We started making our bot a month ago. Firstly, we read the documentation and to understand the competition completely we went through some YouTube videos of some past runs of the competition as it is the first time the competition is happening in India.

We started off by making some 3D printed modules for our bot. We took inspirations from web and created a motor mount, steering mount, and axle on our own. But alas it was not good enough as the 3D printed bot was not big enough to fit all our components and the gears we had printed were not up to the mark we expected it to be. We then changed the model a bit made it bigger, added extra support to the gears to be able to accommodate the load of the motor. At this time, we had our first run after assembling our bot for the first time. We were using a 300rpm 6V n20 motor with a servo to just check the functioning of our bot. We found out that the motor was not fast enough for our purpose here and the 3D printed axles we printed were not smooth enough. We then thought of a brilliant idea and switched to a 600rpm 12V n20 motor and we started to use ball bearings for our bot to make the rotation smoother. At this time, we had two different modules printed. One for the back wheels and components and the other was for the steering motor and the front wheels. We had connected both using screws. But this was not still as efficient as we hoped it to be. So, we went back again to the drawing board for a new design for our cars. We then designed and 3D printed a single piece for the whole bot. Also, now we were using smaller, lock on ball bearings to reduce the weight of the bot to make it faster. This time our bot was a lot better but still not up to the mark it was not of a perfect shape as we hoped, it was not as fine due it being 3D printed and the gears which we had kept in the ratio 1:1.5 to get the maximum power without putting too much effort on the motor. But we were facing the problem that our gear’s D-shaft was getting circular after a bit of use and our bot was drifting due to it not having a differential and 3D printing a differential was very difficult and designing it was even more difficult. After a lot of head scratching, we decided to use LEGO for our chassis and use 3D printed modules to connect our off the shelf components to the LEGO components. So technically we are technically using a hybrid of LEGO and 3D printing which was working a charm for us, which made us finalize it and use it in our final bot. We used all LEGO things for our bot.

For our obstacle round we decided to the use the pixy2 camera module which is highly accurate, responsive and the best module, component our there for colour and height, width detection. pixy2 camera is being used for detecting the colour and the distance of the red and green obstacles. Using this we are commanding the servo motor and the n20 motor to make a turn and avoid the obstacle and continue completing the lap.

We decided to use the ultrasonic sensors for the first round as they are accurate and reliable and meet the requirement which we wanted whereas other sensors did not. The most important part arguably the BNO sensor which we are using as a gyro to align the bot to make it always stay in a straight line and not collide into the walls or the objects by keeping the bot moving in a straight line. It has proved to be a boon to us. All these parts come together and work in harmony making our bot quite accurate, efficient and fast. The most important part for he obstacle round is the pixy2 camera module. The

So in our final robot are learning a lot from our mistakes and prototypes we finally are using a LEGO chassis a LEGO axle which connects to the motor via 3D printed module and we are using LEGO wheels, a pixy2 camera module for the obstacle round. With that we are also using 3 ultrasonic sensors to measure the distance of the objects in front and both the sides and lastly an BNO sensor to act as a gyro and keep the bot aligned in a straight line even a after turning so it doesn’t collide with the walls.