

| Team Number | # Team Members | Type of Robot | Main idea        | Summary   |
|-------------|----------------|---------------|------------------|---|
| 1           | 4              | Zumy          | Capture the Flag | Our project is to use four zumies to implement the Pacman game. While it is not easy to realize the maze structure, we decided to play "capture the flag" game. The four zumies will be divided into two groups and have two territories. The first goal is to get the flag and get back to its own territory successfully will win the game.   |
| 2           | 2              | Zumy          | Rescue Robot     | We are going to build a rescue unit. We will have a designated robot "explorer" in charge offinding "survivors" after earthquakes. It will tag the location of survivors and dispatch additional robots to the scene. After tagging, the explorer keeps exploring the area. The additional robots will act as the "ambulance" and arrive at the scene following the path generated by the explorer. A camera on the top (helicopter in real scenario) will help map the area.   |
| 3           | 3              | Custom        | HeistBot         | We plan to design and implement a 'Heistbot' that will be able to chase down another robot moving in an unknown manner and steal its payload. The Heistbot will have an arm that can pick up the payload once it isclose enough to the target robot.  |
| 4           | 3              | Baxter        | EMG              | Automation can help people with disabilities. Someone who cannot perform everyday tasks may be dependent on other people for simple things. Technology can increase someone's independence. For example, someone who is a paraplegic may need an attendant around the clock to provide assistance with eating, drinking, or fetching objects. A system which couldbe set in place that receives cues from the user to fetch desired objects or help the user witha specific action would help these people greatly.   |
| 5           | 4              | Baxter        | Othello          | Othello is a game played between two people on a checkerboard with blackand white pieces. Our project will be to have Baxter play Othello against a humanusing an AI program we implement. Baxter will determine the state of the boardusing visual sensors, decide whose turn it is, and use his actuators to take his ownturn.  |
| 6           | 1              | Quadrotor     | Quadrotor        | This project aims to make a quadcopter that can follow its user. Using an onboard camera, the copter will track a helmet rigged with ARTags and follow its movements. As the helmet moves, the copter will follow at a set distance   |
| 7           | 3              | Custom        | Fire fighting    | We are going to build a fire--fighting robot. This robot would use data from some type of temperature sensor (possibly an infrared camera) to identify areas of high heat, and standard cameras to identify obstacles in its path. The robot's software would identify an optimal path to some point from which the robot can conveniently fight the fire. The robot would navigate to that location, then would fire a fire extinguisher in order to put out the fire. In order to achieve these goals, we would purchase or our own drivetrain, chassis, actuators, and sensors. This project will definitely only reach the prototyping stage in the time allotted, but we feel that further iterations of this project could potentially be very useful for firefighters. |

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| 8  | 1 | Custom        | IguanaBot          | I will be converting a robot iguana skeleton into a following robot using a combination of active and passive sensing and parts from an RC car. I plan to use a platform of my own design equipped with distance sensors about the robot's face to enable collision avoidance, and pair this with cooperating IR beacons. One beacon will be affixed to the robot via servo to enable active sensing and increase the resolution of an otherwise simple sensor. The other beacon will become wearable, and enable the robot to locate me. The robot will drive via a cannibalized RC car whose controls will be hacked to drive via Raspberry Pi instructions, according to sensory input. |
| 9  | 3 | Zumy, UR5 arm | Zumy Grabber       | UR5 is an industrial robotic arm developed by Industrial Robots and is capable of picking up a 5kg load. Zumy is a small, mobile robot running ROS developed at UC Berkeley by Professor Ron Fearing's Biomimetic Millisystems Lab. The objective of our project is to use the UR5 to track a moving Zumy, calculate the rigid body transform between UR5 and Zumy, and then provide appropriate local actuation at each UR5 joint to pick up the Zumy.  |
| 10 | 3 | Zumy          | Robocup            | Our project is similar to the RoboCup idea: have mobile robots play soccer. We plan to implement the basics of offensive soccer. The mobile robots we will use are called zumys. They will zoom around on their treads, pushing a ball as they go (dribbling the soccer ball). Two zumys will work together to pass the ball back and forth, and will be aided in receiving the ball with mounted electromagnets. Ideally, they will be able to avoid stationary obstacles (the defenders) when both dribbling and passing.  |
| 11 | 2 | Custom        | ClapTrap           | This project aims to build a self-standing robot based on the inverted pendulum problem. It will accomplish balancing by using an angle sensor and a PID loop to control the two wheels of the robot.  |
| 12 | 3 | Custom        | TrashCatch         | Ever wanted to be Kobe Bryant? Ever wished that your trash can would catch your trash wherever you threw it? Well, your dreams can now become reality with TrashCatch! TrashCatch is a system designed to catch your trash as long as your aim isn't terrible. Now, you can feel the thrill of always hitting your target!   |
| 13 | 2 | Baxter        | Mailman Baxter     | Sorting mails have always been tedious and requires intensive labor. Now with Mailman Baxter, mail sorting becomes easy and fun! Want Baxter to catch a package from you? Want Baxter to sort mails to different regions by zipcode? Mailman Baxter got you covered. Even better, it will pile up packages for each region so they are ready to be delivered to you!   |
| 14 | 3 | Zumy          | Light finding Zumy | The project aims to simulate the exploration of an unknown planet. Three exploration Zumies will search for the area with the highest light intensity in order to charge their solar cells (if they had some). Once an area has been found, the Zumy who found the spot would call all the other Zumies to assemble at the brightest area to charge themselves. The Zumies navigate using Cameras as 'eyes'.   |
| 15 | 2 | Zumy          | Formation Control  | For this project, we plan to control a swarm of Zumys to move in unison while maintaining basic configurations. To achieve this multi-robot coordination, we plan to use computer vision as our sensing modality. Using the input from our computer vision, we will use ROS in collaboration with Zumy's mbed microcontroller and on-board ODROID Linux computer to ensure that the Zumys are performing the intended movement.  |

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| 16 | 3 | UR5 arm | Ping Pong        | <p>As any avid ping pong player knows, you can only train as well as your training partner can play. And when nobody is available to play with you, you have even fewer options. At best, you can fold up the table and play with a wall, but you always know exactly where the ball is going to return, and there's no competitive element. Wouldn't it be nice if there were some way to remedy this sad situation? Soon there will be! We're building a robot that can play ping pong! Use it to train your game, occupy annoying kids who keep bothering you to play with them, and even to replace your friends!</p> |
| 17 | 2 | Zumy    | Object Finding   | <p>Given a cluttered environment and a fixed overhead view, locate a QR tag which is hidden from the overhead view using the zumy view (a camera attached to the zumy), by wandering about and observing the various clutter for QR tags.</p>   |
| 18 | 3 | Zumy    | Utensil Sorting  | <p>We plan to implement a utensil sorting Zumy. The Zumy will first get a utensil dispensed from a dispenser containing knives, forks, and spoons. After determining what type of utensil it is, the Zumy will move it to the appropriate pile. After sorting the utensil, the Zumy will return to the dispenser and indicate that it is ready for the next output.</p>   |
| 19 | 3 | Zumy    | Zumy Exploration | <p>We plan to use a Zumy as a mobile robot for exploration. Because of the existence of a limited range of connection to the Zumy, it will deploy wireless connection points (Raspberry Pi boards) in order to extend the range of the existing communicating network, allowing us to control the robot remotely, outside of the range of the central Wi-Fi connection. The Zumy will also keep track of the position of the connection points to autonomously retrieve them upon a return order from the central hub.</p>  |
| 20 | 2 | Custom  | Batting          | <p>We will develop a batting robot which is able to hit a ball to a target position. There are several robots that are able to hit a ball. For example, students at CMU tried to develop a robot whose mechanism imitates human motion. Also, Univ. of Tokyo developed a batting manipulator using a high speed sensing camera to capture and hit a ball. However, they do not care about "where &amp; how to hit it a ball to target position". Therefore, in our project, we will try to control a robot arm to hit a ball to a target position.</p>  |
| 21 | 3 | Baxter  | Chess Playing    | <p>We will teach Baxter to play chess by picking up conventional, unmarked pieces on top of a normal chessboard.</p>  |