

**Patent Law**  
Fall 2017  
Prof. Ford

**Take-Home Final Exam**

This take-home final exam is worth 75% of your course grade. It will be administered on Thursday, December 21, 2016. You have eight hours to complete the exam (or twelve hours if you have been granted an accommodation by the Registrar's Office). At the conclusion of the exam, responses must be emailed to the Registrar's Office at [registrar@law.unh.edu](mailto:registrar@law.unh.edu).

**Please do not put your name or any identifying information on your exam.** Place only your assigned exam number on the top right corner of your answers.

Please format your responses similarly to this document: **single-spaced with 1.5-inch margins and empty space between paragraphs**. Use 12-point Cambria, Century, Constantia, or Book Antiqua; do *not* use Times New Roman. Number your pages. I recommend you submit your answers as a PDF file.

You may consult **any preexisting material you wish** while completing this exam. This specifically includes online research tools like Google and Lexis, though I do not recommend relying on such tools. Answers discussing cases, doctrine, or principles that were not assigned or discussed in this course will receive no credit. **You must write your entire response, yourself, during the exam period; you may not paste any previously written material into your answers**, whether written by you or anyone else. **You may not discuss the exam with anyone while it is being administered**, including other students, attorneys, or participants on online discussion boards. Please type the following at the top of your exam:

I affirm that I have not discussed this exam with other students or anyone else during its administration.

This exam consists of **ten questions**, which are weighted equally. **There is a total word limit of 4,000 words**. This is an exceptionally generous limit that is higher than last year's; you do not need to use this many words, and concise and well-organized responses will be rewarded. **Do not include the questions in your responses. List your word count at the end of your exam.**

If any of the questions are unclear, or don't provide necessary information, state explicitly any assumptions you make and explain how your answer depends on those assumptions.

Good luck and have a wonderful winter break!

**The following scenario applies to all questions:**

In 2015, inventors at Starship Technologies OÜ, an Estonian company, filed two patent applications. (This scenario is based on real patent applications and products, but I have changed the facts for this exam. Please rely on the scenario given here, not any facts from the real world.)

The first application, filed on October 13, 2015, described and claimed a “Method and system for autonomous or semi-autonomous delivery.” The abstract described the invention as follows:

The present invention relates to a delivery method comprising providing a system comprising at least one server, at least one robot and at least one delivery terminal, the method further comprising steps of: communicating a request for at least one delivery from the at least one delivery terminal to the at least one server and/or to the at least one robot; providing instructions from the at least one server to the at least one robot about the at least one delivery, the instructions comprising information about the final delivery location; loading the at least one robot with the at least one delivery to be transported; transporting the at least one delivery in the at least one robot to the final delivery location; and providing access to the at least one delivery in the at least one robot, preferably upon arrival at the delivery location. The present invention further relates to a system comprising at least one server adapted for at least: coordinating communication within the system, receiving/storing/sending data and/or performing computations; at least one robot operating autonomously or semi-autonomously and adapted to communicate with the at least one server in order to facilitate transport of a delivery by the robot to at least one recipient; and at least one delivery terminal communicating with the at least one robot and/or the at least one server.

Starship Technologies makes a system and robot embodying the claimed inventions. The robot is shown to the right, in a photo released by Just Eat, a company that operates a food-delivery app in the United Kingdom.



The first application contained the following written description, which was unchanged during prosecution and became part of the patent's specification:

Autonomous and semi-autonomous mobile robots is a growing field of innovation. It is used for many purposes from warehouse operations to household vacuuming robots, hospital delivery robots, and military or defense applications. Often, a robot communicates with a server to exchange data related to for example robot diagnostics, task status and/or instructions. The server can be for example a cloud server and/or a collection of servers.

The present invention is specified in the claims as well as in the below description. In a first aspect, the invention provides a mobile delivery robot. The robot comprises at least one sensor, and at least one computing module adapted to at least analyze sensor data. The robot further comprises at least one communication module adapted to at least send and receive data. The robot also comprises at least one delivery compartment adapted to store at least one delivery.

In a second aspect, the invention provides a system comprising (i) at least one server that is adapted for at least coordinating communication within the system, receiving, storing data, sending data and/or performing computational analysis, (ii) at least one robot that operates autonomously or semi-autonomously and that is adapted to communicate with the server, and (iii) at least one hub that is adapted to perform at least one function selected from storage, maintenance, repair and resupply of the robot.

In a third aspect, the system comprises (i) at least one server that is adapted for at least coordinating communication within the system, receiving, storing data, sending data and/or performing computational analysis, (ii) at least one robot that operates autonomously or semi-autonomously and that is adapted to communicate with the server; (iii) at least one delivery terminal communicating with the at least one robot and/or the at least one server.

In a fourth aspect, a method making use of the system is provided. The method can make use of any features of the system listed above and below. The method comprises providing a system comprising at least one server, at least one robot and at least one delivery terminal, the method comprising steps of: (i) communicating a request for at least one delivery

from the at least one delivery terminal to the at least one server and/or to the at least one robot; (ii) providing instructions from the at least one server to the at least one robot about the at least one delivery, the instructions comprising information about the final delivery location or first delivery location; (iii) loading the at least one robot with the at least one delivery to be transported; (iv) transporting the at least one delivery in the at least one robot to the final delivery location or first delivery location; and (v) providing access to the at least one delivery in the at least one robot.

The first application contained eight claims:

1. A delivery method, comprising:  
providing a system comprising at least one server, at least one robot and at least one delivery terminal, the method comprising steps of:
  - (a) communicating a request for at least one delivery from the at least one delivery terminal to the at least one server and/or to the at least one robot;
  - (b) providing instructions from the at least one server to the at least one robot about the at least one delivery, the instructions comprising information about the final delivery location;
  - (c) loading the at least one robot with the at least one delivery to be transported;
  - (d) transporting the at least one delivery in the at least one robot to the final delivery location; and
  - (e) providing access to the at least one delivery in the at least one robot, preferably upon arrival at the delivery location.
2. The delivery method of claim 1, further comprising:  
the robot sending a request for input when faced with a hazardous and/or unexpected setting, and  
an operator terminal controlling the robot in the hazardous and/or unexpected setting.
3. The delivery method of claim 2, wherein the hazardous setting is the robot crossing a street.
4. The delivery method of claim 1, wherein the at least one delivery is stored in a compartment within the robot during delivery and wherein providing access to the at least one delivery comprises opening the compartment.

5. A system comprising:
  - (a) at least one server adapted for coordinating communication within the system;
  - (b) at least one robot operating autonomously or semi-autonomously and adapted to communicate with the at least one server in order to facilitate transport of a delivery to at least one recipient; and
  - (c) at least one delivery terminal communicating with the at least one robot and/or the at least one server.
6. The system of claim 5, further comprising an operator terminal for controlling the robot in a hazardous and/or unexpected setting.
7. The system of claim 5, wherein the robot further comprises a compartment for storing the delivery within the compartment, wherein the compartment is configured to be opened to provide access to the delivery.
8. A system comprising:
  - (a) server means for coordinating communication within the system;
  - (b) robot means for autonomous or semi-autonomous operation, transportation of a delivery to at least one recipient, and communication with the server means; and
  - (c) delivery terminal means for communicating with the server means and/or the robot means.

The patent issued on February 1, 2017, as patent no. 9,999,100 (the '100 patent) with unchanged claims.

The second application, filed on November 2, 2015, described and claimed a "Obstacle traversing mobile robot." The abstract described the invention as follows:

Disclosed is a mobile robot adapted to traverse vertical obstacles. The robot comprises a frame and at least one wheel positioned in a front section of the robot, at least two middle wheels and at least two rear wheels. The at least one middle wheel and at least one rear wheel are connected by a tilting lever that is arranged on each of the opposing sides of or to the frame, forming a pair of wheels. Each tilting lever can be turned around a lever bearing located between the respective axial centers of rotation of each pair of wheels.

This application described a way for the robot to overcome curbs and the like through the use of more than four wheels, as shown in the following photo:



The second application contained three claims:

1. A mobile robot comprising:
  - (a) a frame with at least one front wheel, at least two middle wheels and at least two rear wheels; and
  - (b) wherein at least one middle wheel and at least one rear wheel are connected by a tilting lever that is arranged on each of the opposing sides of or to the frame, forming a pair of wheels; and
  - (c) wherein each tilting lever can be turned around a lever bearing located between the axial centers of rotation of each pair of wheels.
2. The robot of claim 1, wherein the tilting lever is adapted to rotate freely until a certain angle is reached.
3. The robot of claim 1, further comprising a sensor adapted to sense the absolute and/or relative angular position of the tilting lever.

The patent issued on April 1, 2017, as patent no. 9,999,200 (the '200 patent) with three claims (changes from the original application indicated):

1. A mobile robot comprising:
  - (a) a frame with at least one front wheel, at least two middle wheels and at least two rear wheels; and
  - (b) wherein at least one middle wheel and at least one rear wheel are connected by a tilting lever that is arranged on each of the opposing sides of or to the frame, forming a pair of wheels; and
  - (c) wherein each tilting lever can be turned around a lever bearing located between the axial centers of rotation of each pair of wheels.
2. The robot of claim 1, wherein the tilting lever is adapted to rotate freely until a ~~certain~~ predetermined angle is reached.
3. The robot of claim 1, further comprising a sensor adapted to sense the absolute and/or relative angular position of the tilting lever, said sensor being one or more of a potentiometer, an optical sensor, a magnetic sensor, and a visual camera system.

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### **Question 1**

Starship Technologies' general counsel is worried that some claims of the '100 patent are invalid under 35 U.S.C. § 112 for failure to satisfy the definiteness requirement. Assess this risk for claim 8.

### **Question 2**

Starship Technologies' general counsel is also worried that the '200 patent might be invalid under 35 U.S.C. § 102, based on the following facts:

- ▶ In August and September 2014, Starship Technologies engineers tested prototype robots embodying the claims of the '100 invention at their offices in Estonia. In that testing, an engineer would place a paper take-out bag, holding a rock but no food, in the robot in a Starship Technologies office; the robot would then navigate to a different Starship Technologies office in a nearby building. An employee would follow alongside the robot to monitor its progress. Many of the trips ended in failure when the robot encountered obstacles or drove itself into a corner. The buildings are in an office park with offices for various companies. In this time, the robot could be seen by members of the public, though few paid attention.
- ▶ On October 15 and 16, 2014, a film crew from CNN, a cable news channel, filmed footage of the robot in action. They also conducted interviews of Starship Technologies engineers.
- ▶ From November 7 to 13, 2014, the CNN story aired on a variety of CNN networks. It showed the robot from a variety of angles, including footage of it climbing over various obstacles. It also described several specific features of how the robot worked.
- ▶ On November 15, 2014, an engineer at a competing robotics company, RoBoCo, sent a memo to RoBoCo executives summarizing the CNN report and describing all the features of the claimed invention, inferring the details from the CNN footage.

Assess the risk that the '200 patent will be held invalid in view of these facts.

### **Question 3**

Starship Technologies' general counsel is also worried about the legal effects of the amendments to claims 2 and 3 of the '200 patent. Assess the likely effects of those amendments under 35 U.S.C. § 112 and § 271.



#### Question 4

Amazon.com, a popular online retailer, is developing flying delivery drones, which it hopes will deliver packages without relying on delivery services like UPS and Fedex. A prototype Amazon delivery drone is shown below:



The prototype contains eight helicopter-like propellers which allow the drone to fly, along with a compartment (the brown box on the bottom) to hold the item being delivered. Amazon is testing the prototype drones.

In Amazon's system, when a customer places an order, an algorithm decides which delivery method to use for that package, considering the package size and weight, the delivery address, how busy various delivery services are, how important the customer is to Amazon, and various other factors. If the algorithm selects drone delivery, the item is routed to a special drone staging area of an Amazon warehouse. (For now, only single-item orders are delivered by drone, and only in the greater Seattle area, with every component located in, and step occurring in, the United States.)

In the staging area, an employee scans the item's bar code with a mobile bar-code scanner, loads the item into a drone's compartment, and scans the drone's bar code. A server receives the bar-code scans and sends the relevant drone delivery instructions — the delivery address, routing information, and so forth. The drone and server, communicating via cellular connection, keep each other constantly updated while the drone flies to the delivery location. For the final few feet of delivery, an Amazon operator in Nevada, using a camera mounted on the drone, positions the drone in front of the recipient's front door and tells the drone to drop the item by the front door before the drone flies away.

Does this delivery method infringe claim 1 or 2 of the '100 patent? Explain.

### Question 5

Amazon is based in Seattle but operates in several countries and plans to roll out drone delivery to several of them. After the Seattle trial is successful, it expands the trial to Vancouver, British Columbia, Canada.

When a Vancouver customer orders an item and the algorithm decides to deliver it via drone, the delivery proceeds as described in question 4, with each component of the system located in Canada and each step taking place in Canada, with two exceptions. First, the server communicating with the drone is located in Seattle. Second, the operator controlling the final steps of delivery is located in Nevada.

Does this delivery system infringe claim 5 or 6 of the '100 patent? Explain.

### Question 6

Starship Technologies' general counsel sends Amazon's general counsel a letter advising Amazon of the '100 and '200 patents and offering to enter into licensing negotiations. After receiving the letter, Amazon directs its outside counsel to investigate the validity of the '100 and '200 patents. Amazon's counsel identifies several relevant references, including an experimental remote-controlled robot with six wheels, shown below:



In the experimental robot, pairs of wheels are connected with tank-style treads, and two of the wheels are on arms that can pivot to overcome obstacles. The robot was developed by a graduate student at the University of Arizona in 2009 and described in her master's thesis, *Obstacle-Mounting Mobile Robot*. The thesis is stored in the University library and published in various searchable online databases. You can also see the robot in action in a YouTube video, posted in 2009, here: <https://www.youtube.com/watch?v=AOXGxFy4GGw>.

Amazon believes that the robot, and/or the video, is invalidating prior art under 35 U.S.C. § 102. Assess this defense for claims 1 and 3 of the '200 patent.

### Question 7

Amazon's counsel also identifies several references that may be relevant to an obviousness analysis, including the following references:

- ▶ An autonomous vacuum cleaner robot with built-in compartment for dirt, the movement of which is controlled wirelessly by a base station that also charges the vacuum and can automatically unload the dirt compartment, sold in department stores throughout Germany in 2008.
- ▶ The UPS MyChoice program, offered by package delivery company UPS, which lets recipients see which packages are en route and reschedule their delivery if the anticipated delivery time does not work, and which was introduced in 2012.
- ▶ The TacoCopter website, <http://tacocopter.com/>, which was released in 2012 as a joke mocking Silicon Valley and describes a nonexistent drone-based taco delivery service.

Are these references relevant prior art for purposes of 35 U.S.C. § 103, with respect to the '100 patent? Explain.

### Question 8

Starship Technologies sells its system to companies like Postmates, GrubHub, and DoorDash, which operate food-ordering apps and act as intermediaries between customers and restaurants that don't want to hire their own delivery drivers. A customer using the DoorDash app, for instance, can order food from a restaurant that has agreed to use DoorDash; DoorDash then sends the order to the restaurant, picks up the food, and delivers it to the customer.

DoorDash's contract with Starship Technologies includes the following language:

Starship Technologies agrees to provide an initial order of 20 Delivery Robots and, at DoorDash's option, up to 100 additional Delivery Robots in the two-year period beginning with this agreement's execution. Starship Technologies further agrees to provide an initial order of 10 handheld Order Fulfillment Devices and to provide Server Software suitable for operating the Starship Technologies system. DoorDash agrees to provide server hardware suitable for running the Server Software. Starship Technologies agrees to maintain and update the Server Software. DoorDash agrees that it will not modify, disassemble, hack, replace, or otherwise compromise the security of the Server Software.

DoorDash runs the Starship Technologies system for three months, to enthusiastic customer response. DoorDash finds that customers who receive an order delivered by a robot are more likely to order in the future; it also finds that it saves money on delivery costs for those deliveries. But it also finds that as the order volume increases, the server becomes unresponsive and crashes.

DoorDash, looking for a way to continue using the Starship Technologies robots, finds that the problem lies in Starship Technologies' server software. A team of DoorDash engineers, working round the clock for two weeks, builds its own server software to replace the Starship Technologies software. It works great, and DoorDash exercises its option to purchase 100 additional Starship Technologies robots.

Starship Technologies later finds out about DoorDash's server software and sues DoorDash for patent infringement. Does DoorDash infringe claim 1 of the '100 patent? Explain.

### Question 9

Fed up with Starship Technologies, DoorDash switches to a competing food-delivery robot sold by a startup called Marble Inc. The Marble delivery robot (which is much less cute than Starship Technologies') is shown below:



Marble provides DoorDash with robots and a server to manage the robots. Marble does not make a terminal device for restaurant use; instead, it provides a custom app that DoorDash can load on iPads at each restaurant.

Starship Technologies sends Marble a letter informing Marble of its patent rights and, when Marble continues selling its system, sues Marble for patent infringement. Does Marble infringe claim 1 of the '100 patent under 35 U.S.C. § 271(b) or (c)? Explain.

**Question 10**

Assume, regardless of your response to question 9, that Starship Technologies is successful in its infringement suit against Marble. Starship Technologies seeks lost-profit damages and a permanent injunction barring Marble from selling its system.

What is Starship Technologies' best arguments *in favor of* an award of lost profits and a permanent injunction? How likely are those arguments to succeed? If there is information you do not have that would be useful for your analysis, explain what that information is and how it would affect your analysis.

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