Unmanned Aerial Vehicles as an Enabler for Next Generation Mobility

Dr. Hamid Menouar
Senior R&D Expert and Product Manager
hamidm@qmic.com
About QMIC

Qatar Mobility Innovations Center

First Independent Innovations Center in Region
Founded in 2009

Innovations Model Optimized for the Region
System Innovations
Idea to Market
User-Centric

Leadership in Key Emerging Market Domains
Intelligent Mobility
Smart Living (IoT)
Road Safety a Worldwide Problem

1.2 million people die in road accidents every year.

A further 50 million people are injured.

Source: WHO this year - 2013
And Old Problem...
Considerable Improvements

Motor vehicle crash deaths in 10 comparison high-income countries, 2013

- United States: 10.3
- New Zealand: 5.6
- Canada: 5.4
- France: 5.1
- Japan: 4.5
- Germany: 4.0
- Spain: 3.6
- Switzerland: 3.3
- United Kingdom: 2.8
- Sweden: 2.7

Countries with the highest and lowest reductions in crash deaths, 2000-2013

- Spain (highest): 75%
- Average of 19 high-income countries: 56%
- United States (lowest): 31%

Deaths per 100,000 people
Roads Are Safer Than They've Ever Been
And Cars Are Safer Than They've Ever Been

- Built to Crash...
- Park Assist
- Driver & Passenger Centric...
- Adaptive Cruise Control
- Driver Assisted...
- Lane Assist
Approximately 90% of all crashes are due to minor mistakes such as distraction, fatigue or being slightly above the speed limit.

Source: www.carrsq.qut.edu.au
Automated Driving to Eliminate Human Error!

Cut Road Accidents by 90%

McKinsey & Co.
CITIES ARE DESIGNED FOR CARS

30-35% Land used for streets

Parked 95% of the time

WASTED SPACE & MONEY
There are 4 times as many parking spaces as cars in America.

31% of our downtown commercial cores are devoted to parking.

Source: http://www.motherjones.com/environment/2016/01/future-parking-self-driving-cars
DIFFERENT EXPECTATIONS

PAST

FUTURE
THERE IS ONE trend of mobility that young people have embraced, though:

MOBILITY AS A SERVICE
Fleet of Taxi ROBOTS
Automation is the Next & Future of Transportation
Levels of Automation

Source: KPMG: CAV – the UK Economic Opportunity, March 2015

QMIC Proprietary

Dr. Hamid Menouar
What about road maintenance?
What about road assistance?
What about road surveillance?
What about road assistance?
Drone-aided Platform for Enabling Next Generation ITS

NPRP9-257-1-056 | www.DroneITS.com
UAVs Applications ... A Reality!

- Flying cameras
- Delivery
- Public safety / Disaster recovery
- Precision Agriculture
- Inspection in Oil, Wind, Construction, electrical industry
- Defense
UAV-Enabled Intelligent Transportation Systems for the Smart City: Applications and Challenges

Hamid Menouar, Ismail Guven, Kemal Akkaya, A. Selcuk Uluagac, Abdullah Kadri, and Adem Tuncer

ABSTRACT

There could be no smart city without a reliable and efficient transportation system. This necessity makes the ITS a key component of any smart city concept. While legacy ITS technologies are deployed worldwide in smart cities, enabling the next generation of ITS relies on effective integration of connected and autonomous vehicles, the two technologies that are under wide field testing in many cities around the world. Even though

Due to their mobility, autonomous operation, and communication/processing capabilities, UAVs are envisaged in many ITS application domains. The authors describe the possible ITS applications that can use UAVs and establish:

Placement of the UAV Docking Stations


Video link: https://www.youtube.com/watch?v=jmxxL9Gzo-M
Qatar V2X Pilot - Architecture

The pilot includes:
- MSC: Mobility Services Center
- RSU: Road-Side Unites
- OBU: On-Board Unites
Qatar V2X Pilot - Architecture

Unmanned Areal Vehicles (UAVs)
Drones for ITS
Flaying V2X Road-Side Unit

Video link: https://www.youtube.com/watch?v=eJ_JUjmgLOQ

3D Space Navigation
UAVs Applications ... A Reality!

- Flying cameras
- Public safety / Disaster recovery
- Precision Agriculture
- Inspection in Oil, Wind, Construction, electrical industry
- Defense

Limited Flight Lifetime! 30 min
An Example

16 km max
What if we let the UAV ride the bus?

Exploiting the Existing Land Transport!
Others already doing it...
Automated Landing

Video link: https://www.youtube.com/watch?v=iUO39s-Zj08
Drones to help improve the traffic

FOCUS AND OBJECTIVES
The focus areas and objectives of the DroneITS R&D project include, but not limited to:

- **UAVs Emplacement Planning**
  Selection of initial locations where to place UAVs parking

- **UAVs Dynamic Coordination**
  Designing optimal coordination algorithm(s) to

- **UAV-based Data Routing**
  Some of the targeted applications requires more
Thank You!

Dr. Hamid Menouar
Senior R&D Expert – Product Manager
Qatar Mobility Innovations Center
hamidm@qmic.com
www.menouar.com