



## Smart Cities Workshop

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This poster will discuss the design, conduction, results, and conclusion of an experimental workshop for mid-grade high-school students, which introduced the theory, underlying technologies, and operational challenges of Smart Cities and intelligent Mobility on Demand (MOD) systems. MOD systems are transportation networks of parking stations and shared vehicles (bikes, automobiles, etc.) that allow users to make point-to-point trips on demand. In the workshop students brainstormed ideas of how to use sensors, communication networks, incentive mechanisms, and graphical user interfaces to sense inventory imbalances and persuade users to optimally relocate vehicles through price incentives. Furthermore they tested those ideas in practice by designing, prototyping, and playing an interactive board game that implements those technologies and replicates the economic principles of a dynamically priced MOD system.

The students were organized into four teams: the first team developed the electronic infrastructure of the stations from programming three microcontrollers to read data from RFID sensors to having them send messages to a central computer through the Internet, each time a player checked an RFID tag to a station. The second team developed the server program in Java (Processing) in the central computer to collect the incoming messages from the stations, turn them into prices, and visualize them as a color-coded map on the physical surface of the board game through a mounted projector from the ceiling. The third team developed the rules, designed the layout, and helped in the prototyping of the board game that was used to understand perception of payoffs and decision-making of users in the system. Finally, the fourth team developed an agent-based simulation program to explore the impact of user demand patterns on the service rate (performance) of vehicle sharing systems.

Through the synergetic collaboration of the four teams, students learn basic digital electronics, programming, data visualization, computer simulation, game theory, time-management and teambuilding skills by integrating their work on a hands-on collaborative project that stimulates their imagination while emphasizes the results of their efforts. This intensive workshop is designed for graduate level students at the MIT Media Lab and it is the second time it is being offered at secondary level education, with highly satisfactory results.

