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PROSPECTUS

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About Us

Four students from different branches during the spring of 2013 joined hands to learn about microcontrollers and the different technologies used in making of autonomous robots. Our primary purpose then was to design autonomous robots to participate in different competition held in college fests across India. It took us immense dedication and hard work especially since there was no external or professional aid involved which could better our learning process. After 2-3 months of sleepless surfing of the internet, we learnt more or less sufficient about microcontrollers and automation to design our own autonomous line follower. Our project was a successful one but there were many discrepancies in the line follower that we designed unlike the professional ones. We took no time to rejoice in glory but instead we focused quickly on other major autonomous robots competition that were being held. In no time, we successfully designed our obstacle avoider, edge avoider robot, phototrophic and photophobic robots. Our robots won competitions across India including the IURL (Indo-Us Robo League).

After that, we thought of redesigning our robots and modifying it so it can help society in different ways. We modified our existing line follower to make a solar-powered line follower which could water plants around it. We speculated that this line follower could improve the campus of our university by maintaining the environment. Unfortunately, even this robot lacked the professional accuracy and required high maintenance which rendered it useless.

After the line follower project was scraped, we planned to participate in the NSSC (National Students Space Challenge) held at IIT Kharagpur. Inspired by the problem statement, we worked to design a 5-DOF mechanical arm controlled by a remote operator which could be used by a ground station to pick and place objects in a different planet. Unfortunately, the requirements for this competition were minimal and our arm project became seemingly complex for the competition and thus we crossed all deadlines for designing the robot. The 7-DOF arm project was just halfway complete on 9th December, 2013 when there was a mechanical failure in the arm and we did not have enough funds to procure the materials needed for making amends. Since our project was incomplete, we couldn’t participate in any completion but we presented our research at BARC (Bhabha Atomic Research Centre), Mumbai. Dr. Prabir Pal and Dr. Sanjeev Sharma from BARC appreciated our project and spoke about their research on the 7-DOF Arm. I expressed my desire to collaborate my project with theirs to design a better 7-DOF. They agreed to collaborate with us in the 7-DOF arm for two months (from May-July) to design an intelligent 7-DOF Robotic Arm capable of autonomous control on condition that the final Robotic Arm will be used at BARC to transfer nuclear waste from the reactors to the treatment plant and all research must remain confidential under DAE (Department of Atomic Energy) Act Terms. The NARM team expanded when different students from 1st year contacted us in order to learn about mechatronics and different application. Our newly expanded NARM team constituting of 15 members participated in all the robotics events of ojass-14 where we won the most Innovative robot award in RoboSoccer and Kurukshetra.

Our Achievements

Our Mission

-“Design the Future”

With this motto in mind, NARM strives to design technologies which help in the betterment of life. The Research division designs many technologies which are ground breaking cornerstones in research in Mechatronics. In short, we help mankind climb the evolutionary ladder faster.

The NARM Venture operates on several levels where each level has a particular mission. The details on how each department inside the NARM Venture operates is given within the section titled the ‘Structure of the Team’.

Structure of the NARM Venture

The NARM Team functions with its well-defined structure and a proper hierarchy in everyone’s position in the team. The Core Team of NARM is the head of entire NARM and each subsequent department has a head controlling all divisions and teams under him while each team has a captain controlling his team. The main structure of the team in its hierarchical order is given below.

# The NARM Core Team

The Core team of NARM constitutes of 5 members at maximum including the Team Captain and is responsible for controlling all the departments of NARM directly under it. The NARM Venture and the NARM Team both converge in the Core team to function efficiently. The decision of the core team, headed by the Head of NARM Venture, is final and binding in all aspects of NARM.

The main functions of the core team are given below:

1. Decide on the annual budget
2. Decide on the current research focus for the R&D division
3. Decide on which competitions to participate in the year
4. Plan the entire yearly schedule for different aspects of NARM

The 5 members of the Core Team are:

1. Head of NARM Venture
2. Captain of NARM Team
3. Head of Research & Innovation Division
4. Head of Promotional Division
5. Head of Advisory Team

# Research and Innovation Division

The Research and Innovation division is the most important aspect of NARM and it is responsible for all research that takes place in the field of robotics. The Head of Research and Innovation Division decides on a particular research and divides the research among the different divisions of NARM and gives them a duration to complete their research. The different divisions in R&D and their functions are:

1. Mechanical:   
   Students interested in Mechanical Engineering can join this division. This division is responsible for designing and making the structure of any robot so that the device is strain free and is not prone to mechanical failure. Solar and other alternative energy source based robots are designed in this division. The teams in this department are:
   1. Solar Robotics:   
      The Solar Robotics conducts research on different types of solar cells (monocrystalline and polycrystalline), the miller engine circuit and other different interfaces to increase the efficiency of the solar cell. The power requirement and the size factor of a robot are given to the solar robotics team and they are required to design the entire power system of the robot powered by solar cells.
   2. Structure Designing:  
      This team designs the entire structure for the robot. The size factor, torque, strain and other mechanical factors are given to them and they design the entire structure of the robot in precisely two steps. First, they design the entire structure on a CAD Modelling software. Next, the model is analyzed for failure using an analysis software like ANSYS. A proper material is selected for the fabrication that satisfies all the mechanical requirements for the project like density, stress, etc. and the entire structure is made from the material.
2. Electronics  
   The Electronics division designs all the electronic components for the robot including the motherboard design, sensor design and wireless communication circuit and protocol design. The different teams working under the electronics division are:
   1. **Signal Processing:**This team designs all the circuitry for long-range and short-range communication between different devices