times encountered in this project ■

Tree-D

Yahya Khaled El Ali

Lebanon, a country distinguished by its unique ecological formation and its charming natural wealth, and fauna and flora, has been facing exponentially growing environmental problems because of global warming – a catastrophic phenomenon which has accelerated harmful parasites' penetration of trees. Each year, harmful parasites infect thousands of trees, which explains the declining trend of the Lebanese Agricultural sector, which makes up an important part of the national GDP. The frequency of this occurrence rings the bell of social concern, as families lose a potential source of income.

Today, farmers in Chouweifat – a Lebanese city – believe that the more trees are planted, the more tangible poverty is. This claim is valid. The decrease in annual yields and harvest rates accompanied with increases in the costs of pesticide treatments implies a financial challenge and a setback.

Parasites are known to relocate from one tree to another which proves the necessity of treating all infected trees

However, many farmers, private owners, etc. cannot afford deploying the existing pesticide treatments on all the trees they own or can save which explains the ineffectiveness of the existing solutions.

By now, you are probably asking yourselves: "How big of an issue is this in monetary terms?" Entomologists estimate that, each year, Lebanon loses a value worth of $1 Million because of 150 dead pine trees. With pine trees constituting 18% of the total trees in Lebanon, it is truly

EACH YEAR, HARMFUL **PARASITES INFECT** THOUSANDS OF **TREES** IN LEBANON

a devastating loss. Therefore, is developing a radical, autonomous and cost-effective product feasible? The answer is Tree-D. Tree-D is a service startup that utilizes drones, chemical pellets, and a shooting mechanism to deliver autonomous, highly accurate, and cost-effective seasonal treatments for trees. Tree-D is made accessible to every single person for an affordable price starting from LBP 5,000 per tree.What are you waiting for? Make every cent count to save the Lebanese environment ■