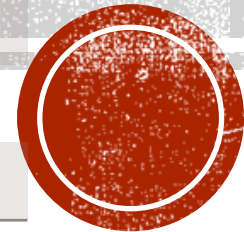




**Prince Mohammad Bin Fahd University**  
**College of Engineering**  
**Department of Electrical Engineering**

**INTELLIGENT TRAFFIC LIGHT CONTROL WITH  
EMERGENCY AMBULANCE CLEARANCE**

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Co-Advisor: DR. Muhammad Omair Butt

**May 17<sup>th</sup> , 2022**

# OUTLINE

- Traffic Light Introduction
- Problem Statement
- Proposed Solution
- Project Objectives
- Project Architecture
- Component
- Planning
- Background
- Design: Structure Options
- Integration
- Bonus feature (IOT)
- Design: Completed Work
- TESTED
- Project Management & Teamwork
- Impact of project
- New Skills Acquired and Applied
- Cost
- References
- Video Link



# TRAFFIC LIGHT INTRODUCTION

The congestion of traffic in streets

The overcrowding

Road accidents.

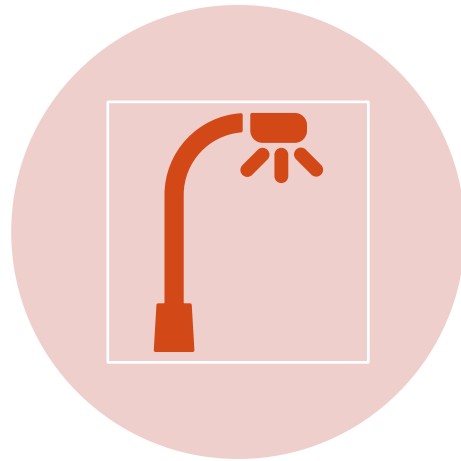
All these factors lead us to think about intelligent traffic light and monitor system



## PROBLEM STATEMENT

- Traffic cars in road needs to be monitored
- Avoiding time delay for emergencies situations

# PROPOSED SOLUTION

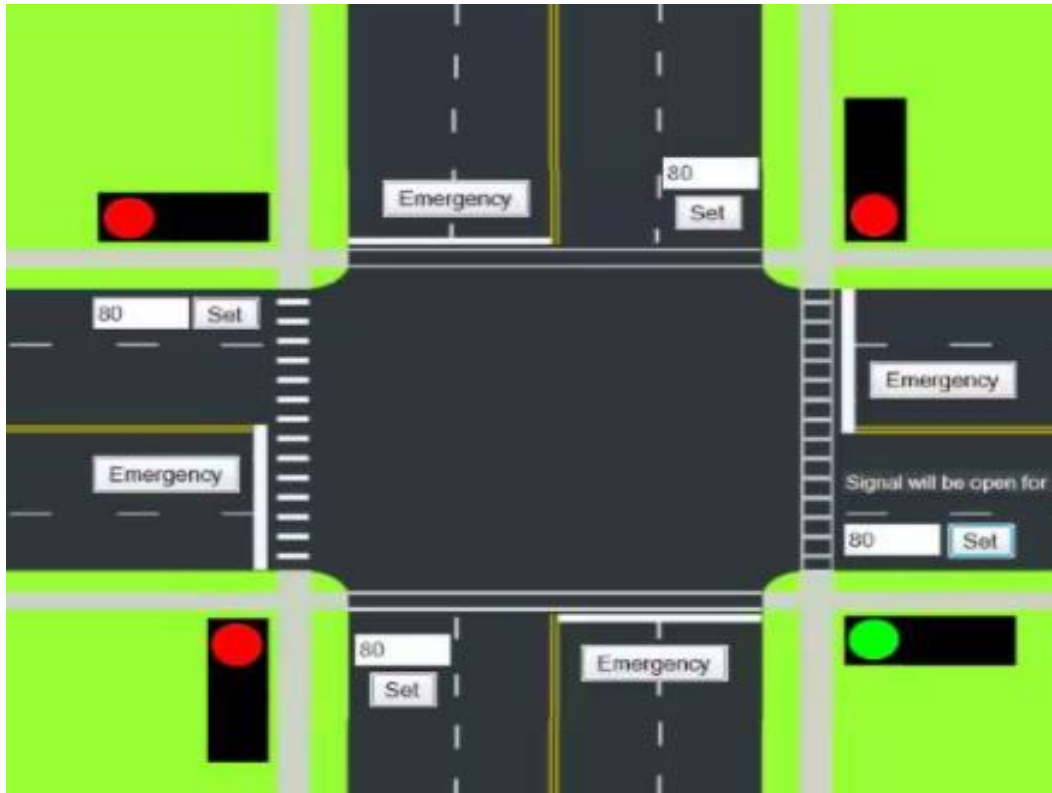


DESIGN OF SMART TRAFFIC LIGHT  
CONTROL AND MONITORING  
SYSTEM



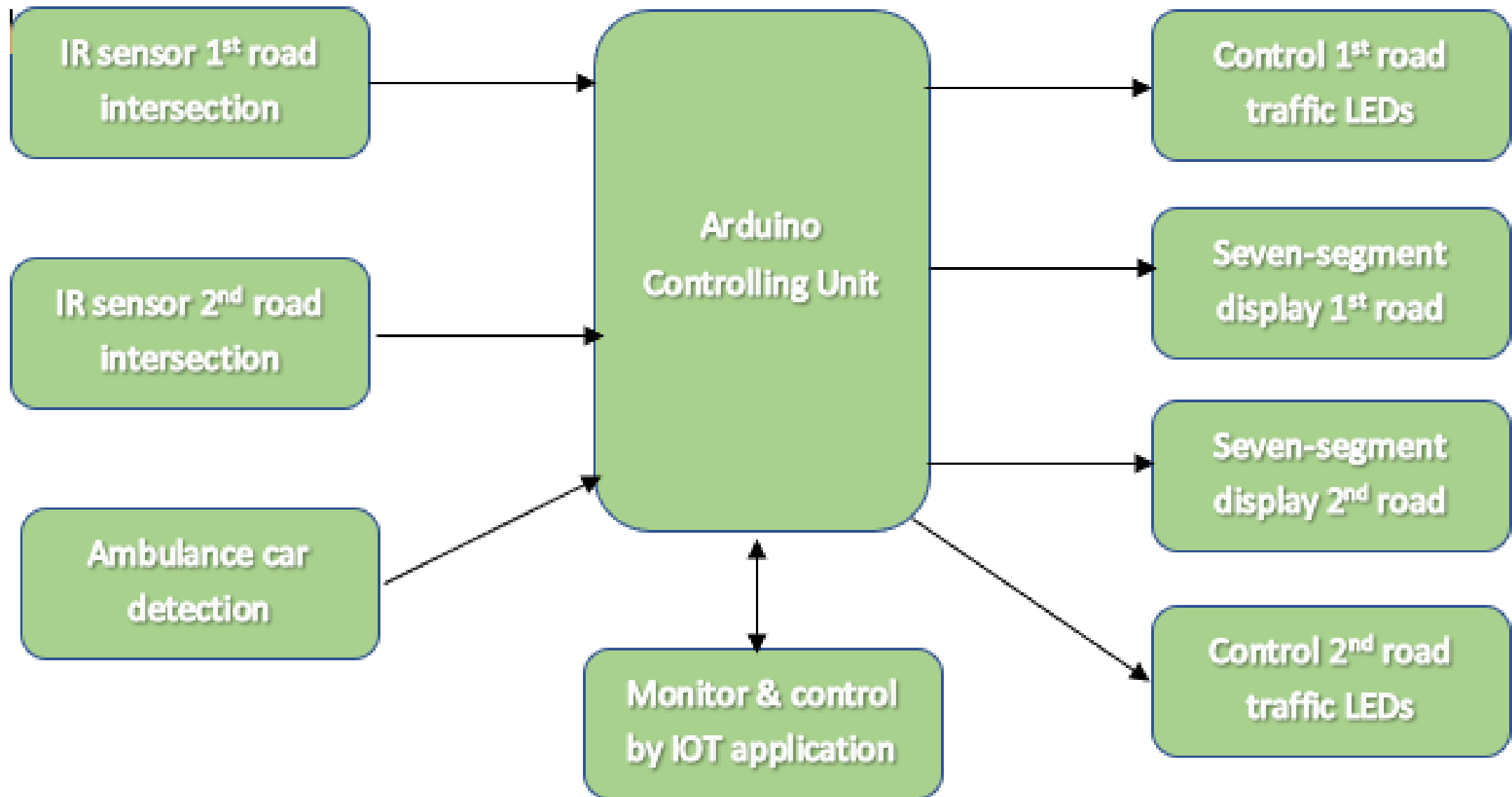
FACILITATE THE CROSSING OF  
AMBULANCES AND IMPORTANT  
CARS

# PROJECT OBJECTIVES



- Design of smart traffic light control and monitoring
- Minimize and avoid traffic congestion
- Minimize waiting time
- Reducing accidents
- Facilitating the work of ambulances
- Facilitate crossing vehicles
- Practical implementation of the system
- Performance evaluation

# PROJECT ARCHITECTURE



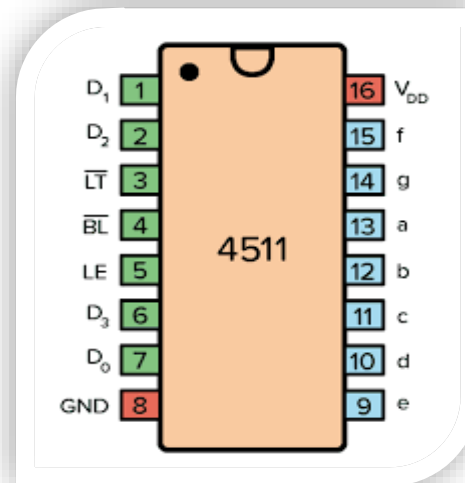
# COMPONENT



Arduino Mega(ATmega1280)



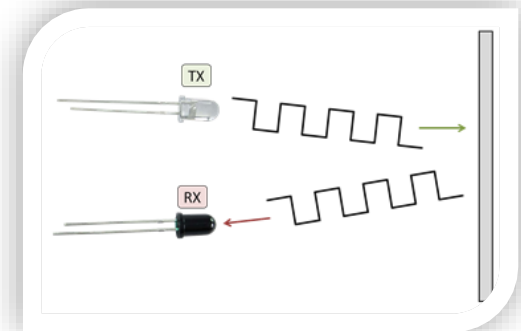
Seven segment LED



CD4511 – A BCD to 7-Segment Display Driver Chip



Speak Recognition, Voice Recognition Module V3 MOD54



Round IR Receiver Transmitter LED-Photo Diode & Photo Transistor

# PLANNING



- Design subsystem1 (How to control the normal light traffic)
- Design the simulation intersection (subsystem 1)
- Implement ambulance clearance detection system
- Validate ambulance clearance system
- Implement the IR sensor to detect cars and control in each intersection in the system
- Implement the seven-segment display in every road intersection
- Implement the intelligent traffic algorithm (coding), which is control the traffic intersection
- Integrate Intelligent traffic light control system with emergency ambulance clearance
- Design 3D printing and voice recognition configuration (subsystem 2)
- Implement industrial design model
- Test and validate all systems( subsystem 3)
- Finalize project demo
- Submit Rpt/PPT/Brochure/Video...etc.

# BACKGROUND

## Road deaths

Approximately 1.24 million people die each year as a result of road accidents, according to the WHO

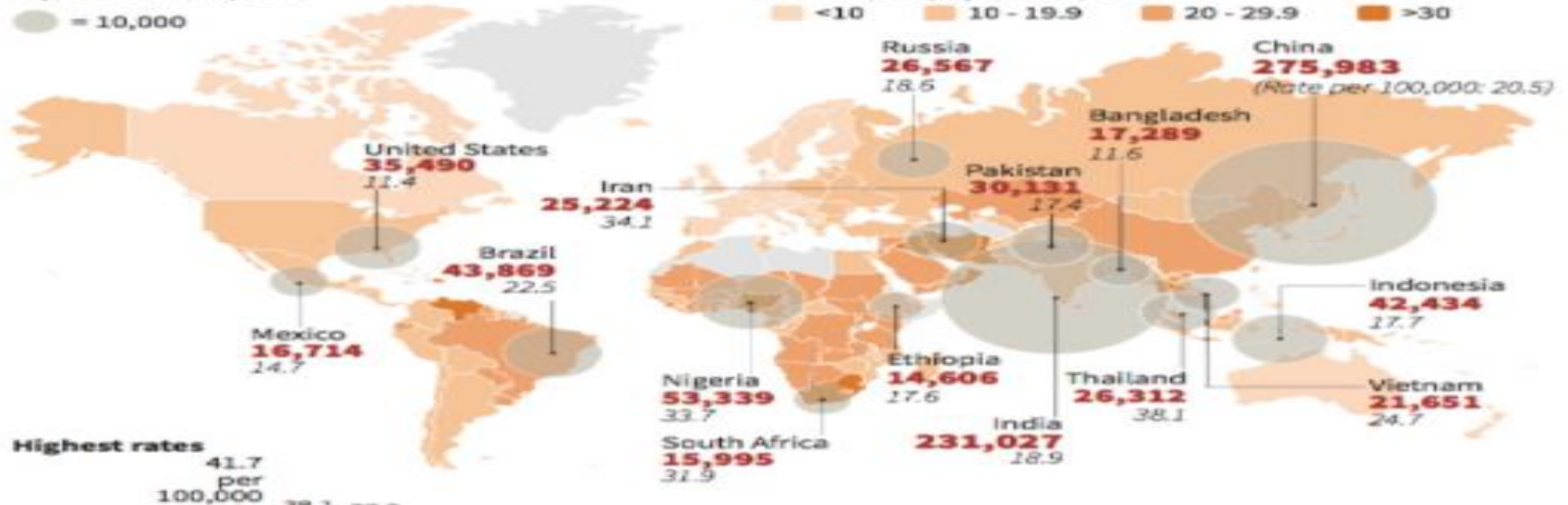
**Estimated numbers**  
Top 15 countries, 2010

● = 10,000

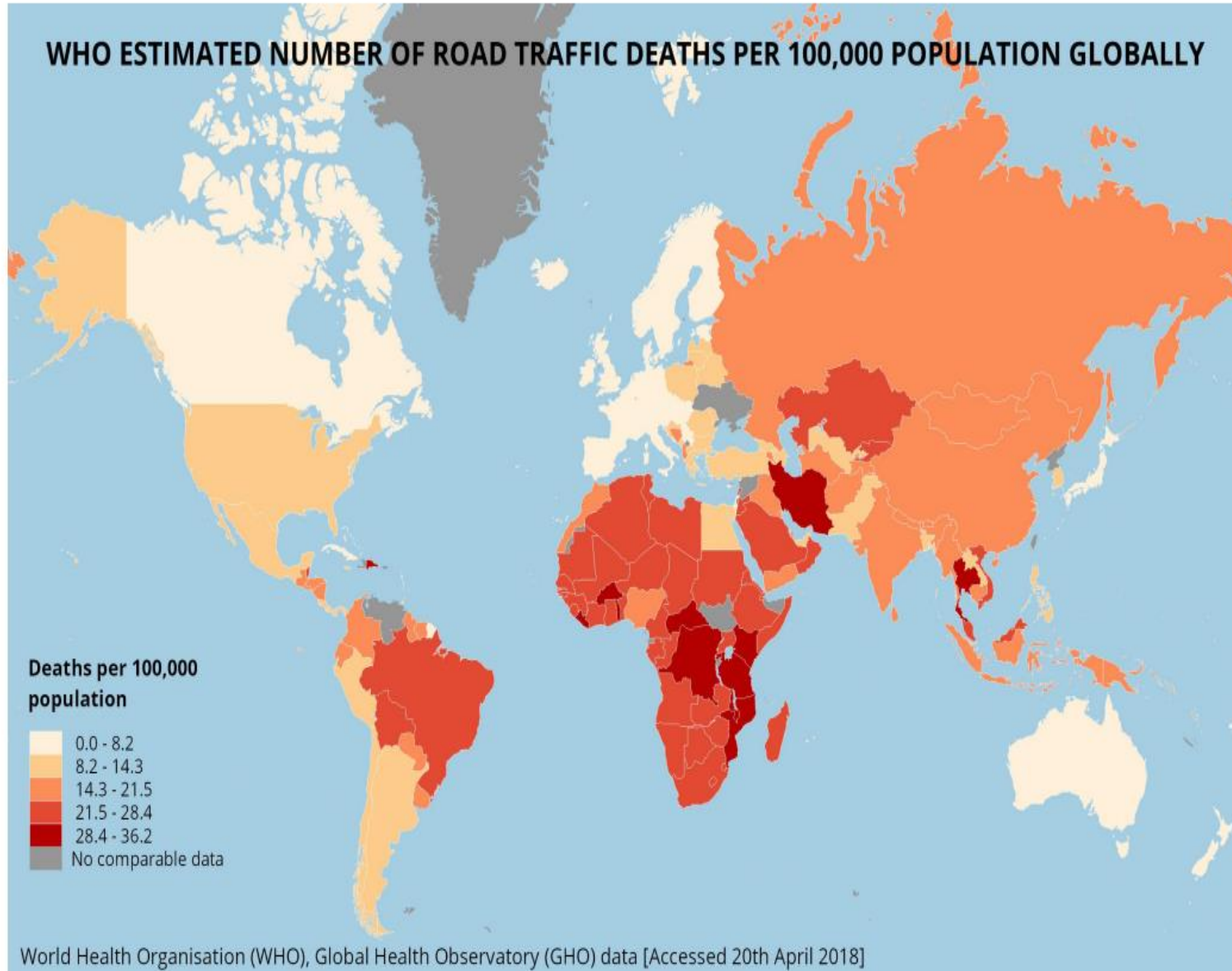
**Death rate**

Per 100,000 population, 2010

■ <10   ■ 10 - 19.9   ■ 20 - 29.9   ■ >30

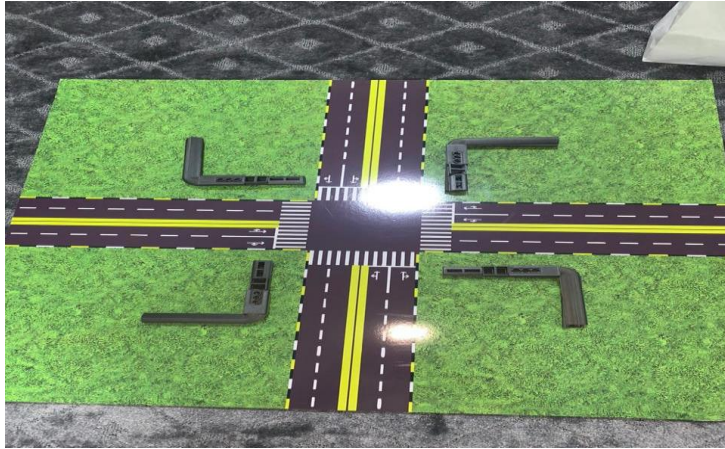


## WHO ESTIMATED NUMBER OF ROAD TRAFFIC DEATHS PER 100,000 POPULATION GLOBALLY



# BACKGROUND

# DESIGN: STRUCTURE OPTIONS



Traffic intersection, 1.5x1.5 m, 20 cm width for each road



3D PRINT TRAFFIC



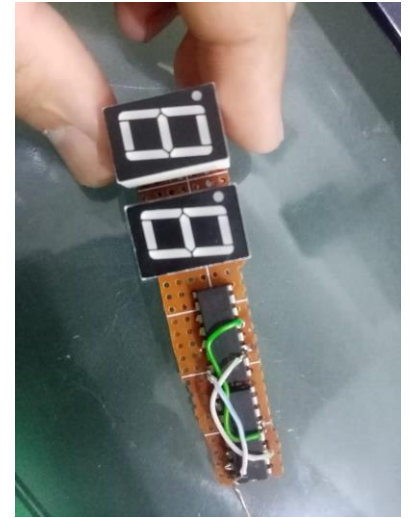
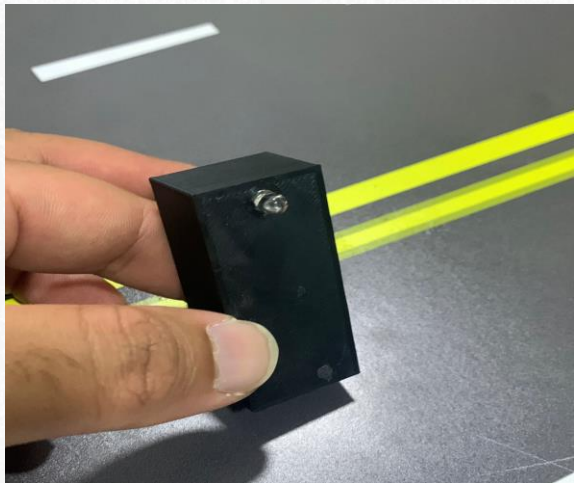
DEMO CARS



3D PRINT IR SENSOR COVER

# DESIGN: STRUCTURE OPTIONS

- 3D Printer Traffic and soldering



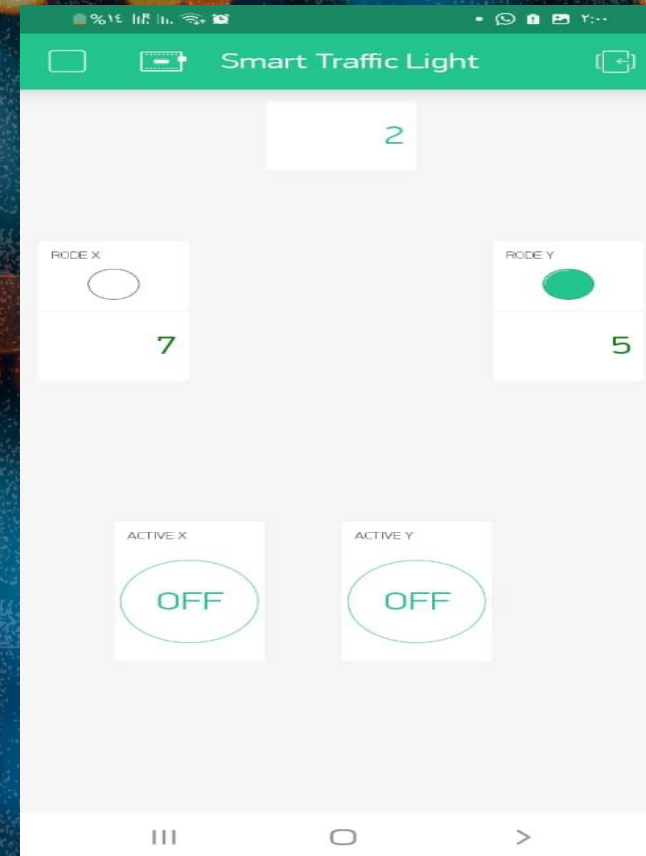
# INTEGRATION

- IR alignment and testing
- Vehicle entrance and exit
- Hidden wires Connection



# BONUS FEATURE (IOT)

- Blink application to monitor and control complete traffic system
- Beside the smart traffic light we added a blink app to monitor and control the system The application is sync with the real traffic light system in the intersection The normal counter is from zero to five which indicates there is no car



# DESIGN: COMPLETED WORK

Implement ambulance clearance detection system

Validate ambulance clearance system

Implement the seven-segment display

3D printer traffic intersection design.

Implement the IR sensor

Finalizing the industrial design model, and the voice recognition (subsystem 2)

Test and validate all system(subsystem 3).



Tested the voice recognitions



Tested the traffic control



Implementing car counting

**TESTED**

**SUBSYSTEMS**

Task	Abdullah	Hassan	Nawaf	Abdurahman
Search & acquire components	20%	30%	20%	30%
Design & Implement Subsystem 1	25%	20%	35%	20%
Design & Implement Subsystem 2	30%	25%	20%	25%
Design & Implement subsystem 3	25%	20%	35%	20%
Testing	15%	30%	40%	15%
Write Reports & Presentations	35%	20%	20%	25%


## PROJECT MANAGEMENT & TEAMWORK

- Teamwork task division



# PROJECT MANAGEMENT & TEAMWORK





## **IMPACT OF PROJECT**

- The most important impact for our project is saving lives by introducing ambulance clearance to the system

# NEW SKILLS ACQUIRED AND APPLIED



Learn more about Arduino and their types

Learn more about coding with the Arduino Controller

Deep analysis for the system

Give good information about 3D printing and the Features

Item	Quantity	Unit Cost (SR)	Subtotal
7 segment Display Unit	8	5	40
IR SENSOR	16	12	192
Voice Recognitions	1	140	140
4711 IC Decoder	8	7.75	62
Arduino Mega Controller	1	100	100
Industrial Design	1	170	170
3D Printing for intersections	4	87.5	350
3D printing IR sensor boxes (PMU printer)	16	FREE	-
Demo vehicles	6	35	210
<b>Total Cost</b>			<b>SR 1264</b>

**COST**

# REFERENCES

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[1] A. Albagul, "Design and development of sensor based traffic light system", American Journal of Applied Sciences. FindArticles.com. 19 Oct, 2010.

[2] Mahmoud Taghizadeh et al., "A Generalized Framework for Integrated Vehicle Traffic and Wireless Network Simulation", AD-H

[3] Ayad M. Turkey et al., "Genetic Algorithm Applications for Traffic Light Control", UNISCON 2009, LNBIP 20, pp 115-120, 2009.

[4] Khalid A. S. Al-Khateeb et al., "Dynamic Traffic Light Sequence Algorithm Using RFID", Journal of Computer Science vol.7. No.4, pp517-524, 2008.

[5] Shwe Yi Aye, "Design and Construction of LAN Based Car Traffic Control System", Word Academy of Science, Engineering and Technology, vol.46, 2008.

[6] Visit Hirankitti et al., "A Multi agent Approach for Intelligent Traffic Light Control", Proceeding of the Word Congress on Engineering 2007 vol. I, WCE 2007, July 2-4 2007, London, U.K. OC Now 2010, LNCS 6288, pp205-219, 2010.

# VIDEO LINK

- [https://www.canva.com/design/DAF4msb85g/cy\\_SLMLnNPcGJ5FcageNOg/watch?utm\\_content=DAFA4msb85g&utm\\_campaign=designshare&utm\\_medium=link&utm\\_source=publishsharelink](https://www.canva.com/design/DAF4msb85g/cy_SLMLnNPcGJ5FcageNOg/watch?utm_content=DAFA4msb85g&utm_campaign=designshare&utm_medium=link&utm_source=publishsharelink)