

# IROS 2011

2011 IEEE/RSJ International Conference on  
Intelligent Robots and Systems

September 25-30, 2011  
San Francisco, California

## General Information



Room	Golden Gate	Continental 1	Continental 2	Continental 3	Continental 4	Continental 5	Continental 6	Continental 7	Continental 8	Continental 9
14:00-15:30		Microsensing	Localization	Audition	Telerobotics	Bio-inspired	Field robotics	Wheeled robots	Learning policies	Novel actuators
15:30-16:00					Coffee break					
16:00-17:30	Interactive I	Micromanipulation	Localization	Audition	Demonstrations	Bio-inspired	Field robotics	Teleoperation	Learning for control	Novel actuators
17:30-18:30					Break					
18:30-20:00					Welcome reception, Continental Ballroom					

## Monday, September 26

## Tuesday, September 27

8:00-9:30	Interactive II	Object recognition	SLAM	Microrobotics	Platforms Forum	Medical robotics	Grasping	Software	Bio-inspired	Exploration
9:30-10:00					Coffee break					
10:00-11:30	Interactive III	Perception	SLAM	Microrobotics	Generation Forum	Medical robotics	Grasping	Contact deformation	Limbed robots	Learning
11:30-12:30					Lunch break					
12:30-13:45				Design Plenary: Shigeo Hirose, Gerd Hirzinger, and Marc Haibert. Chair: Bernlie Roth						
13:45-14:00					Coffee break					
14:00-15:30	Interactive IV	Collision avoidance	Motion estimation	Microrobotics	Horizon Forum	Medical robotics	Grasping	Actuator design	Fish-inspired	Novel sensors
15:30-16:00					Break					
16:00-22:00					Dinner cruise on the San Francisco Bay *					

## Wednesday, September 28

8:00-9:30	Interactive V	HRI	Representation	Medical robotics	Haptics	Motion planning	Aerial robotics	Walking	Networked robots	Vision
9:30-10:00					Coffee break					
10:00-11:30	Interactive VI	Assistive robots	Estimation and fusion	Surgical robotics	Haptics	Motion planning	Aerial robotics	Passive walking	Multirobot systems	Visual servoing
11:30-12:30					Lunch break					
12:30-13:45				BioRobotics Plenary: Alain Berthoz, Heinrich Bülthoff, Mandyam Srinivasan. Chair: Ruzena Bajcsy						
13:45-14:00					Coffee break					
14:00-15:30	Interactive VII	HRI	Visual tracking	Safety	Haptics	Motion planning	Marine robotics	Humanoid control	Multirobot planning	Sensor calibration
15:30-16:00					Coffee break					
16:00-17:30	Interactive VIII	HRI	Motion prediction	Haptic rendering	Medical Rob. Forum	Motion planning	Marine robotics	Gait analysis	Modular robots	Identification
17:30-18:30					Break					
18:30-23:00					Evening at the Museum with Picasso **					

## Thursday, September 29

8:00-9:30	Interactive IX	Force control	RGB-D	Kinodynamic plan.	Stochasticity	Biped locomotion	Robot vision	Joint design	Autonomous vehicles	Anthropomorphic R.
9:30-10:00					Coffee break					
10:00-11:30	Interactive X	Grasping control	Mapping	Randomized plan.	Stochasticity	Humanoids	Robot vision	Medical robots	Rescue robots	Transportation
11:30-12:30					Lunch break					
12:30-13:30					Awards Ceremony					
13:30-14:30				Self-driving Cars Plenary: Sebastian Thrun and Chris Urmson. Chair: Henrik Christensen						
14:30-14:45					Break					
14:45-16:15	Interactive XI	Manipulation	Industrial robots	Marine systems	(Self-)assembly	Humanoids	Robot vision	Exoskeleton robots	Aerial robots	Swarms and flocks
16:15-16:45					Coffee break					
16:45-17:45	Interactive XII	Climbing	Novel locomotion	Marine systems	Town Hall Meeting on Conferences.	Moderator: Peter Corke		Medical robots	Aerial robots	Novel designs
17:45-18:30					Break					
18:30-20:00					Farewell reception, Continental Ballroom					

\* Dinner Cruise. Buses will be leaving at 16h00 from the Taylor Street entrance.

\*\* Evening at the Museum. Buses will be leaving at 18h30 from the Taylor Street entrance.

# Table of Contents

Welcome to San Francisco .....	ii
San Francisco attractions .....	iii
San Francisco Visitors Information Center .....	v
Weather .....	v
Transportation .....	vi
Useful information .....	vii
Social events update .....	viii
Hilton San Francisco Union Square .....	ix
Conference registration .....	x
Internet access .....	x
Restaurants and bars .....	x

# General Information

## Welcome to San Francisco

San Francisco, California, is a spectacular peninsula surrounded by water on three sides and grows from the inside out. This modern city has become one of America's favourites and is visually spectacular, with many world-famous steep hills offering incredible views of San Francisco Bay and the breathtaking Golden Gate Bridge, which opened in 1937 and immediately became the longest suspension bridge in the world.

The Pacific Ocean forms the westerly boundary of the peninsula, while San Francisco Bay lies directly to the east. In total there are three main districts – downtown (between the bay, Market Street and Van Ness Avenue), South of the Market District (SoMa) and the westerly side of the city, which is mainly residential and incorporates Pacific Heights, Richmond, the Golden Gate Park and the Marina area. For everything in the way of tourism, pay a visit to the highly regarded **San Francisco Visitors Information Center**, which is located within the Hallidie Plaza on the corner of Market Street and Powell Street.

San Francisco is regularly classed as one of the top tourist destinations in the world and it is easy to see why. With top attractions such as Alcatraz Island – the 'Rock in the Bay' which was once the most notorious prison in existence, housing some of America's most dangerous offenders; Pier 39 on Fisherman's Wharf – a lively bay area with numerous shops, arcades, seafood restaurants, cafés, fairground rides, ocean views and its own colony of sea lions; Lombard Street – probably the world's most bendy street; and of course the famous San Francisco cable cars, which provide cheap and easy access to the whole city and its many steep hills.

There are also some great museums here, boasting a wealth of information about the city itself and exhibiting many interesting collections, such as the Museum of the City of San Francisco – established in 1991 and telling the interesting story of the city's history, and the unusual Fortune Cookie Museum – a small fortune cookie factory producing over 20,000 fortune cookies a day in the city, where fortune cookies were actually invented. San Francisco can also boast numerous excellent art galleries, shopping districts and restaurants. In fact, when it comes to food there are almost 4,500 different restaurants, cafés and bars in this part of California, which has become nothing short of the nation's trendsetter when it comes to food.

Another major San Francisco tourist attraction is the Hakone Japanese Tea Garden, situated in the vast Golden Gate Park. These traditional Japanese gardens provide the most tranquil place in the whole of the city and cover around two hectares / five acres. With koi carp ponds, pagodas, drum bridges and a Japanese Tea Room, these exquisite landscaped gardens are well worth a visit.

The local climate is generally mild and very sunny, in spite of the famous morning fog. The city is without question a lively and friendly Californian destination, with some highly developed areas, including tall skyscrapers, and contrasting, more traditional districts, such as Chinatown – home to one of the largest Chinese communities outside of Asia. The cosmopolitan city of San Francisco is diverse, open minded, exciting and most of all, enjoyable.

## **San Francisco Attractions**

Tours can be booked and organized through the tour desk located at the Lobby level of the Hilton hotel.

- **Fisherman's Wharf**

The ultimate tourist's dream – a myriad of souvenir shops, restaurants, and sea lions all in one centralized area. Visit Pier 39, the Cannery and Ghirardelli Square for all your shopping indulgences. Street entertainers will amuse you amidst the spectacular backdrop of San Francisco Bay.

- **Cable Cars**

Ride the legendary cable cars for breathtaking views and a first-hand experience of the streets of San Francisco. Purchase one-way tickets at the cable car terminals, police/information booths or on board the car itself. For unlimited all-day access invest in an \$14 Muni pass good for rides on the cable car lines, buses and streetcars.

- **Alcatraz Island**

Over 14 million people have visited Alcatraz for a glimpse of life in the prison known as "the Rock." Take a ten-minute boat ride to the infamous maximum-security prison where criminals such as Al Capone, "Machine Gun" Kelly, and Robert "The Birdman" Stroud were kept isolated from the public.

- **Golden Gate Bridge**

A San Francisco icon and a sightseer's must see. The Golden Gate Bridge is one of the world's most beautiful and most photographed bridges. There's only one way to experience it – put on some comfortable shoes and take the hour roundtrip walk across or rent a bike to and also explore the high-society neighborhoods of Sausalito/Tiburon!

- **Golden Gate Park**

Golden Gate Park is the largest urban park in San Francisco. At 1017 acres, it is in the shape of a long rectangle, similar in shape but 174 acres larger than New York's Central Park. A narrow strip, known as The Panhandle, extends from the eastern end of the park. The park was planned in the 1860s and built in the 1870s on land that was

thought to be uninhabitable. The park contains several San Francisco landmarks, including the de Young Museum and the Conservatory of Flowers

- **Chinatown**

Enter the world of the Far East while staying in San Francisco. Just steps away from Union Square you can meander through a bustling neighborhood filled with Chinese temples, exotic herb shops, Asian restaurants, fish markets, bookstores, produce markets, and bakeries. Buy fortune cookies or have your palm read along the way!

- **San Francisco Museum of Modern Art**

SFMOMA opened in 1935 as the first museum on the West Coast devoted solely to 20th century art. Open daily (except Wednesdays) from 11:00 am to 6:00 pm. Shop for posters, books, and apparel in the Museum Store and support the exhibitions and programs the museum offers.

- **Union Square**

In the epicenter of downtown San Francisco you will find a 2.6 acre manicured park serving as a haven for both people-watching and world class shopping. Enjoy the finest names in fashion, dining, and theatre, or enjoy a cup of coffee and simply watch the world go by.

- **Ferry Building**

Not only is the Ferry Building the gateway to San Francisco's Financial District, it is also a jumping off point to many local destinations -- many within walking distance, others accessed by the famous cable cars that run through the streets of San Francisco. With the recent renovation of the Ferry Building and the Ferry Building Marketplace, there's a lot to do at this dynamic locale. The new Marketplace has shopping, dining, a year-round farmer's market (Sat., Sun., Tues. and Thurs.), plus free tours of the Ferry Building on Saturdays, Sundays and Tuesdays at noon.

- **Pier 39**

Among the City's most visited attractions, Pier 39's entertainment options include V -- The Ultimate Variety Show; Turbo Ride; Blue & Gold Fleet Bay cruises; and Alcatraz Island Tours; Riptide Arcade and Studio 39. As many as 800 sea lions now reside on the pier's "K" dock.

## San Francisco Visitors Information Center

The San Francisco Visitors Information Center is located on the lower level of Hallidie Plaza, next to the cable car turntable at Powell and Market streets.

900 Market Street,  
San Francisco, CA 94102

TEL: +1 800 637 5196

URL: <http://www.sanfrancisco.travel>

### Hours

9:00 to 17:00 – Monday through Friday

9:00 to 15:00 – Weekends and Holidays

### Weather

Because of its sharp topography and maritime influences, San Francisco exhibits a multitude of distinct microclimates. The high hills in the geographic center of the city are responsible for a 20% variance in annual rainfall between different parts of the city. They also protect neighborhoods directly to their east from the foggy and sometimes very cold and windy conditions experienced in the Sunset District; for those who live on the eastern side of the city, San Francisco is sunnier, with an average of 260 clear days, and only 105 cloudy days per year.

Temperatures exceed 75 °F (24 °C) on average only 28 days a year. The dry period of May to October is mild to warm, with average high temperatures of 64–71 °F (18–22 °C) and lows of 51–56 °F (11–13 °C). The rainy period of November to April is slightly cooler with high temperatures of 58–64 °F (14–18 °C) and lows of 46–51 °F (8–11 °C). On average, there are 67 rainy days a year, and annual precipitation averages 20.4 inches (518.16 mm).

Climate data for San Francisco (downtown)													
Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Record high °F (°C)	79 (26.1)	81 (27.2)	99 (37.2)	100 (37.8)	101 (38.3)	103 (39.4)	103 (39.4)	102 (38.9)	102 (38.9)	102 (38.9)	86 (30)	76 (24.4)	103 (39.4)
Average high °F (°C)	58.1 (14.5)	61.4 (16.33)	62.5 (16.94)	64.5 (18.06)	65.4 (18.56)	67.7 (19.83)	68.2 (20.11)	69.2 (20.67)	71.3 (21.83)	70.4 (21.33)	64.1 (17.83)	58.6 (14.78)	65.1 (18.39)
Average low °F (°C)	46.4 (8)	48.5 (9.17)	49.2 (9.56)	50.1 (10.06)	51.4 (10.78)	53.2 (11.78)	54.4 (12.44)	55.6 (13.11)	56.1 (13.39)	54.6 (12.56)	50.8 (10.44)	46.7 (8.17)	51.4 (10.78)
Record low °F (°C)	27 (-2.8)	31 (-0.6)	35 (1.7)	40 (4.4)	43 (6.1)	46 (7.8)	47 (8.3)	48 (8.9)	48 (8.9)	43 (6.1)	38 (3.3)	27 (-2.8)	27 (-2.8)
Rainfall inches (mm)	4.72 (119.9)	4.15 (105.4)	3.40 (86.4)	1.25 (31.8)	.54 (13.7)	.13 (3.3)	.04 (1)	.09 (2.3)	.28 (7.1)	1.19 (30.2)	3.31 (84.1)	3.18 (80.8)	22.28 (565.9)
Avg. rainy days (≥ 0.01 in)	11.4	10.8	11.2	6.2	3.3	1.4	.4	.9	2.1	4.1	8.7	9.6	70.1
Sunshine hours	185.9	207.7	269.1	309.3	325.1	311.4	313.3	287.4	271.4	247.1	173.4	160.6	3,061.7





## Useful Information

- **Electricity and Electrical Sockets**

Electrical plugs in the United States have two flat pins. If you are traveling from outside the country you will probably need an adaptor to connect your electronics. The standard voltage in the United States is 110 V (60 Hz).

- **Time Difference**

The official time in San Francisco is 8 hours behind Greenwich (in summer GMT-7). In comparison, San Francisco is 3 hours behind New York, 8 behind London and 9 hours ahead of Hong Kong.

- **Business Hours**

The business hours for stores in San Francisco are generally from Monday to Saturday and from 9:30 or 10:00 a.m. to 6:00 or 7:00 p.m. Some stores in tourist areas like Fisherman's Wharf, Chinatown and North Beach stay open until midnight.

- **Currency in the United States**

The official currency of the United States is the U.S. dollar (\$, USD, US\$).

- **Credit Cards**

Most major credit and debit cards are accepted throughout the USA, including American Express, Diners Club, MasterCard and Visa. Visitors are advised to carry at least one major credit card, as it is common to request prepayment or a credit card imprint for hotel rooms and car hire, even when final payment is not by credit card.

- **Tipping**

Unlike many countries, service is usually not included in the bill with the exception of large parties (typically six or more people). If you're with a large party, be sure to check your bill just in case. 15%-20% is often automatically charged for a large party (six or more). If the tip is included, the breakdown of the bill will read "gratuity", which means that a tip is already included.

- **Smoking**

Smoking throughout California is banned from all public indoor spaces. This includes bars, restaurants and offices. In such places you are more likely to find a magical talking unicorn than an ashtray. It is also banned outside from within 20 feet of an entrance to a business.

## Social Events Update

- **Welcome Reception**

A welcome reception will be offered to all IROS 2011 participants on **Monday, September 26, 18:30-20:00**. Half an hour after the end of the sessions, we will meet in the **Continental Ballrooms** for light drinks and snacks.

- **GOLD Lunch**

On **Tuesday, September 27, at 11:30**, a lunch for all Graduates of the Last Decade (GOLD) will be organized at **Jasper's Corner Tap** (right across the street of the conference venue). This luncheon was initiated within the RAS Technical Activities Board as a mean to let graduates be aware of what the society has to offer and to network with each other. The opportunity is also used to present the structure of the society and introduce the various Technical Committees forming TAB. Free buffet lunch will be available on a first-come, first-served basis. RAS members will be prioritized. Not a member yet? Sign up now at [www.ieee-ras.org](http://www.ieee-ras.org)!

- **Dinner Cruise on the Bay**

San Francisco's skyline is most spectacular when seen from the water. On **Tuesday, September 27**, we will take you on an afternoon and dinner cruise on the San Francisco Belle, a beautiful three-leveled 292-foot sternwheeler with a unique Art Nouveau style. During the cruise, you will have ample opportunities to enjoy the views of the City and many of its most famous sights, such as Alcatraz, Angel Island, the Embarcadero, Fisherman's Wharf, Coit Tower, the skyscrapers of the Financial District, and – of course – the Golden Gate Bridge. Busses will leave at the **Taylor Street entrance** of the Hilton hotel at **16:00**, and we expect to be back at the hotel at 22:00.

- **Lunch with Leaders**

This event is organized by the IEEE Robotics and Automation Society (RAS) and will take place on **Wednesday, September 28, at 11:30** at **Jasper's Corner Tap**. Lunch with Leaders (LwL) was initiated by the Student Activities Committee with the aim to provide students with an opportunity to get in contact with leaders and get advice and mentoring on their career and research. RAS members will have first priority.

- **Evening at the Museum with Picasso**

This year, we have discovered a very special venue for the conference banquet. It will be held on the evening of **Wednesday, September 28**, in the de Young Museum. The museum is situated in Golden Gate Park, which extends all the way to Ocean Beach, and which features many other attractions such as the Japanese Tea Garden, the Botanical Garden, and the California Academy of Sciences, to name but a few. As a special highlight, we will have exclusive access to the Picasso Exhibition. Transfer busses will leave at the **Taylor Street entrance** of the Hilton hotel at **18:30**, and we expect to be back at the hotel at 23:00.

- **Awards Ceremony**

All IROS 2011 participants are invited to attend the Awards Lunch, on **Thursday, September 29, at 12:30**. All conference participants are welcome to join while the eight IROS 2011 Conference Awards will be presented in the **Continental Ballroom**.

- **Farewell Reception**

At the end of the conference, a reception will gather all IROS 2011 participants on **Thursday, September 29, 18:30-20:00**. Light food and drinks will be served in the **Continental Ballroom**.

### Hilton San Francisco Union Square

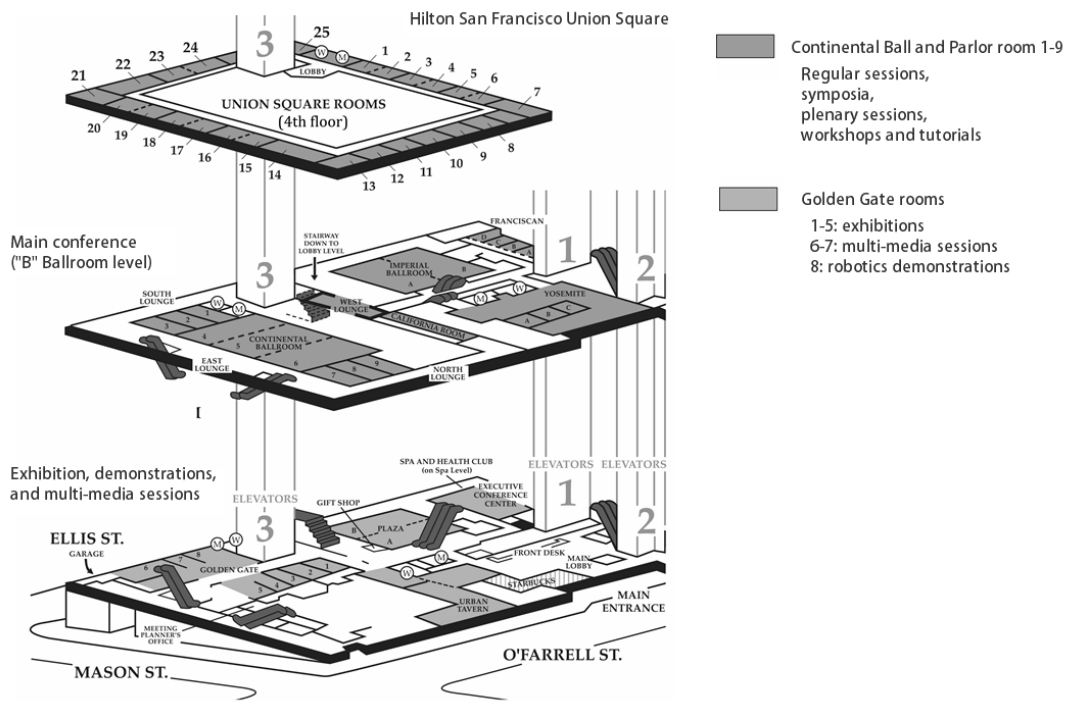
Hilton San Francisco Union Square is located several blocks south-west of Union Square in the heart of San Francisco, California. The complex is currently the West Coast's largest hotel with 1,908 hotel rooms, and is one of the tallest structures representing the Brutalist architecture.

333 O'Farrell Street, San Francisco, California, 94102

Tel +1 415 771 1400

Fax +1 415 771 6807

Web <http://www.hiltonsanfranciscohotel.com>



## Conference Registration

A conference registration desk will be setup and opened in front of the **Continental Ballroom** at the Hilton San Francisco Union Square during the following hours:

<b>Saturday</b>	Sept. 25	17:00-19:00	<b>Wednesday</b>	Sept. 28	8:00-18:00
<b>Sunday</b>	Sept. 26	7:00-18:00	<b>Thursday</b>	Sept. 29	8:00-18:00
<b>Monday</b>	Sept. 27	7:00-18:00	<b>Friday</b>	Sept. 30	8:00-14:00
<b>Tuesday</b>	Sept. 28	8:00-16:00			

## Internet Access

**Free WiFi Internet access** will be provided at the Golden Gate Room and on the Continental Callroom levels during the entire conference period. In the lobby of the conference hotel, free WiFi Internet access is also provided. At the hotel rooms, it is provided for a fee.

## Restaurants and Bars

In the direct vicinity of the Hilton hotel, plenty of restaurants of almost all categories and many cuisines can be found. The following list contains a few suggestions:

- **Chinese, Vietnamese**

**Tian Sing**  
138 Cyril Magnin St  
(at Ofarrell St)  
+1 415 398 1338  
www.tiansing-restaurant.com  
Distance: 0.1 miles  
Price range: \$\$  
Good for groups: yes

**Kim Thanh**  
607 Geary St  
(between Jones St & Leavenworth St)  
+1 415 928 6627  
Distance: 0.2 miles  
Price range: \$\$  
Good for groups: yes

- **Thai**

**Smooth Thai**  
Parc 55 Hotel  
55 Cyril Magnin St  
+1 415 362 7456  
Distance: 0.1 miles  
Price range: \$  
Good for groups: yes

**The Old Siam Thai Restaurant**  
201 Ellis St  
(between Mason St & Taylor St)  
+ 415 885 5144  
Distance: 0.1 miles  
Price range: \$\$  
Good for groups: yes

- **Japanese**

**Hana Zen**

115 Cyril Magnin St  
(at O'Farrell St)  
+1 415 421 2101  
www.hanazenrestaurant.com  
Distance: 0.1 miles  
Price range: \$\$\$  
Good for groups: yes

**Dojima-Ann**

219 O'Farrell St  
(between Powell St & Cyril Magnin St)  
+1 415 956 0838  
Distance: 0.2 miles  
Price range: \$\$  
Good for groups: no

- **French**

**Grand Cafe**

501 Geary St  
(between Shannon St & Taylor St)  
+1 415 292 0101  
www.grandcafe-sf.com  
Distance: 0.1 miles  
Price range: \$\$\$  
Good for groups: yes

**Jeanne D'arc**

Cornell Hotel de France  
715 Bush St  
+1 415 421 3154  
www.restaurantjeannedarc.com  
Distance: 0.3 miles  
Price range: \$\$\$  
Good for groups: yes

- **Italian**

**Kuleto's Italian Restaurant**

221 Powell St  
(between O'Farrell St & Geary St)  
+1 415 397 7720  
www.kuletos.com  
Distance: 0.1 miles  
Price range: \$\$\$  
Good for groups: yes

**Fino Restaurant**

624 Post St  
(between Taylor St & Trader Vic Aly)  
+1 415 928 2080  
finoristorante.com/ Distance: 0.2 miles  
Price range: \$\$  
Good for groups: yes

- **Indian**

**Little Delhi**

83 Eddy St  
(between Cyril Magnin St & Hallidie Plz)  
+1 415 398 3173  
www.littledelhisf.com  
Distance: 0.1 miles  
Price range: \$\$  
Good for groups: yes

**Chutney**

511 Jones St  
(between O'Farrell St & Geary St)  
+1 415 931 5541  
www.chutneysf.com  
Distance: 0.2 miles  
Price range: \$  
Good for groups: yes

- **Mexican**

- **Colibri Mexican Bistro**

- 438 Geary St  
(at Mason St)  
+1 415 440 2737  
www.colibrimexicanbistro.com  
Distance: 0.1 miles  
Price range: \$\$\$  
Good for groups: yes

- **Herbert's Mexican Grill**

- 161 Powell St  
(between Ellis St & Ofarrell St)  
+1 415 362 8001  
Distance: 0.1 miles  
Price range: \$  
Good for groups: no

- **Vegetarian**

- **Golden Era Vegetarian Restaurant**

- 572 O'Farrell St  
(between Jones St & Leavenworth St)  
+1 415 673 3136  
www.goldeneravegetarian.com  
Distance: 0.1 miles  
Price range: \$\$  
Good for groups: yes

- **Millenium**

- 580 Geary St  
(between Shannon St & Jones St)  
+1 415 345 3900  
www.millenniumrestaurant.com  
Distance: 0.2 miles  
Price range: \$\$\$  
Good for groups: yes

- **Sandwiches, Cafes**

- **Taylor Street Coffee Shop**

- 375 Taylor St  
(between Ellis St & Ofarrell St)  
+1 415 567 4031  
Distance: 0.1 miles  
Price range: \$  
Good for groups: no

- **Cafe Madeleine**

- 580 Geary St  
43 O'Farrell St  
(between Grant Ave & Market St)  
+1 415 362 1713  
www.cafemadeleinesf.com  
Distance: 0.2 miles  
Price range: \$\$  
Good for groups: no

- **Bars**

- **Johnny Foley's Irish House**

- 243 O'Farrell St  
(between Cyril Magnin St & Powell St)  
+1 415 954 0777  
www.johnnyfoleys.com  
Distance: 0.1 miles  
Price range: \$\$  
Good for groups: yes

- **White Horse Tavern & Restaurant**

- Hotel Beresford  
635 Sutter St  
+1 415 673 9900  
Distance: 0.2 miles  
Price range: \$\$  
Good for groups: yes

