

EMOTION DETECTION SYSTEM IN UNCONSTRAINED ENVIRONMENTS



- **JUSTIFICATION**
- **TARGET**
- **PROPOSED SYSTEM**
- **RESULTS OBTAINED**
- **REFERENCES**

JUSTIFICATION

According to the world health organization WHO, approximately 1.35 million lives are lost each year due to traffic accidents. [\[1\]](#).

Between 20 and 50 million people suffer non-fatal injuries and this causes some disability.

Accidents cost most countries 3% of GDP.

According to statistics from the World Bank group, Latin America and the Caribbean are one of the regions with the highest mortality rate from road accidents, behind Africa and the Middle East [\[2\]](#).

Injuries caused by traffic accidents are the eighth leading cause of death, INEGI [\[3\]](#).

According to data from the National Highway Traffic Safety Administration (NHTSA), more than 9% of fatal accidents in the United States in the last seven years involved a distracted driver.[\[4\]](#)

Some of the causes mentioned are linked to emotions, which are impulses from the brain that control the behavior of people in the face of external stimuli and are presented consciously or unconsciously.

Taking into account that if the driver presents a negative emotion, this could be a risk at the wheel.

TARGET

- **OVERALL OBJECTIVE**

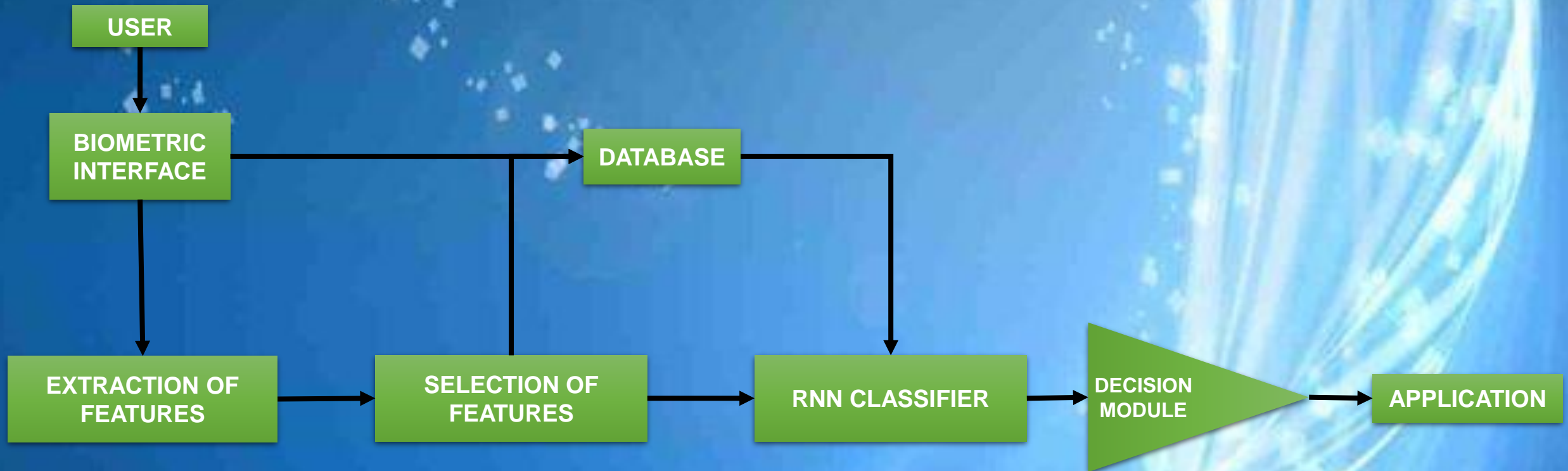
Detect emotions in people during the manipulation of external agents in which the responsibility is beyond the security of the same, from digital image processing and the use of neural networks.

- **SPECIFIC OBJECTIVE**

Design an algorithm for data acquisition while driving a car or transportation system.

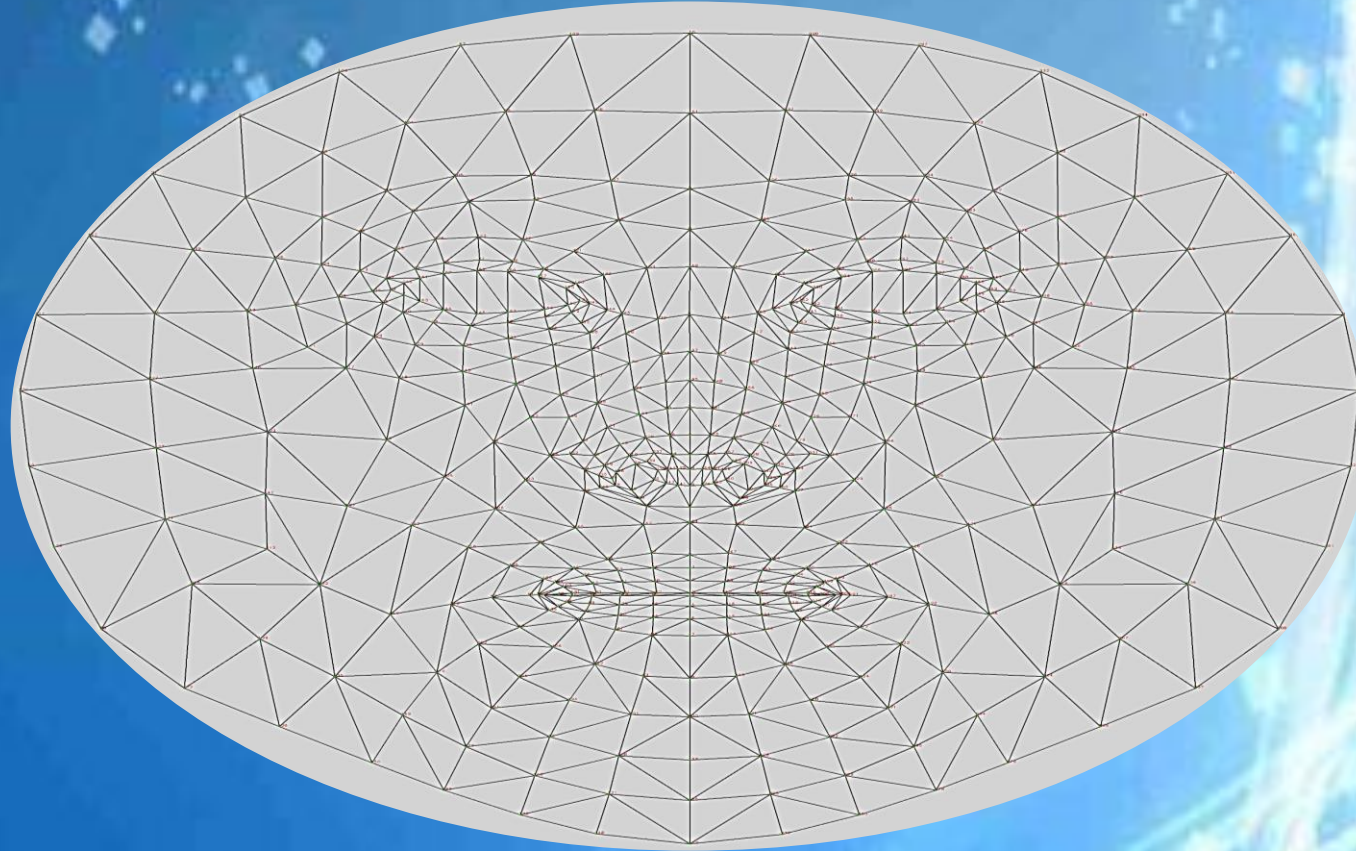
Check the stress detection algorithm using neural networks

PROPOSED SYSTEM



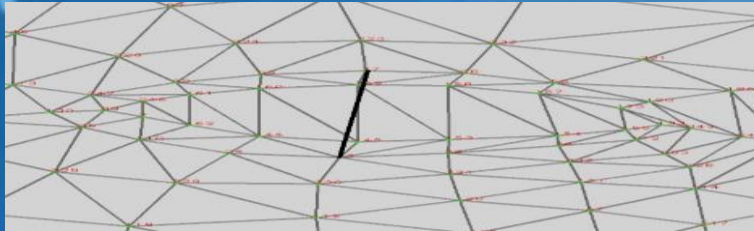
EXTRACTION OF FEATURES

**FRONT MESH WITH
468 FACIAL
REFERENCE POINTS**



SELECTION OF FEATURES

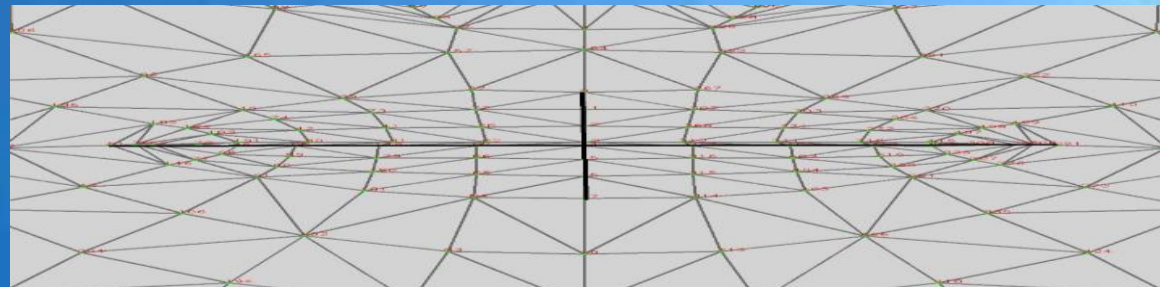
RIGHT EYE



LEFT EYE



LIP



FACE DETECTION

XMIN, YMIN



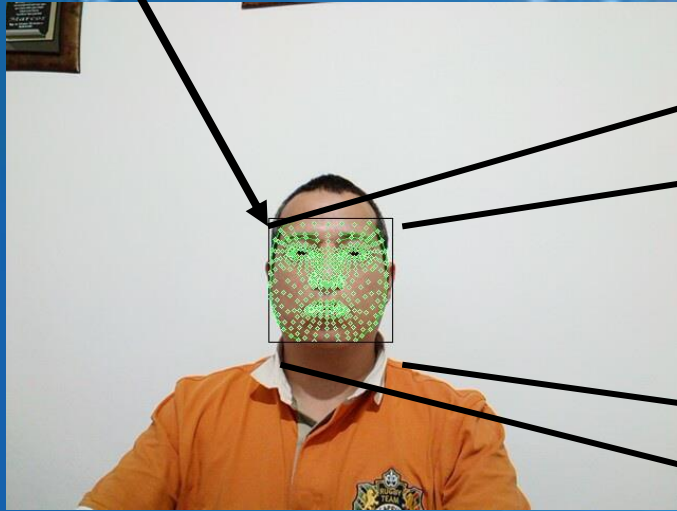
XMIN + WIDTH



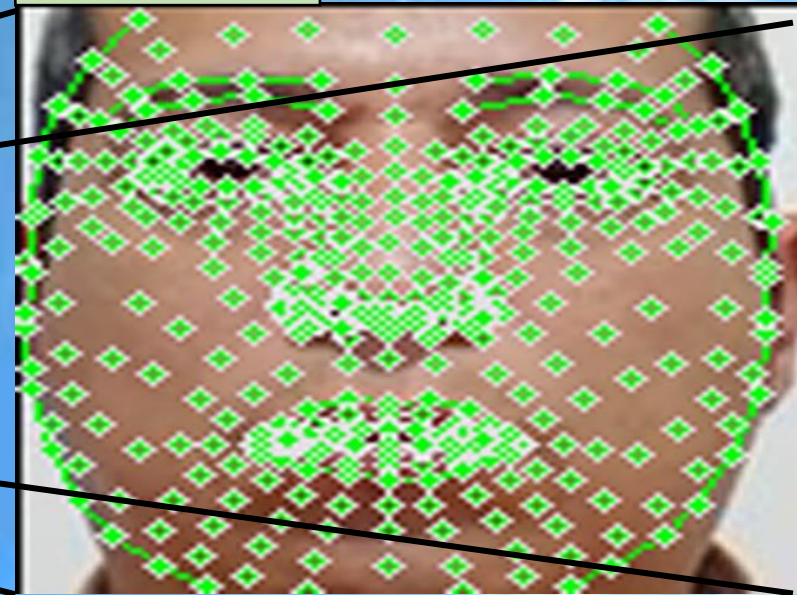
YMIN + HIGH

POINTS OF REFERENCE

XMIN, YMIN



XMIN + WIDTH



YMIN + HIGH

SELECTION OF FEATURES

XMIN, YMIN



XMIN + WIDTH



YMIN + HIGH



EUCLIDEAN DISTANCE

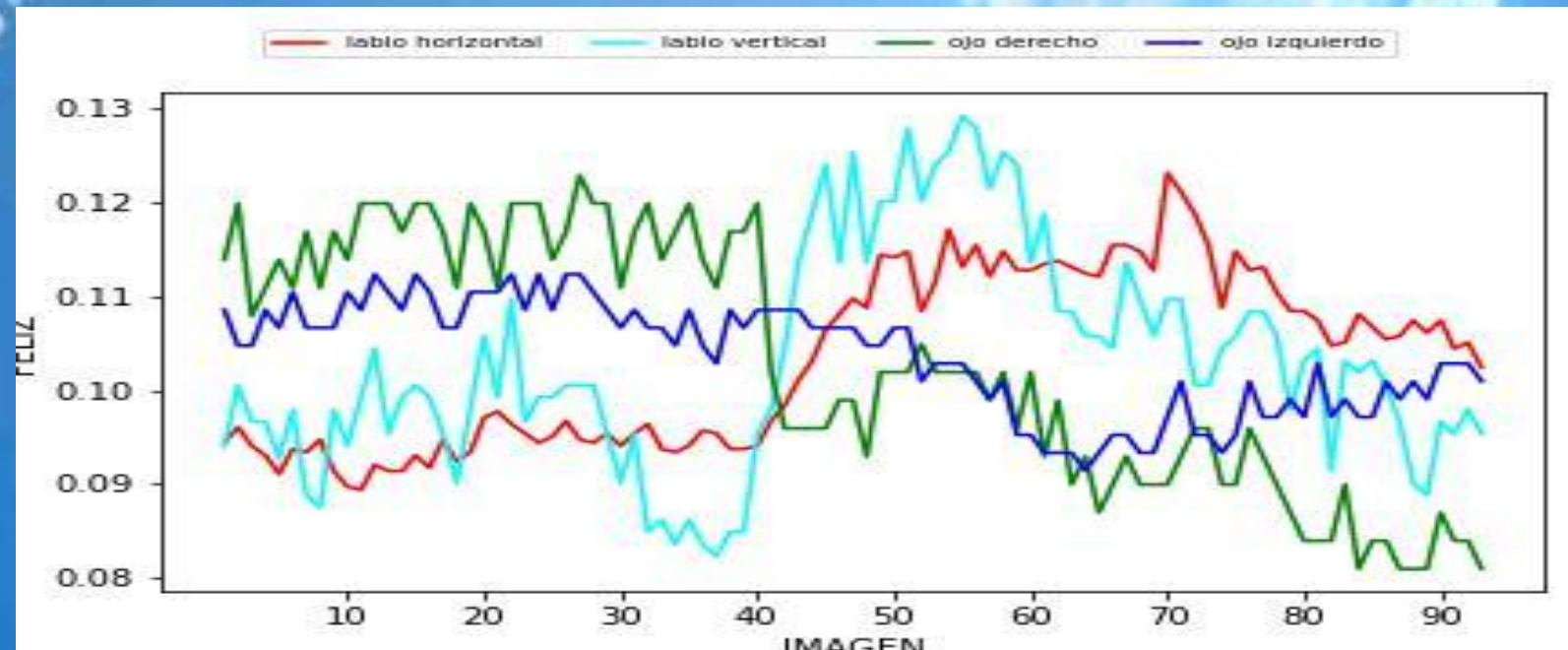
$$d(\mathbf{x}, \mathbf{y}) = \sqrt{\sum_{i=1}^n (x_i - y_i)^2}$$

STANDARDIZATION

$$d(\vec{u}) = \frac{\vec{u}}{|\vec{u}|}$$

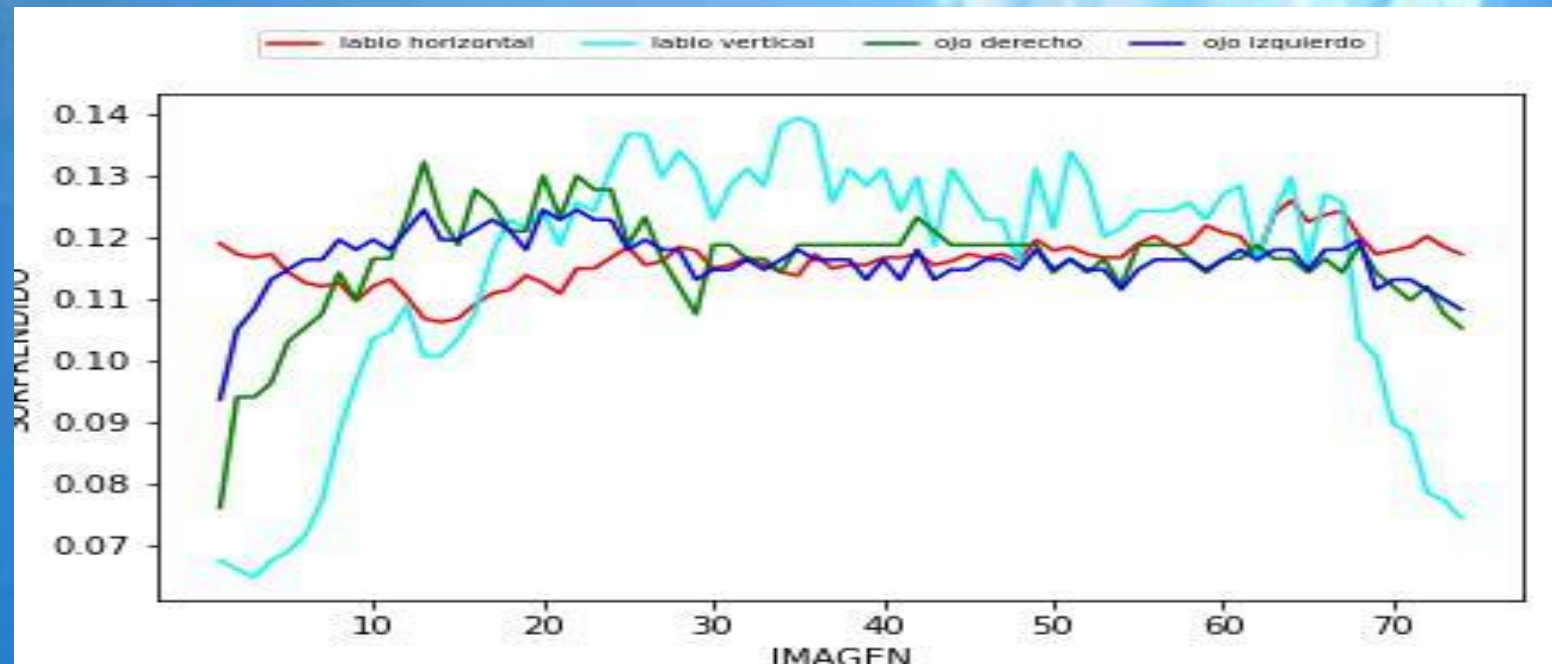
RESULTS OBTAINED

HORIZONTAL LIP	VERTICAL LIP	RIGHT EYE	LEFT EYE	FPS
MIN	MIN	MIN	MIN	MIN
0.089357195	0.082261204	0.080935237	0.091408178	31
MAX	MAX	MAX	MAX	MAX
0.12315898	0.129267607	0.122901657	0.112355885	35



RESULTS OBTAINED

HORIZONTAL LIP	VERTICAL LIP	RIGHT EYE	LEFT EYE	FPS
MIN	MIN	MIN	MIN	MIN
0.106150242	0.064818092	0.07612076	0.093660657	34
MAX	MAX	MAX	MAX	MAX
0.125872145	0.139289941	0.132091906	0.124342597	37



PC
LENOVO 10AHA0X9LS.
Intel(R) Core(TM) i7-4770 @ 3.40GHz (8CPUs), ~3.4GHz.
16384MB.

REFERENCES

- [1] <https://www.who.int/es/news-room/fact-sheets/detail/road-traffic-injuries>
- [2] <https://www.bancomundial.org/es/news/feature/2021/02/08/inseguridad-vial-pandemia-amlat>
- [3] https://www.inegi.org.mx/contenidos/saladeprensa/aproposito/2020/EAP_Acctraf20.pdf
- [4] <https://www.nhtsa.gov/risky-driving/distracted-driving>



THANKS FOR YOUR ATTENTION