

# SMART | PARK

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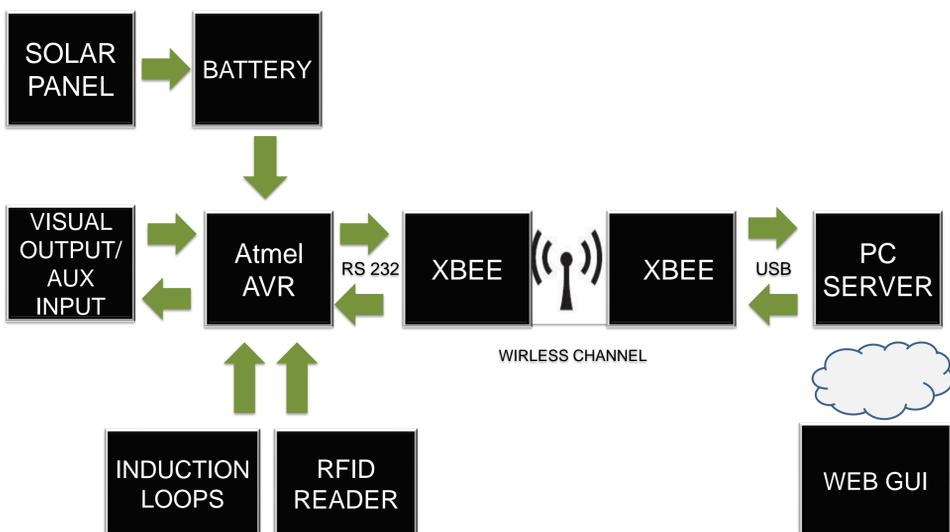
## PROJECT GOALS:

Design a gateless and wireless parking lot management system, and alleviate parking lot congestion by visually indicating lot usage by on-site LED displays.

- Implement solar powered RFID vehicle tracking solution.
- Design a website displaying lot capacity at all times.
- Add induction loops to track untagged vehicles.
- Design an alphanumeric display to designate zones to special event parking.

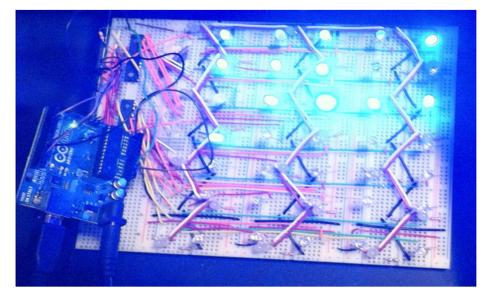
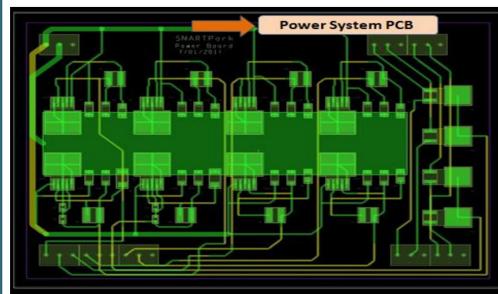
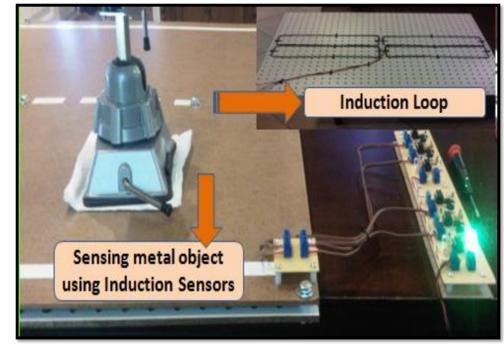
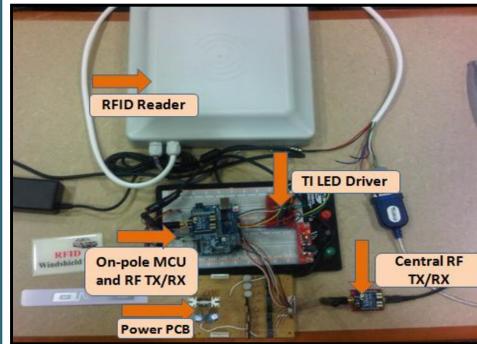
## APPROACH:

- Poles form “virtual gates” dividing the parking lot into different zones.
- RFID tags, included into parking permits, will be read as soon as cars enter the parking zones, by poles.
- Vehicles are tracked within the zones to determine parking lot usage.
- Upper LED on-site displays indicate the real-time current fill capacity of parking zone.
- Lower alphanumeric LED on-site displays designate zones to special event parking.
- Central database server controls the poles which communicate wirelessly via Zigbee protocol.
- On-site solar panel charges pole system battery which increases cost effectiveness and ease of installation.
- Website with user friendly GUI enables drivers to find out a parking space availability miles before they reach the lot.
- Induction sensors are implemented to detect untagged vehicles.

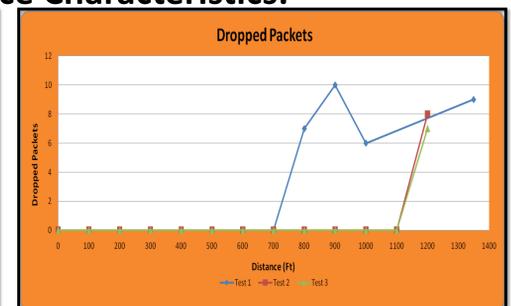
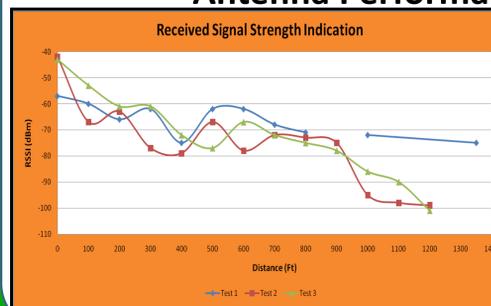


System-Level Diagram

## PROJECT RESULTS:



### Antenna Performance Characteristics:



## ACCOMPLISHMENTS:

- Successfully built the physical pole including the LED's, solar panel, cooling system and battery.
- Implemented RFID solution for vehicle tracking.
- Added an alphanumeric display per customer's request.
- Provided multi-node links wirelessly between central server and the poles.
- Designed a website which will determine lot capacity at all times.
- Identified untagged vehicles using induction sensors.
- Tailored our design to the needs of our potential first customer, UTD.

## FUTURE CONSIDERATIONS:

- Deploy a prototype for the UTD parking lot system.
- Provide a ported web App for iPhone and Android phones.
- Implement a large multi-pole parking lot array .