Becoming a Successful FRC Rookie

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Starting a Team

There are a lot of things to think about when starting a team, but there are several that are crucial to the team's success. Top 3 in my opinion are members, mentors, and sponsorship, but there are more that I will talk about.

The reason those 3 are the most important is that FRC is expensive. Time wise and money wise. I am not trying to scare you but be aware that to be successful in the first year it is important to have a good core membership of the team and to have a good sponsorship backing.

Here are some suggestions on how to go about each of these:

Members

Because FRC is a time limited competition (you only get 6 weeks to build your robot) having a solid base of students is extremely important. The FRC robot is big and there are a lot of things besides the robot that are important for a team. As a minimum I would say 10 dedicated students are required for a successful team. Not to say it cannot be done with less. I will mention this again in the Competition section but for the building perspective there are 3 major groups/tasks that take a lot of time from week 1 to week 6 when building a robot: Mechanical (can be split up into sub-teams like drivetrain, manipulator, etc), Electrical, Programming. Here are the distributions for the minimum:

	Mechanical	Electrical	Programming	CAD*	Total
Students	4	3	2	1	10
Mentors	1	1	1	1	4

The above numbers are not set in stone, especially for the mentors. Depending on the dedication of the mentors one mentor could do everything but it is suggested to distribute the work between at least 2 mentors.

Initially the more members you can get the better. This will help with work load during the build season. Adding to each of the teams proportionally will help students get their HW done and will help the students stay fresh throughout the

build season. In the first year when the team is just starting having too many dedicated team members will not be an issue but it is good to delineate roles ahead of the build season.

Sponsorship

FRC is expensive! But as a rookie you are open to a lot of special grants from companies and organizations aimed at helping rookies succeed in FRC. Some of these organizations are usfirst.org who provide rookie grants, FIRST in Texas, NASA, and others. These grants are focused on providing payment for registration for the first event. The registration fee is 5,000 but also includes a kit of parts which has almost everything needed to build a basic robot able to play the game.

Rookie grants are just one of the many ways to get sponsorship for the team. It is good to apply for as many as possible and assume you will get 25 % of what you are going to apply for. It is also good to have a sponsor packet that shows what your team does to compete and spread STEM around the community. It is going to look pretty empty at first but will grow as you do more and more things as a team.

Approach companies especially ones where the student's parents work and ask for sponsorship there. There is more incentive for companies to donate to a place to which the employee is related. Getting a small amount from a lot of places is just as good (if not better) than getting a couple of large grants. If one of the grants is not renewed one year then you do not lose a significant chunk of your funding.

Besides monetary donations ask around for in-kind donation of things, tools, parts, material, and others. These can be as important and sometimes more important than the monetary donations as the money is used to buy these things if they are not donated. Here is a list of things that our team has obtained in our rookie year for free from various places:

Part	Qty	Sponsor	Connection
Shelves	3	Weatherford	Mentor Workplace was throwing out old shelves and tables
Tables	2	Weatherford	See above
Desktops	4	EcoServices	Company was upgrading their desktops
Screens	4	Weatherford	Old screens that were sitting in storage
SheetMetal	5	ACE Steel	5 4x10 1/8" Aluminum Sheet
More Shelves	2	Spectrum FRC 3847	A veteran team had extra shelves that they were able to donate
Table Saw	1	Mentor	Mentor had one in garage and brought it for the team
Miter Saw	1	Mentor	See above

As a last resort parents have matching programs in some of their companies and you can ask them to donate to the team so that their company matches their donation. This can be found on google "matching gift companies". This is a last resort because I would first try to approach companies and places for monetary and in-kind (parts, etc) donations and only if the team is still struggling go the route of parent matching.

Space

FRC is a big robot and it takes space to build it and test it before the competition. Space is one of the hardest things in my opinion to get. Well at least good space is. As a rookie we were lucky that our school had been using a strip mall across from the school for storage and we were able to get a room there that we could use, but if that is not an option there are very good alternatives.

Building in a classroom is not as bad as it sounds. The only problem is storage. If there is no space at the school building in a classroom that has the biggest closet (as strange as this sounds) is the best option. It means that you will have to clean everything up and store it until the next meeting.

But if there is some kind of storage space in the school (which is usually unorganized) try to get your school to give you the space. In our case the strip mall that was used for storage was completely full of boxes and things being stored, but we were allowed to organize and stack things and were able to clean out a relatively large space, enough to have 1 room as a "machine shop" and the shared space as parts storage and build area.

As a guideline a great space is the size of a classroom. With this space dedicated to you, it will be a lot easier to build and have enough space to store tools/parts as well as have enough place to easily work on the parts of the robot.

School

For any robotics endeavor especially FRC it is crucial to have the schools support. Whether it is monetary, administrative or otherwise, the school is a major player in this process. It is important to follow the school rules and to make sure that they are in the loop of what is happening with the club (as the club is part of the school)

In order to get the schools support you need to show them several things:

1. The club attendance is good (the more people the more supportive the school)
   a. Students are the drivers for school policy, if everyone was on the robotics team the school would spend a lot on it.
2. The club is successful (which does not mean winning in year 1)
   a. This could be going to an off-season and being the highest rookie or being the most improved rookie or the students learning a lot, anything

3. You have a plan
   a. Make sure you have a concrete plan on meetings, funding, competitions, training, everything.

This is a lot of work. More at some places then others but to get the school to appreciate the club and the mission of FIRST and the principles of FRC is a key to the successful continuity of the club and of the beneficial relationship with the school.

They can be a huge asset on your side as they also buy new computers and shelves and tools from time to time so it is worth trying to get some of their used things to use for the robotics team for the first couple of years.

Tools/Parts/Other materials

As I said in the sponsorship section it is very beneficial to get in-kind donations as this way you are getting the parts that you would have bought anyways for free. Kit of Parts and Rookie Vouchers give a lot of useful parts to rookies. This was a huge help for us in our rookie year. We did raise enough money as well to stock up on parts as well. But getting to tools. If you raise enough money rookie year and if you raise more than enough stash it for next year or buy parts/tools that will be useful throughout the team's existence. Rookie grants are only for 1 year so stocking up on some parts is a good idea if you have raised enough money to cover all of the costs.

Having said that most of the material is not hard to find as a donation from sponsors in exchange for visibility for the sponsor on the website/shirt/etc. Tools on the other hand we bought for example from the money we raised outside of the rookie grants. This is a "one time cost" as these tools will hopefully last you more than one season. This is worth taking into account when budgeting. Your first year budget might be huge but then the subsequent years you have almost no spending besides registration.

Pre-Season

Start Early

One of the best things you can do to have a successful rookie year with an FRC team is to prepare early and by early I mean end of the school year early. I started the team in May. This is the end of the FRC competition season but is a great time to get ready and get the students involved to compete at FRC off-season competitions. These competitions are very low key and everyone helps each other and the team will learn a lot at one of these about FRC, the team and the time commitment for success.

Off-season Events

These events teach the students how to work on the robot and how to compete. They teach them the rules of the competitions and of the building

process. To get ready for the actual build season as far as what to do, this is one of the best tools there is. It gives the students a build season feel in the summer when they are freer and have no school to deal with, and lets them compete after with what they have created.

If you started in the summer by building and going to off-seasons there is no reason to stop and wait until the build season starts. There are many things that can be done to get ready for FRC so that the students know the basics and are ready for a busy 6 week build season.

Training

Speaking of being ready for a busy build season…. Training is a huge, huge aspect of being successful in the build season. Training is available from other first teams online for almost anything. Programming, CAD, Electrical, Mechanical,

Design, anything you can think of its there. If you have mentors or teachers who are proficient in one of these you can have them teach the students the basics.

Training can be done outside of meetings and some sort of system to see students competency made if desired before the season starts. This will help with students using machines, using the software and being able to focus on accomplishing the task instead of learning as they are going. This will save you an enormous amount of time during build season and will help the team be more successful in the end.

Training for general subteams can be great but also making sure the students know how to do simple things regardless of the subteam they are on is a good practice too. The "Machine shop" training that we have is a requirement for all members before they are allowed to use any tool. This assures that they are proficient and will not hurt themselves and at the same time ensures that during the build season if someone is asked to do anything to a part they know exactly what to do.

Outreach

Volunteering

A large part of the first mission is to spread STEM and Robotics and make it more popular in the community. This is usually done through volunteering and through demonstrations of your robot to companies, local businesses, the school, and at various events. As a rookie team, especially if you do not have a robot, this is really hard to do. This is why you should start early and have a robot for the off-seasons which you can use for the demonstrations.

If the case is that you have a robot from offseason or you have a robot from another competition, it's great for the team and for the students to spend a

couple of weekends volunteering at an event by showing the robots and interacting with the community. This can be anything from showing little kids robots and letting them drive them around to helping at the food bank to helping at a senior home, anything literally anything. Try to incorporate the robot and it will get you brownie points! :)

Starting/Helping Teams

Again as a rookie this will be difficult to do as you are focusing on getting your team ready and competent for build season, but this does not necessarily have to mean you have to spend time at another teams place and help them

because as a new team you don't have experience and cannot contribute too much to the FRC conversation yet. And that is OK.

Helping teams when you are a rookie can still be something very feasible. Let's say that you have a sponsor who donated sheet metal to your team, you can share that with other teams if you have enough. The other teams will be more open to share their sponsor donated materials with you as well. This again will be a win-win for both teams as they will have access to more materials and tools and be able to build a better robot in the end.

Hosting Events

Some things do go a long way though. Let's say you are hosting a CAD workshop from a teacher who used to work with it or someone you know in the industry who knows it, what you can do is reach out to the other rookie teams and say hey, we are going to be learning CAD at our lab/school/classroom, and if you guys want to come we would love to have you. This will help both teams, as they will gain a great deal of knowledge about CAD and you can interact with them and maybe get some info on Electrical that they know better than you.

I truly believe that sharing resources (not just between rookie teams but from the veterans as well) is a great way to get better and is something that every rookie should do to make themselves and the others around them better. At a regional competition even though you are competing against/with each other you want to have a fun event for everyone and that is done by being prepared and knowledgeable as early as possible.

Scheduling

Meetings before/after build season

FRC can be a year round activity, and I think it should be treated like one. As I stated before the build season is only 6 weeks and the team does not have time to start learning and start fundraising and preparing during the 6 weeks. The team should be focused on building. This is the reason scheduling is crucial to a successful team and meeting before and after build season is also very important.

Before the build season meetings do not have to be often, if you start at the beginning of the school year then meetings once a week are great! You can do a build meeting and a training meeting alternating and this way all of the training will be done before the season starts as well as the students will have experience building something (does not have to be a robot) before the build season starts.
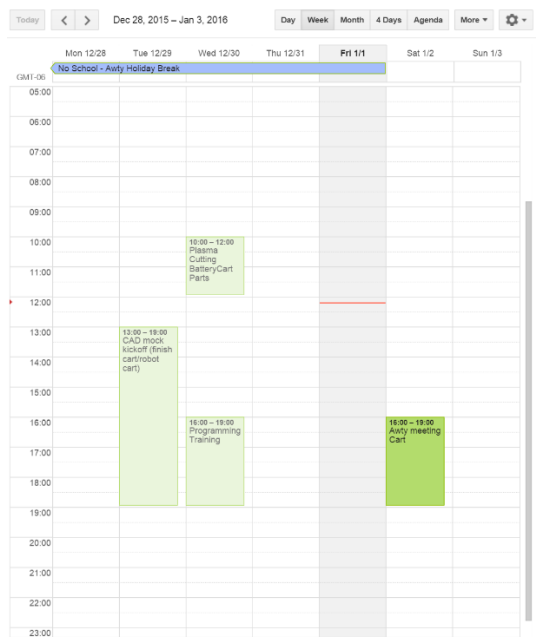
Meetings before the season should also focus on having fun, and recruiting for the busy build season. If you have made a small robot, shirt cannon, something then have some meetings that are dedicated to getting new members. Start the meeting by driving the robot or whatever around the school after school to get attention or have it in the cafeteria at lunch, then you will have more people at the meeting and you can engage them.

Meetings after build season are important too. Because there is a 30lb withholding allowance (meaning you can make 30lb of parts and put them on your robot at competition, while staying under the limit) the robot can be tweaked and tuned well after it is put in the bag. Some good teams build a copy of their robot and then iterate on that so that they can just take a subsystem and exchange it as long as it's under 30. This is very hard to do on a tight budget but there are things that are easier. For example if you have a shooter that you build, build a second one as close as possible to the one on the final robot. This will let

you modify the copy and then if its better you can put it on your robot at the competition (modularity here is a beautiful thing).

School Events

Coming from outside the school as an industry mentor I had an issue with the school schedule, I did not know it. And it is really important to get a schedule for all of the school events ahead of the school year so that you know the best times for meetings, publicity demos and other events that the club may host or participate in. Scheduling around any event that the school has will increase the attendance and help get more students interested in the club and in the FRC program.

Create your own google calendar and put all major school dates on there in addition to your club dates for meetings demos and other events. This will help get everyone organized and help avoid major conflicts with schedules. This is one of the best free organizational tools out there. You can put it on your website and email signature as well that way anyone can always see what is happening with the team.

In addition you can use this calendar to see when the best day to do a demo is. For example if there is a big rivalry basketball/any sport game going on, you can ask the school to show off the robot or club somehow at halftime/intermission etc. this gets great publicity and again helps get the team members. Avoiding conflicts and seeing opportunity in already scheduled events can lead to a great recruiting effort as well as a great sustainability record for students who are in the club.

Parents Availability

This is different at every school and for every member but having the parents on your side never hurt. They are the ones that are letting their students participate in afterschool activities and plan their schedules to pick them up and

such. Parents can also play a great role during build season as you want to focus on building with the students the parents are a great way to get food to the team while they are working hard.

Parents are also a great way to travel to competition. You don't need every single parent on the team to be able to drive but if you get several parents that are willing to then it makes travel (from the physical and administrative/approval standpoint) a lot easier. I have found that schools allow parents to carpool students but not outside mentors.

If the parents are engaged they are also more likely to help find parts/tools/funding etc for the team that you might not have access to or may not have thought of before.

Adult Roles on the Team

Head Mentor/mentors roles

The head mentor is the main point of contact for all team business. This is probably the most time consuming role on the team. It is also the most rewarding. The head mentor along with other mentors who will help him, is responsible for the smooth operation of the club. Making sure the students are taught the proper techniques for different tools, making sure they know how to CAD, program, design, etc. This is the main role of the mentors. It is NOT to build or to code or to CAD. The mentors teach and the students do. That I think is one of the most important aspects to not forget. This is a student competition and the students are the ones that are physically designing, building, programming this robot and not the mentors, parents, teachers, etc.

The mentors do most of the background organizational aspects, by this I mean the procurement of tools and parts the talking to the school to make sure approvals are there as an adult has to be in charge of the club and I believe (and what we have implemented) that there should be a student leadership group who run the student part of the club (making sure students attend, getting them info about meetings, etc) The mentors and this leadership group decide on the trainings and are in constant contact about club affairs.

Teacher's role

Teachers can have many roles on the team including being a mentor, or only being a teacher sponsor, meaning they are the representative of the school. In our situation I found that it is best to have at least 2 teachers who are willing to help out. By this I mean that one can/should be more hands on, and the other can help deal with the school policies, paperwork and talking to the school about various things.

This worked really well for us as our head mentor was the one running the club activities/affairs but the funding/payments etc had to go through the school so the mentor and the teacher sponsor would stay in contact and the teacher worked out all of the aspects on the school side making it a lot easier for the mentors to focus on teaching the students and making sure the club is running smoothly.

Parent's role

The parents role can also vary significantly based on the involvement of the parent. Parents are a great asset during build season for non-robotics related things, but can also be great mentors to the students. Some of the best mentors are former team parents. Besides bringing food to the meetings during build season to make sure the students are fed and are not distracted from building, they can take the students to competitions, help organize outside events like volunteering and outreach and can help find sponsors and in-kind donations for the team.

Parents also take great pictures and are great about spreading info on how well the kids did at a competition or demo or whatnot and this can also be a great asset as they will publicize the club to other parents which will increase attendance.

Preparing for the competition

Organization

       It is extremely important to keep everything and everyone organized especially when you go to a competition. At the competition there is little time to waste for things like finding things and assigning people to tasks. Everyone should know what they are doing and where everything is in order to have a smooth running and successful event.

       The organization starts from the tools and where they are placed, whether they are labeled or not and whether the parts are as well. If this is all done before the competition, and something breaks on your robot during, it is easy to say ok I need x,y,z and go to the drawers which have x,y,z and get it out and quickly fix it instead of looking for the parts and so on.

       This organization goes a long way to keeping everything in place and easily accessible. This helps the team look professional at events as well and it is always impressive when a rookie team when asked for help or a tool, doesn't have to look around but has everything ready to go. You can just use shelves that were donated and or rolling chests in our case and tape and write what is in each drawer.

Pit Set Up

       This goes hand in hand with organization, but planning ahead of time what you will bring to the competition to fit in your 10x10ft space is important. You don't want to forget things but you also want to keep in mind that you need room in the pit to work on the robot.

The way you set it up is also important. You do not want to spend a lot of time putting up shelves and getting everything organized. You should go to the competition, put everything in place and worry about making sure your robot is top notch, not whether this shelf it straight. Having said that something mobile and on wheels is always easy to roll in and set up.

Image/Attitude

Image and attitude of everyone are something important for the team's reputation. When the judges walk by they would rather see a very professional team with an OK robot vs an amazing robot, but it's unorganized, and the team is being mean to each other and so on. Ideally you will have both, but it is important to make sure the image that the team gives is one of professionalism.

This can be done by coordinating beforehand. Dress code can be a part of the professionalism. The way that the team acts is also a big factor in the image of the team. The physical image that the pit creates and that the team provides is a huge aspect of being recognized now and in the future.

And finally attitude. Remember this competition is supposed to be fun! For the students and the mentors, and everyone else there! So follow these guidelines to be successful but don't forget to have fun doing it! This attitude will get the team a long way!

If anyone has any questions for me please feel free to email me at pavchag@gmail.com.