Modern problems, modern solutions

By Team A

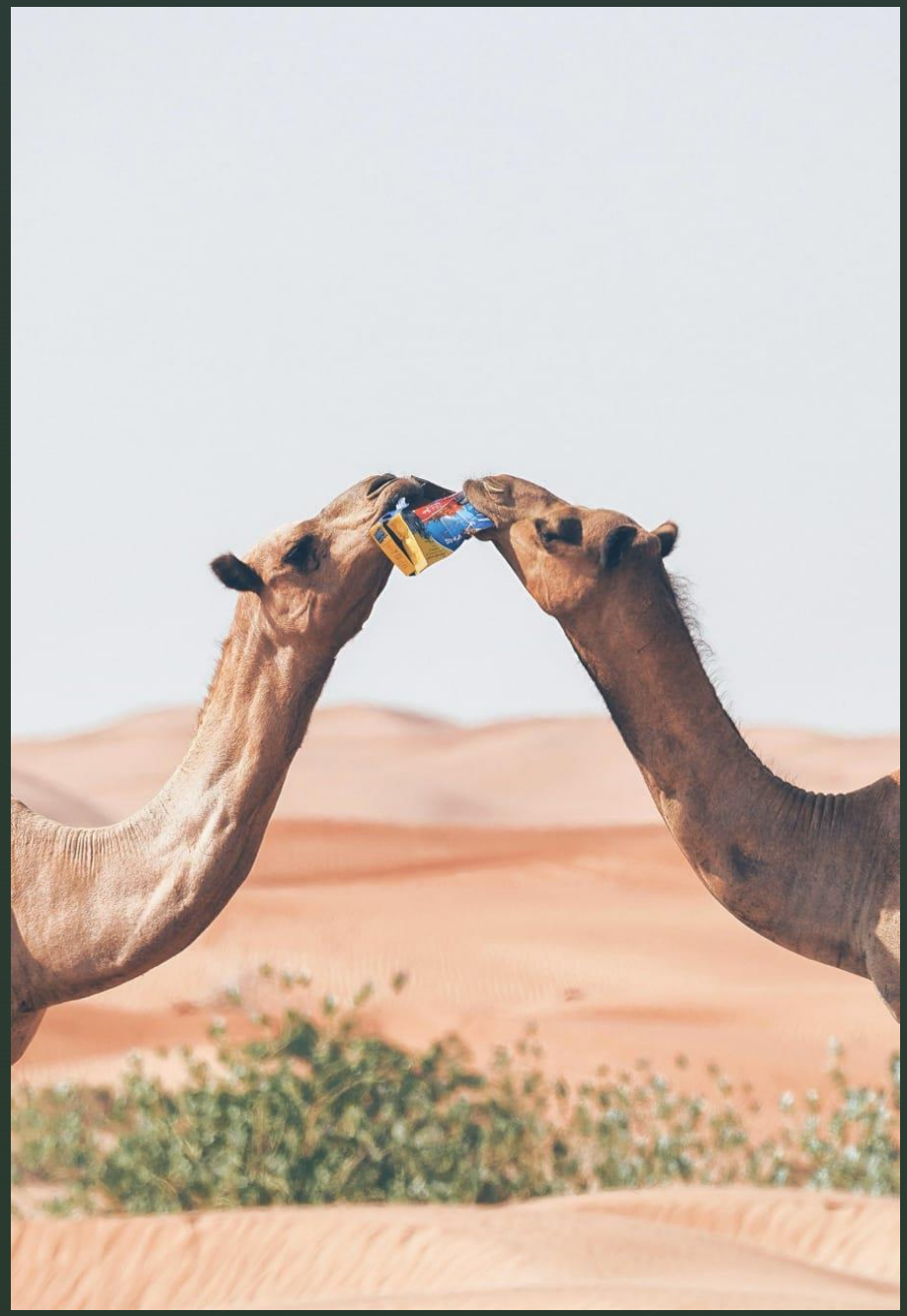
Car Pollution in the UAE

- Following the statistics, vehicles in Dubai take 3.1 million trips a day, which is expected to increase to 13.1 million trips a day by the year 2020.

- One of the major factors of pollution in our cities today is the traffic. Studies find that 30% of traffic congestions are the result of drivers searching for a **parking spot**.

Plastic Pollution in the UAE

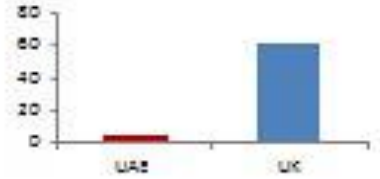
- The country's residents use a whopping 13 billion plastic bags a year.
- With the equivalent of 43 gallons on an average per person in 2011, the United Arab Emirates had the fourth-highest level of bottled water consumption in the world.



Plastic usage of the population of the UAE compared to the population of the UK

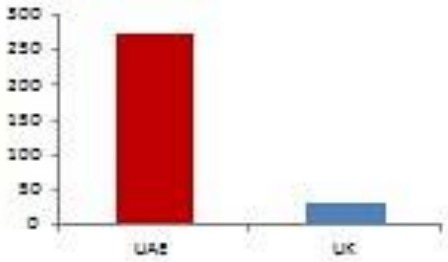
PLASTIC NOT SO FANTASTIC

UAE Population: 5 million



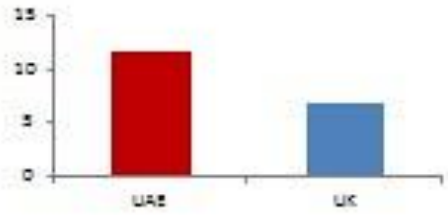
UK Population: 62 million

- 275 litres of bottled water per person per year.
  Worldwatch Institute



- 33 litres of bottled water per person per year.
  Just Drinks

- 11.6 billion plastic bags per year.
  Green Prophet



- 6.8 billion plastic bags
  Waste and Resources Action Programme

Design Brief for Proposal 1

- **Fully automated reserved car parking system**

- Mobile app generates a barcode for the user
- Informs you about any available parking
- User scans barcode once the car is parked

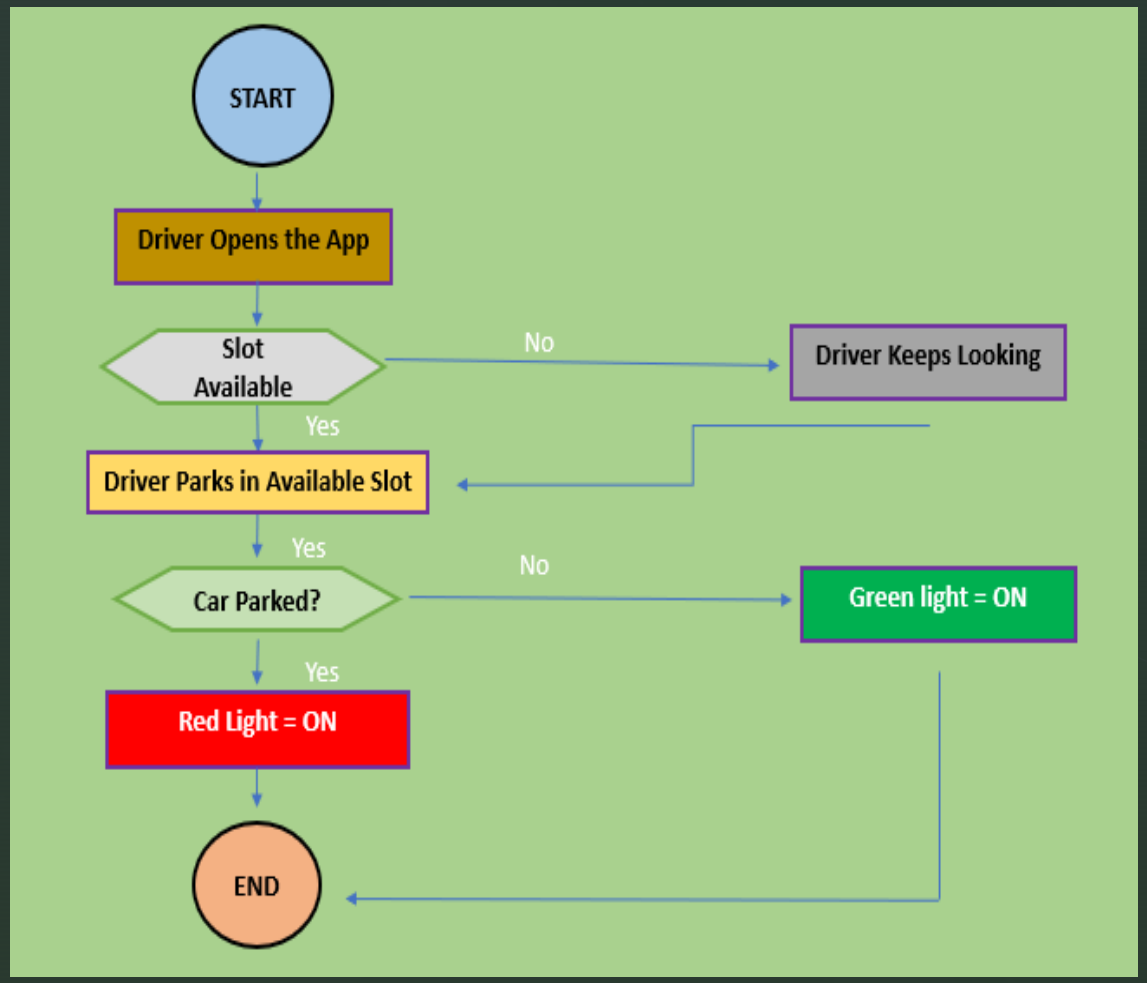
Design brief for Proposal 2

- **Reverse Vending Machine**

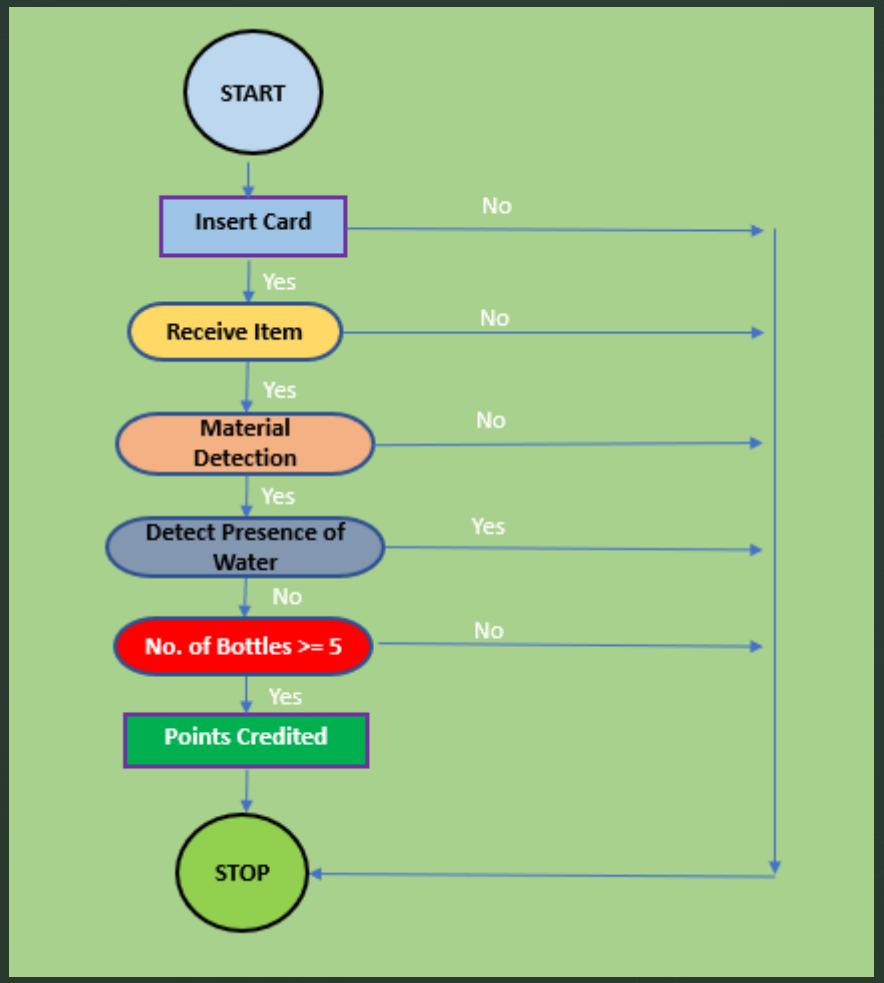
- Users get rewarded with credit on their nol cards for turning in plastic waste from the environment
- Helps reduce the carbon footprint of people

Flowcharts

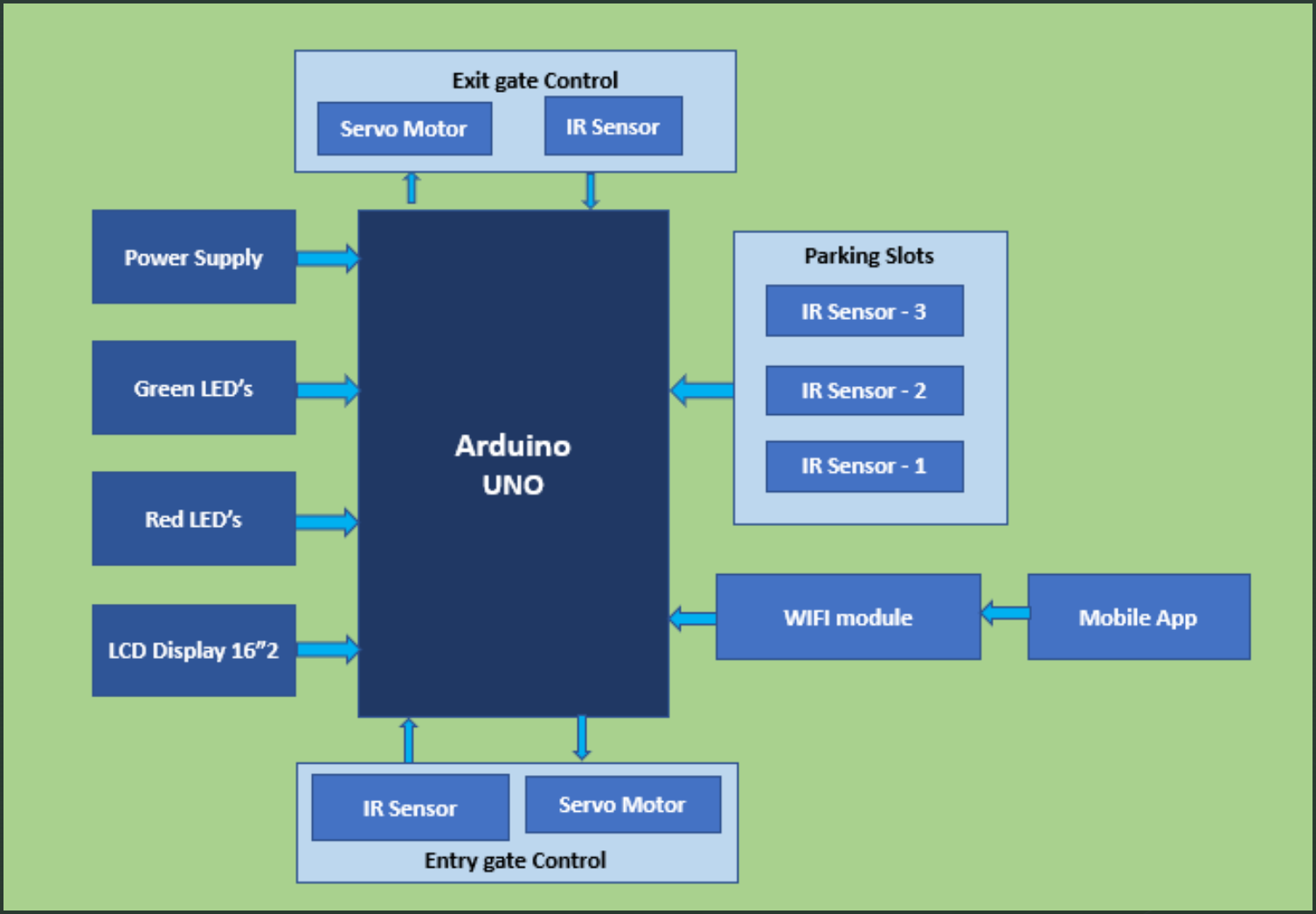
Reserved parking system



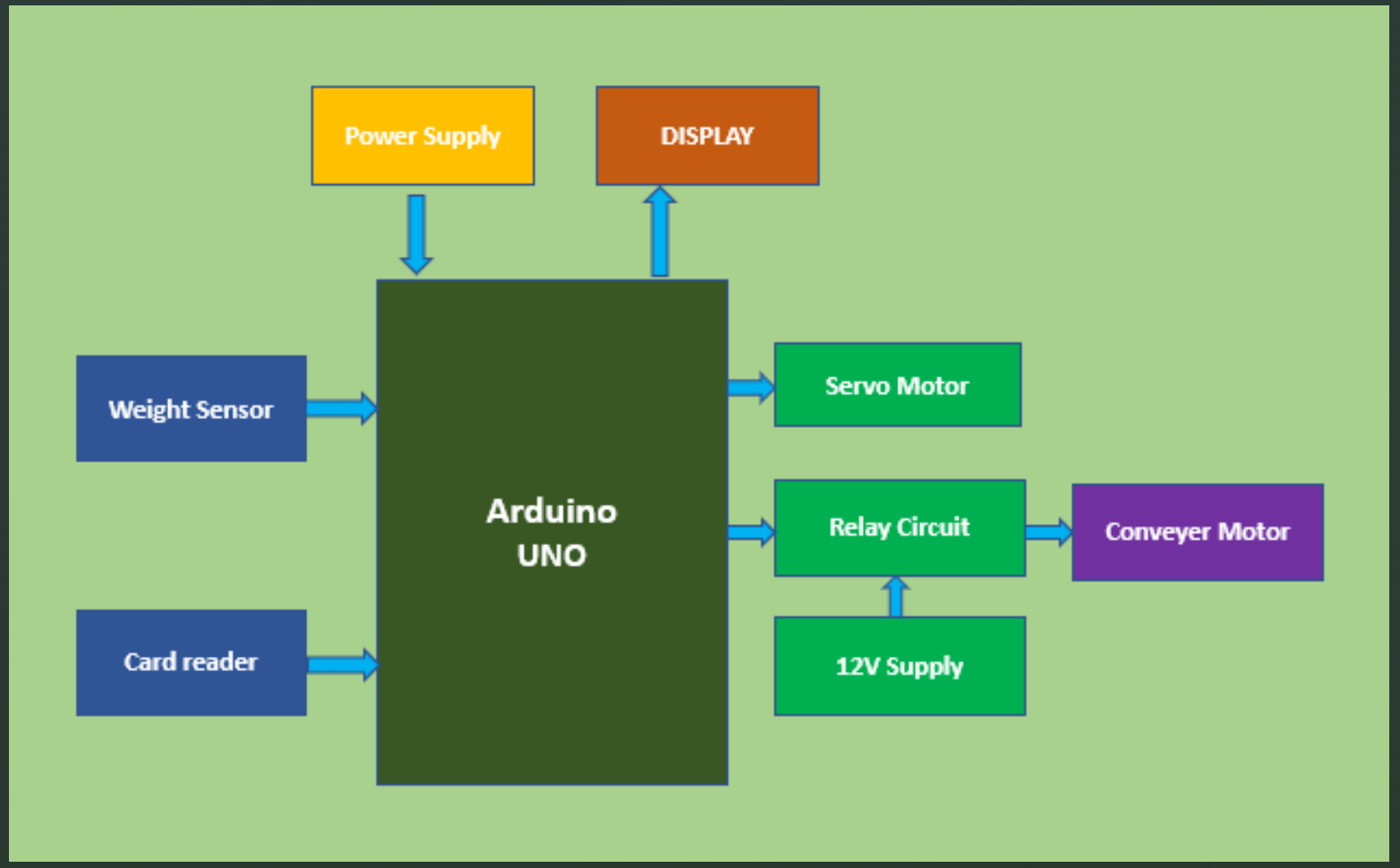
Reverse vending machine



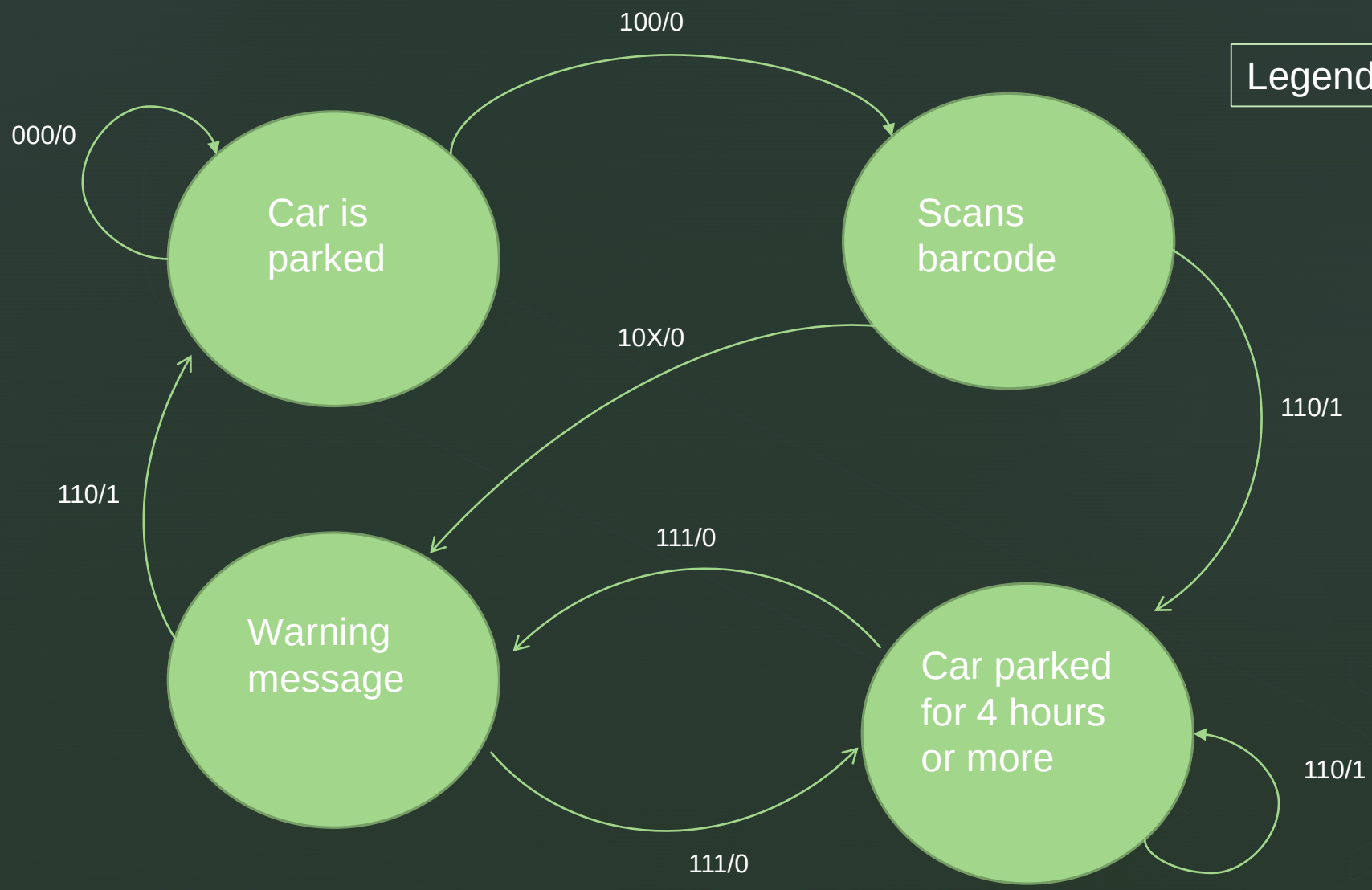
Block diagram for reserved parking system



Block diagram for vending machine



Reserved Parking System State Diagram



Inputs : W- Proximity Sensor (car present or not)
X- Barcode Scanner (barcode scanned or not)
Y- Timer (has it been more than 4 hours)

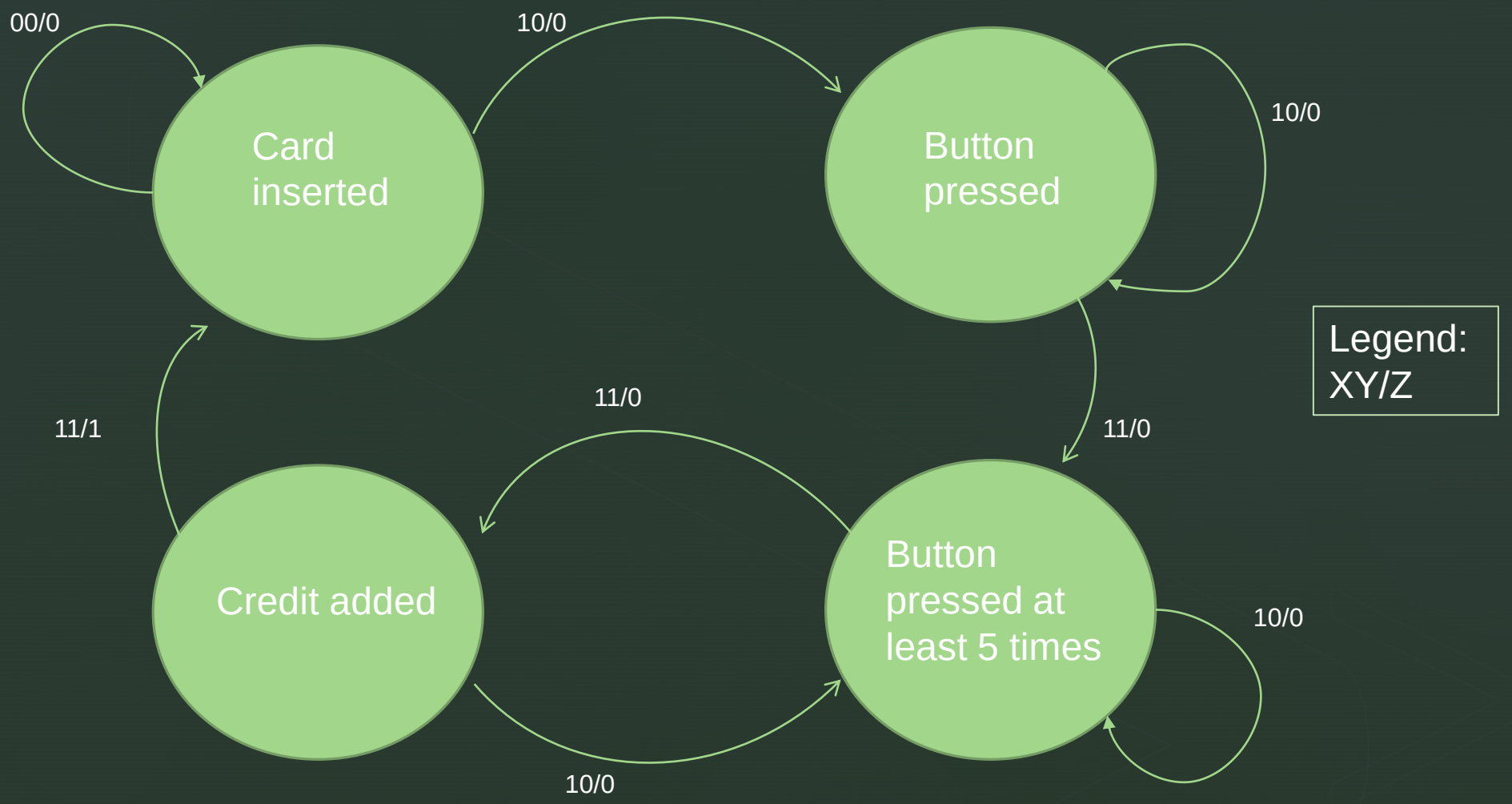
Outputs : Z- 1 if the car is parked, the barcode is scanned and the car is parked for less than 4 hours.

Q0 Q1	000	001	010	011	100	101	110	111
00	000	100	010	010	110	110	110	110
01	000	100	010	010	110	110	110	110
10	010	110	010	010	010	110	010	010
11	001	101	001	001	010	110	010	010

Equations:-

Q0= (W.Q0')+(Y.X')
Q1= W+(X.Q0')+(Q1'.Q0')
Z= W'.Q1.Q0

Reverse vending machine State Diagram



Inputs: X- Card inserted
Y- Button pressed

Outputs: Z- Card is inserted and button is pressed for at least more than 5 times

Q0 Q1	00	01	10	11
00	000	100	110	110
01	010	010	110	110
10	000	100	010	010
11	010	010	001	001

Equations:-

Q0= (X.Q0')+(X'.Q1)+(X.Q0')
Q1= (X.Q1')+(X'.Q1)+(X.Q0')
Z= X.Q1.Q0

Why reserved parking system?

- Average passenger vehicle emits 4600kg of carbon dioxide per year
- Equates to 8.7g per minute
- Sample size of 10% of registered vehicles in Dubai (340,000/3,400,000) saving 1 minute on parking equates to 2,950kg of carbon dioxide
- Reduce traffic
- Reduce emissions/ air pollution

Marketing Target: Reserved parking system

Short term target:

- RTA/Government parking spaces
- Mall parking

Long term target:

- GCC countries government/paid/public parking spaces
- International government/paid/public parking spaces

Why reverse vending machine?

- 18.1 million riders used Dubai metro in the first half of 2019
- 10% of riders = 1,810,000
- 10% use minimum of 5 bottles = 9,050,000 bottles collected
- Reduce pollution
- Save energy
- Recycle

Marketing Target: Reverse vending machine

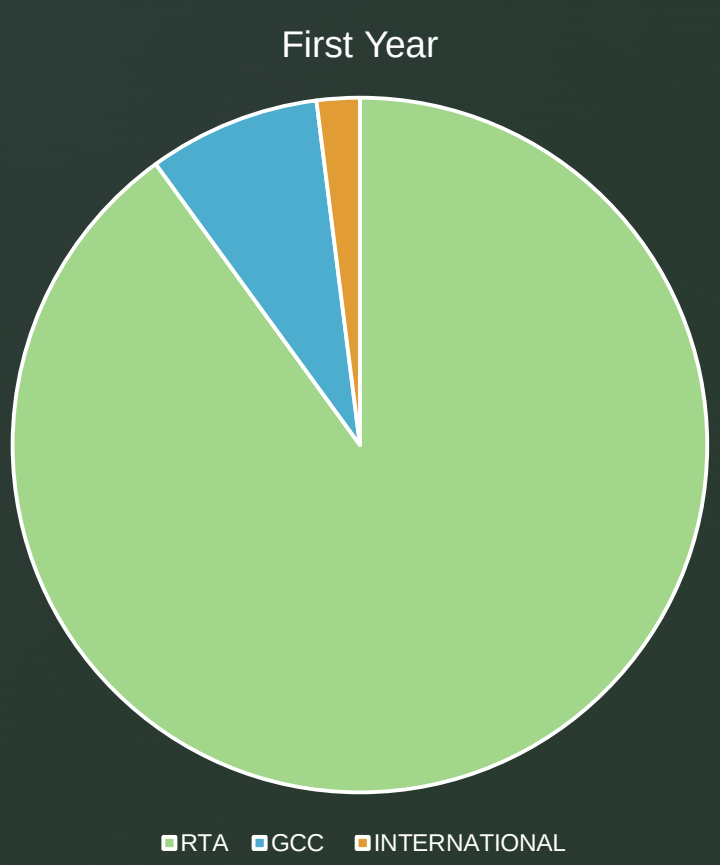
<u>Short term target:</u>

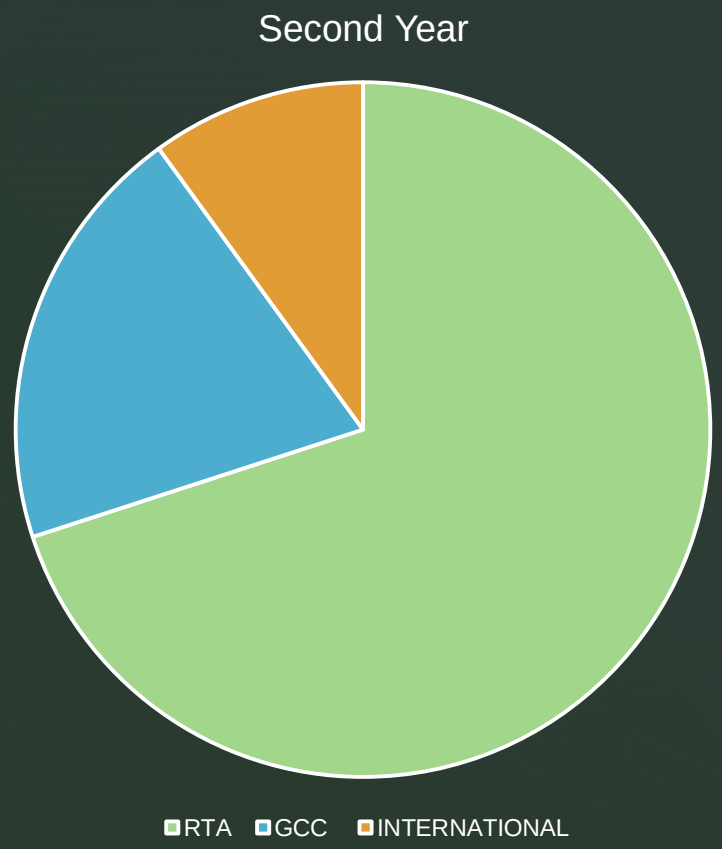
RTA public transport

- Busses
- Tram
- Metro
- <u>Long term target:</u>

- GCC countries
- International countries

Estimated target market





Labour Cost

	Expected Time Spend (Hours)	Hourly wages per person	Hourly wages for team	Total Wages for team
Deliverable 1	6	75 AED	300 AED	1,800 AED
Deliverable 2	12	75 AED	300 AED	3,600 AED
Deliverable 3	6	75 AED	300 AED	1,800 AED
Deliverable 4	8	75 AED	300 AED	2,400 AED
Deliverable 5	18	100 AED	400 AED	7,200 AED
Deliverable 6	30	125 AED	500 AED	15,000 AED
Deliverable 7	3	75 AED	300 AED	900 AED
Deliverable 8	3	75 AED	300 AED	900 AED
Total Labor Cost	86 Hours	675dhs per person	2,700 AED for team	33,600 AED for team

Components cost estimate: Reverse Vending machine

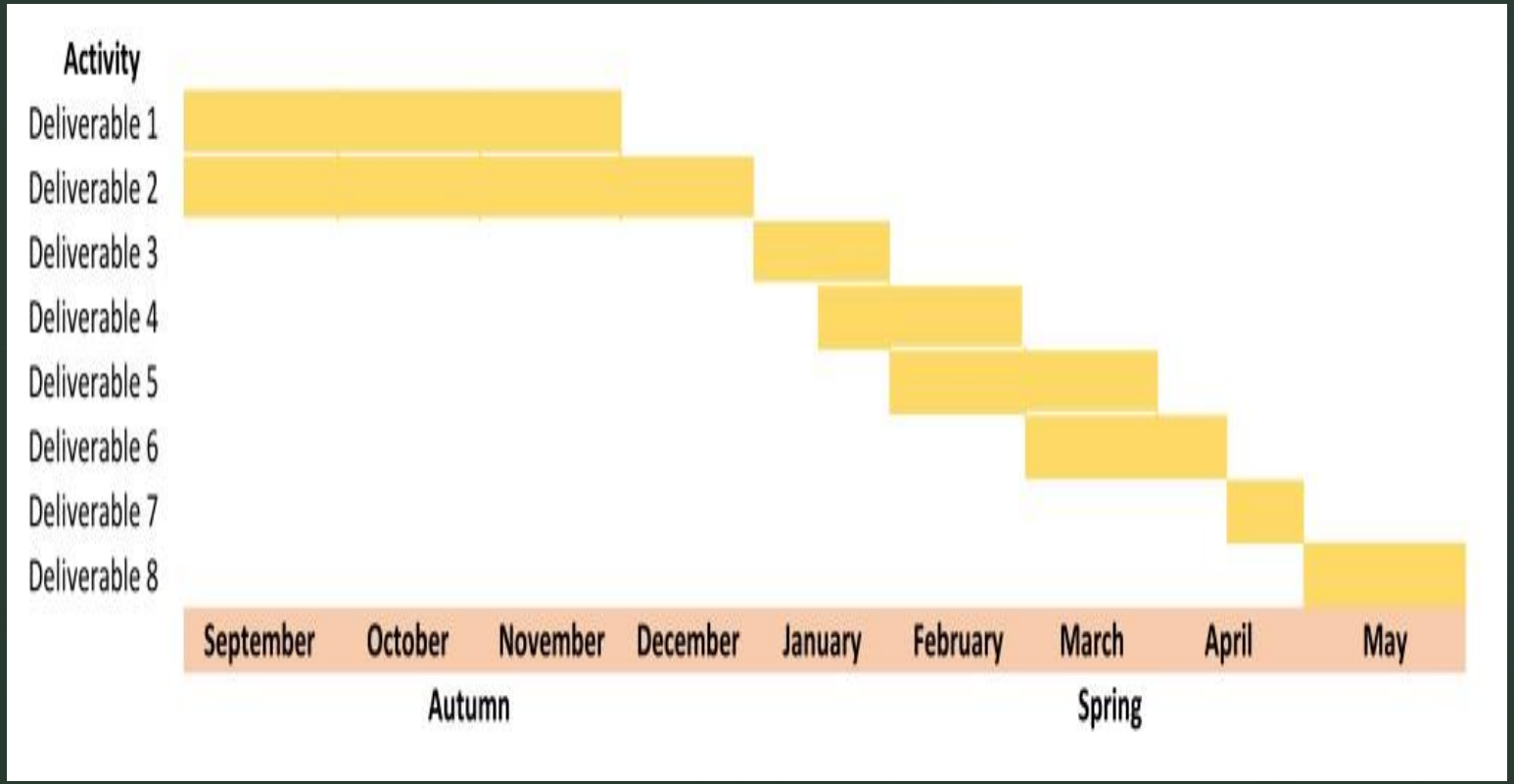
Component	Quantity	Cost
Arduino starter kit	1	600 AED
74HC74 (Dual D type flip flops)	1	4 AED
Infrared Proximity Sensor	1	45 AED
Pressure sensor	1	80 AED
74LS08 (Quad 2-input AND gate)	2	8 AED
74LS04 (HEX inverter gate)	1	4 AED
NE555 timers	1	5 AED
Total Cost		746 AED

Components cost estimate: Reserved Parking system

Component	Quantity	Cost
Arduino starter kit	1	600 AED
74HC74 (Dual D type flip flops)	1	4 AED
Infrared Proximity Sensor	1	45 AED
74LS08 (Quad 2-input AND gate)	2	8 AED
74LS04 (HEX inverter gate)	1	4
Total Cost		661 AED

Gantt Chart

Deliverable 1: Proposal Presentation
Deliverable 2: Detailed Design
Deliverable 3: Design Simulation
Deliverable 4: Breadboard Prototype
Deliverable 5: Perfoboard
Deliverable 6: Final Design Report
Deliverable 7: Final Design Presentation
Deliverable 8: Trade Show



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