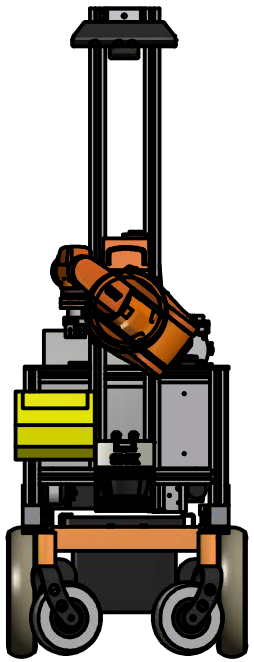
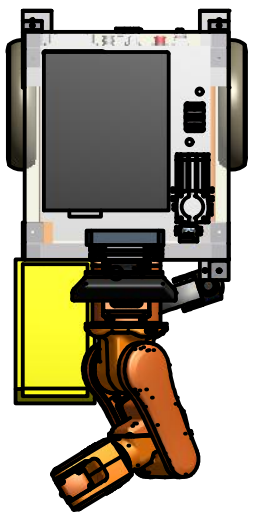
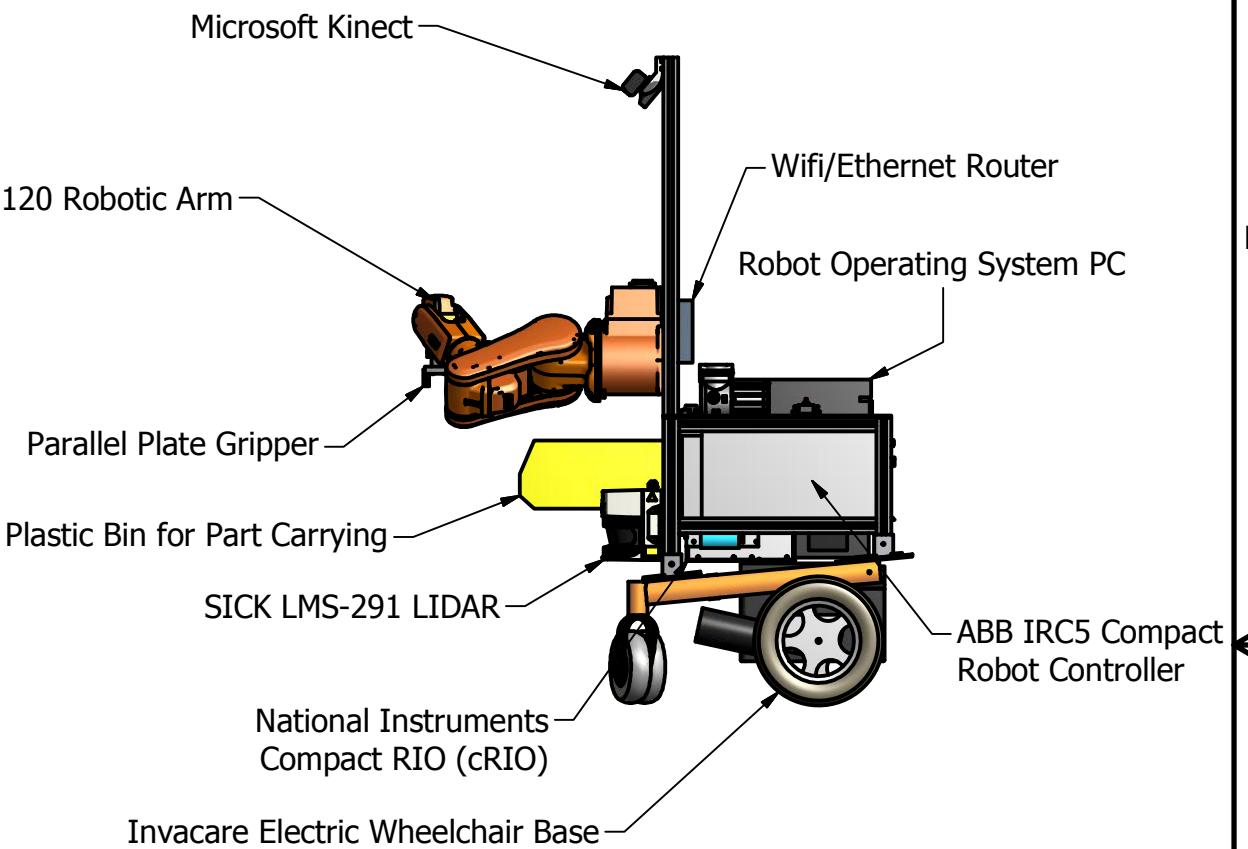






DRAWN	Edward Venator (esv1@case.edu)	08/30/13
CHECKED		
QA		
MFG		
APPROVED		

Robot Overview

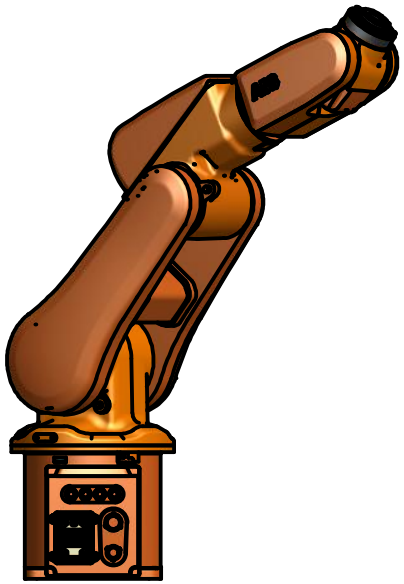
TITLE

aBBY - A Mobile Robotic Manipulator

SIZE	DWG NO	REV
A	robot	

SCALE

SHEET 1 OF 3

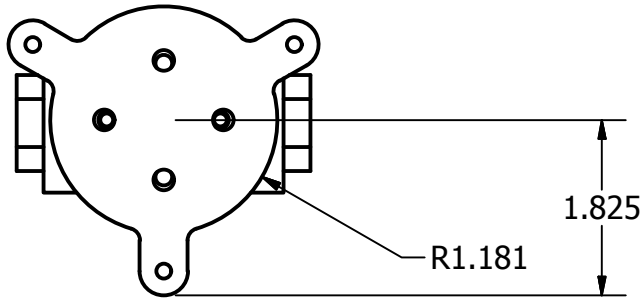


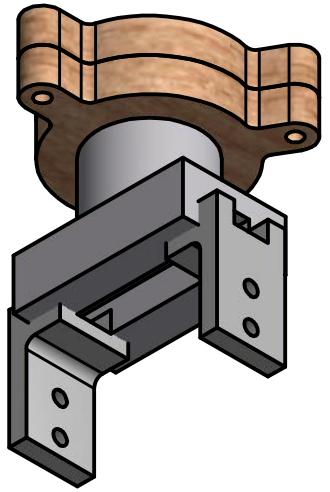
The manipulator on the robot is an ABB IRB-120 industrial robotic arm. The IRB-120 is a six-axis robotic arm with a spherical wrist. It has a tool flange that allows for the mounting of end effectors as well as pneumatic and electrical connections near the tool flange to connect sensors and actuators to the arm. The IRB-120 is ABB's smallest robotic arm, with a 580 mm reach and a payload capacity of 3 kg. The arm itself weighs 25 kg and must be mounted to the extreme front of the robot, which means its weight exerts a large moment on the robot. This was a serious consideration in the placement of the robot's center of mass. It can be mounted at any angle, and on this robot is mounted 90° (with the base mounted to a vertical surface). The decision to mount the arm vertically on the front of the robot was so that the majority of the arm's work envelope would be outside of the volume of the robot. This maximizes the functional work envelope of the arm and minimizes the possibility of the arm colliding with other parts of the robot.

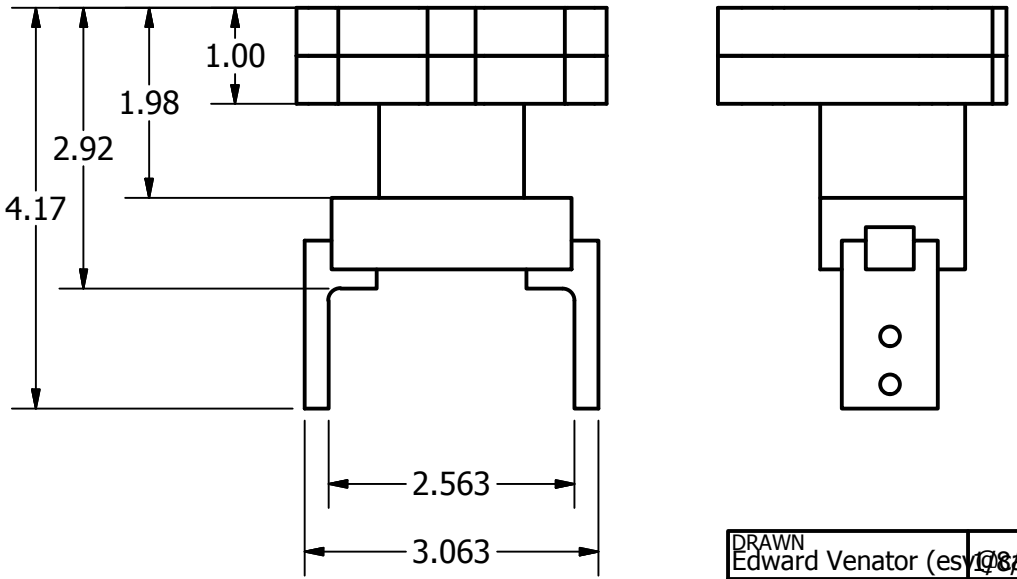
The IRB-120's joints are powered by non-back-drivable AC electric servos, with position feedback from resolvers. According to ABB, the IRB-120 is capable of position repeatability of 10 micrometers. The arm's position is controlled by an ABB IRC5 Compact robot controller, which is in turn commanded by a ROS Industrial interface.

DRAWN Edward Venator (esv1@calpoly.edu)	12/8/2013	IRB-120 Robotic Arm
CHECKED		TITLE
QA		aBBY - A Mobile Robotic Manipulator
MFG		
APPROVED		
		SIZE A / DWG NO robot / REV
		SCALE / SHEET 2 OF 3

Gripper shown in open position.
In closed position, jaws are approximately 1.75" apart.







For this project, the IRB-120 was fitted with a parallel plate gripper. Although a more dexterous gripper, such as a BarrettHand, would have been desirable, one of the goals of this project was to create this robot as cheaply as possible. This pneumatically actuated parallel plate gripper has only two positions (open and closed), and is simply and cheaply constructed from aluminum and a single double-throw pneumatic piston. The pneumatic nature of the system makes the gripper jaws back-drivable, with a constant gripping force determined by the pneumatic system's adjustable regulator. The regulator can be set to any pressure up to the system's maximum pressure of 120 PSI.

Dimensions in inches

DRAWN Edward Venator (esv1@psu.edu)	12/8/2013	Parallel Plate Gripper
CHECKED		TITLE
QA		aBBY - A Mobile Robotic Manipulator
MFG		
APPROVED		
SIZE A	DWG NO robot	REV
SCALE		SHEET 3 OF 3