A.T.O.M (Advanced Techtronix Organization of MAIT)

Sessions & Workshops Conducted

As a society we plan to **conduct around 2 seminars every month** and **build minor projects** depending on the **backlog**. The knowledge gained from the minor projects will be used to build the major projects which we will work on parallelly. Till now we have conducted several technical sessions on various topics alongwith 2 orientations.

Introduction to ROS session:

- This was one of the first sessions we conducted in our society in the month of November by our admins Jasmeet Singh & Naman Malik.
- We covered the basics of ROS (Robot Operating System) & simulation based robotics.
- Many terminologies related to ROS were discussed which helped all the students understand the ROS architecture and project structure. While it was completely beginner friendly, this session was designed with an aim to aid newcomers who were working on the selection task as well.
- Overall around 20-30 people attended the session in online mode on our discord server and we received good feedback.

Getting Started with GIT session:

- For the month of **December**, we conducted a seminar on Introduction to Git & how to use it conducted by Manav Sethi.
- Git is version control software that allows people to work together collaboratively and even remotely. Understanding Git is an essential skill that every engineer needs.
- The explanation & theory of the session was followed by a practical hands on demo of using git with a demo project repository.

Getting Started with CAD & 3D Printing:

- This session was conducted in the month of February by Naman Malik, Jasmeet Singh & Manav Sethi.
- The session covered all the theory regarding the use of CAD (Computer Aided Design), Additive/Subtractive Manufacturing, 3D printing & its types.
- The theory was followed by a hands-on Part Designing workshop led by Naman Malik for designing a case for an Arduino Uno development board.
- The session was attended by around 20-30 students in offline mode and received great feedback.

Linux Install Fest & Intro to Linux session:

- This is an informal meetup followed by a formal session.
- The install fest, as it sounds, is like a fest where people from different branches are free to gather around and jam together while installing and customising their laptops with Linux (specifically Ubuntu).

- The install fest was followed by a session on Introduction to Linux and command line by Jasmeet Singh which is yet another essential skill for an engineer.

Ongoing Projects

The society is currently working on 2 minor projects **:**

- **Curve Tracer Algorithm**
  - This is a simulation based project of a robot that uses a PID Controller to follow a set of waypoints.
  - With this project we aim to have a mobile robot follow a custom path which will be input from an image.
  - We use computer vision to implement Contour Detection and extract waypoints from an image. Therefore, this will also allow our robot to draw stuff on the ground!
- **Obstacle Avoidance Stack with Assistive teleoperation**
  - This is a project to develop a custom obstacle avoidance algorithm inspired from the bug algorithms.
  - We aim to use this obstacle avoidance stack for assistive teleoperation of mobile robots.

These projects are based on ROS and will be integrated with one of our major projects - **MR Robot (ModulaR Robot).**

Society Structure

- Founders:
  - Jasmeet Singh
  - Naman Malik
  - Manav Sethi
- As A.T.O.M aims to build a society/community, we plan to have **NO HIERARCHY**. There will be a group of **'ADMINS'** who will be the main decision makers & representatives of A.T.O.M. New admins will be selected through voting among the existing admins.
- The society will be mainly divided into 3 department:
  - Mechanical Design & Fabrication
  - Electronics & Embedded Systems
  - Software & Simulation

  Each society project will have a project lead from each department who will help manage the project in coordination among all members. We plan to use the same project management methodologies that are used in industries.

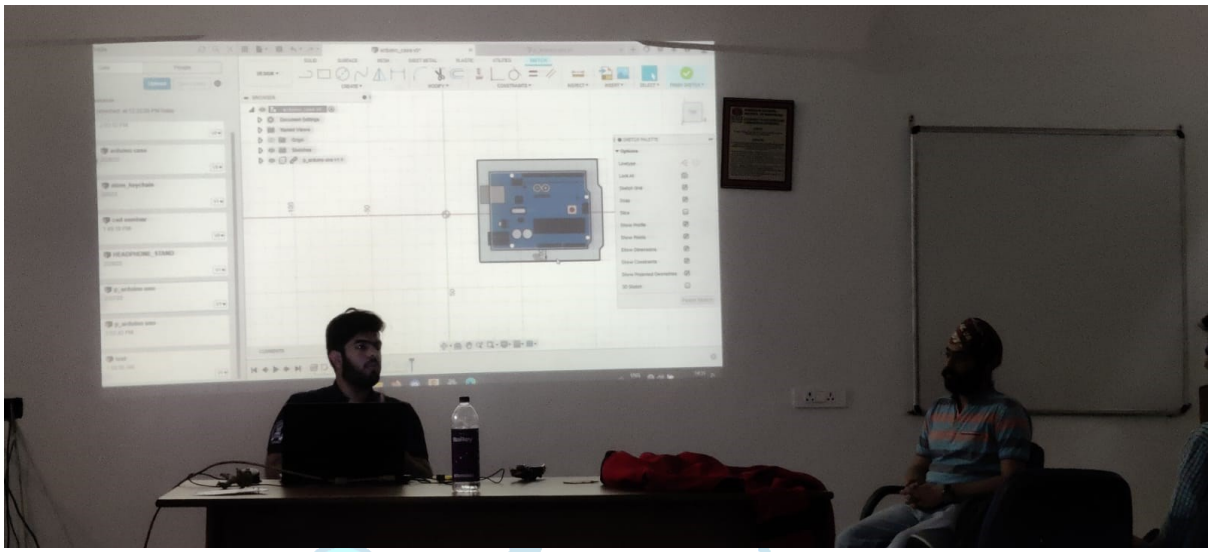
Current Society Members:

- Jasmeet Singh - Admin (ECE)
- Naman Malik - Admin (ECE)
- Manav Sethi - Admin (IT)
- Kartik Rana - Admin (MAE)
- Divyansh Sharma - Social Media Manager (ECE)
- Manan Gupta - Social Media Manager (ECE)
- Himanshu Singh Rawat - Website (ECE)
- Jayesh Chaudhary - ECE
- Arjun K Haridas - CSE
- Sahaj Arora - ECE

Links

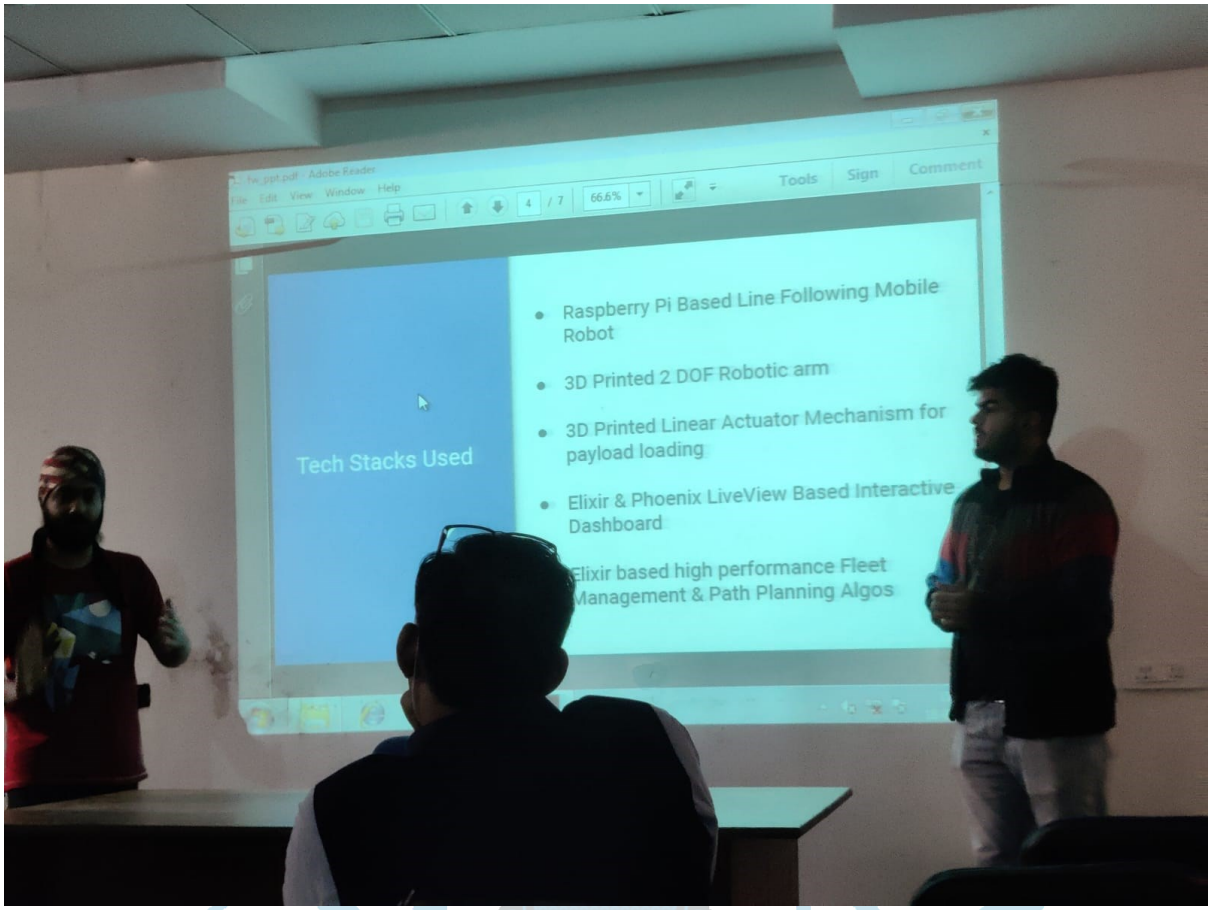
- https://github.com/atom-robotics-lab
- https://atom-robotics-lab.github.io/
- https://www.youtube.com/channel/UCMGzre9_yk8R42rBfu9gO1A
- https://www.instagram.com/a.t.o.m_robotics_lab/

A.T.O.M Orientation (February)



Intro to CAD & 3D Printing Session

Linux Install Fest



Project Showcase & Demo

A.T.O.M's Day Out in HACK-BVICAM 2022!

On **11th March 2022**, our **A.T.O.M** society **participated** in **HACK-BVICAM** distributed in **3 teams** led by 3 of our admins Naman Malik, Jasmeet Singh and Manav Sethi.
The **competition had 5 positions on the podium**, out of which **our teams bagged 3 positions!** The teams **won** a total of **15k cash prize, 3 smart phones** & many **goodies** leading to a **total prize pool of 50k!**

The **hackathon** had many **tech related themes** like **AI/ML, Future Mobility, IOT, FinTech** etc. Out of these tracks **our teams** developed **real world projects** related to **Future Mobility, IOT & Smart City tracks.**

The **team** which **bagged** the **first position** led by Naman Malik, **developed** a **hardware-based project** for **monitoring working conditions of workers in hazardous conditions like coal mines.** The project consisted of a **smart wearable device**, which could be attached to the belt buckle of the worker, **like a holster**. This piece of hardware **contained** a plethora of **sensors** like **accelerometer, smoke sensor, humidity sensor and temperature sensor.** Long range **Radio-Frequency modules** were **used** to **transfer** this **data** to a **central hub** with **internet connectivity.** This **data** was then **visualised** on a **Grafana Dashboard**, where an admin could monitor sensory data for each worker. All the sensors could be used to **detect emergency** conditions like **fall detection**, **gas leak** etc. The **team** which **bagged** the **second position** led by Manav Sethi, developed a **hardware-based project** for a holistic **traffic management system**. The project had **multiple IR sensors embedded** on the **road** to **determine** the **density of traffic waiting** on a particular signal and **accordingly control** the **traffic lights.** Apart from this the **red-light sensors** also **had** a **RFID receive**r which **detected** a **passing emergency vehicle** such as an **ambulance** and **appropriately changed** the **traffic lights.**

The **third team** led by Jasmeet Singh, **received** the **runner's up position.** Their project was based on **making a smart parking system** that **allows** you to **book parking spots in public spaces** just **like** you **book seats for a movie show.** The project **used Computer Vision** on live **video stream** from **CCTV** cameras using **OpenCV** to **detect empty parking spots** and accordingly **update** a **Django based web interface**. The web interface **allowed** the **user** to **book** a **spot** which was then **blocked by** a **barrier** in **real time**. All this was **demonstrated** to the judges using the **Gazebo Simulator** and **ROS (Robot Operating System).**

All in all, the **hackathon** was a **great learning** and **bonding experience** for the whole **society**. We met & **interacted** with **many people** with different **backgrounds** and **ideas**. It was great to attend an **offline event after** a **long period** of isolation due to the COVID19 pandemic!