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Prototype (Px refers to a Prototyping Planner)	**Prototype name**	**Prototype iteration**	**Responsible**	**Status**	**Design change / prototype adjustment since last iteration**	**Results**	**Effort (scale 1-5)**	**Success (scale 1-5)**	**Design decisions**	**Need for further testing and iterating**
P1	Airthightneess	**P1.0**	dosLHAMAS		N/A	It didn't succeed to create an sirtight lid	3	1	We need to find another way of connecting the different parts in our product, where fluid and or air can escape.	Yes. We need to find another type of fitting/fugue.
		P1.1	dosLHAMAS		We have tried to make the connectinos between the hose and quick coupling airthight with shrink flex.	It is airthight!	3	5	We need to use shirk flex for all of the connections where it is possible.	No - not unless we have connections where it doesn't fit.
P2	First brewing	**P2.0**	dosLHAMAS		N/A	First test of the brewing works sucessfully. The mixture produces bubles	4	4	We need to stir the mixture daily to keep the bubbling going	We need to test the brewing for a longer time period.
		P2.1	dosLHAMAS		10 days have passed	The bubbeling have stopped/decreased a lot. After racking we tasted the juice/wine and found that it tasted very much like yeast/ethanol.	5	3	We would like to try another recipe. Maybe the mix needs more sugar? Maybe the yeast we used was to strong.	We need to test another recipe and keep the stirring more constant.
		P2.2	dosLHAMAS		Time has passed.	We have decided to discard this batch after having forgotten to stir it some days, and needed the lid with the airlock for our newest batch.	2	1	We discard this batch	No.
P3	The case	**P3.0**	dosLHAMAS		N/A	The shape works well since it can be placed up against a wlla/ in a corner	3	4	We would like to test if a drawer would work well for when cleaning the filter.	We need to test if the components fit inside the box
		P3.1	dosLHAMAS		Laser cutted wood. Squared shape instead of rounded.	The box was nice to test different placement versions of the components, but turned out to be way to large.	4	4	We can make a way smaller case if we want to. The squared shape looks very "boxy"	Another smaller design of the case.
		P3.2	dosLHAMAS		A smaller square drawn on paper with the components on top.	We have found that a box with the measurements 230x240 is a properly sized box.	2	4	We still would like a rounding on this squared drawing, but it will not cause any problems. The drawer needs to be pulled out from the side of the box.	A more final prototype in carboard or wood, with a rounding.
		P3.3	dosLHAMAS		A cardboard version of the case's inner design.	The box is made of a rectangle (150x250) and a half circle (d=250).	2	4	We still would like a rounding on this squared drawing, but it will not cause any problems. The drawer needs to be pulled out from the side of the box.	A more final prototype in carboard or wood, with a rounding.
		P3.4	dosLHAMAS		We have made a 3D drawing with the correct measurements.	The drawings	4	5	We found a lot of details and aspects we hadn't thought about before we started drawing, which was nice.	We need to manufacture the different parts to test if the protoype would actually work.

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		P3.5	dosLHAMAS		We have produced our CAD model in a combination between 3D print and laser cutted wood.	It works!	5	5	We need to add veneer and spray paint the parts to make the protoype look less protoype-ish.	We need to glue the parts together and add finsihing details.
		P3.6	dosLHAMAS		We have paintet the 3Dprint	Looks fine, but a bit to green to signal sustainability	2	3	We would like to test if the color gets more on point if we spray black on top from a far distance.	We need to test a new color.
P4	Temperature sensor	**P4.0**	dosLHAMAS		N/A	We succeeded in measuring both temperature and humidity	2	5	We chose to use the NHT11 sensor	No.
P5	Whisk	**P5.0**	dosLHAMAS		N/A	We found that the whisk with the 4 squares was the most effective.	4	2	The whisk still didn't work optimally	We need to test the whisk closer to the bottom of the carboy
		P5.1	dosLHAMAS		The whisk is placed closer to the bottom of the carboy	It helps to get the whisk closer to the bottom, but there is some groowes where the sugar gets stuck	1	3	It is a good idea to get the whisk as close to the bottom as possible	We need a better whisk design to mix the mixture evenly
		P5.2	dosLHAMAS		The mixture is now closer to a real brewing sistuation and consists of suger, yeast and water.	Yeast is weights less than coffe grounds, and allows for more movenemt/mixing.	1	3	The yeast is mixed more at the bottom than the top of the carboy. Maybe two whisk on top of eachother	A better whisk design
		P5.3	dosLHAMAS		We test a whisk with a longer arm pointing downwards to reach the sugar in the carboy's groove.	Cardboard loses its shape to quick to actually test if the shape fits.	1	3	We need a more sturby material	A better whisk design
		P5.4	dosLHAMAS		A more stable material - now a stick instead of cardboard.	We taped the sticks togeteher, but the tape loses its stickyness quiet quick	1	3	The whisk arm needs to be quiet string to make an actual test	A stronger stick needs to be tested.
		P5.5	dosLHAMAS		The angeling of the "arm" is different.	The angeling is not on point, but close.	1	3	The angeling is necessary to avoid getting in carambolage with the spout.	A more aqurate design.
		P5.6	dosLHAMAS		A lasercut piece of wood is added to the existing whisk	The piece of wood is a bit to long and has a wrong angeling.	2	4	The testing with lasercutting before an actual 3D print works well.	A shorter and more angeled piece of lasercutted wood.
		P5.7	dosLHAMAS		Our estimated size of the lades have been tapet on the existing whisk to test if it still can pass through the carboy openening.	It is still possible to get the whisk through the hole if you angle it.	1	5	It is possible to make all of the whisk's "arms" longer and bigger to obtain general more effective stir.	The longest arm still doesn't fit properly.
		P5.8	dosLHAMAS		We have added both a bigger blade on one of the arms and a new laser cutted "long arm".	Closer but still not fitting corrrectly down into the groove while not hitting the spout on the inside of the carboy.	1	4	We need to take into consideration that the spout will be replaced with the filter/pump tubes.	A more precise lasercutting of the arm.

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		P5.9	dosLHAMAS		Another shape of the "arm"	It hits the spout.	2	4	We need to create a "lower" arm to avoid the spout.	Another design of the arm.
		P5.10	dosLHAMAS		Another shape of the "arm"	It works!	2	5	This design both allows the "arm" to pass the spout while reaching the sediment in the groove.	The final model in an 3D print.
		P5.11	dosLHAMAS		The whisk is 3D printed.	It works, and is now functional!	4	5	The whisk is now ready to insert into the carboy.	No.
P6	Carboy fixation	**P6.0**	dosLHAMAS		N/A	After testing the different heights we found that even the lowest fixation is enough to keep the carboy in place.	4	4	The indenatation works well, since the spout often complicates placing and removing the carboy, when the fixation is placed high on the carboy.	A more precise design of the indentation.
		P6.1	dosLHAMAS		We went with the indentation and lasercutted a rough version	The carboy fits well and does not move when we push it	3	2	A smoother indentation is prettier but could reduce the support.	A smoother indentation.
		P6.2	dosLHAMAS		We have created a drawing to get the correct measurements, making the indentation fit the carboy	The drawing looks fine, and allows us to get a 1:1 idea about how the result will look.	2	4	We would like the indenattion to encapsulate the carboy to the point where the rounding of the bottom ends.	We need to print the version to physically test if our measurements are correct.
		P6.3	dosLHAMAS		The CREO model has now been printed.	The shape fits! And the carboy is succesfully kept in place	4	5	It would look nice, if we could place this indenation down into a plate, resulting in an "invisible" and smooth transition.	A plate carrying the indentation.
		P6.4	dosLHAMAS		The indentation has been placed down into two pieces of wood.	It works well and looks nice.	4	5	We need to glue the indenattion to get a completely stable prototype.	No.
P7	Pump	**P7.0**	dosLHAMAS		N/A	The pump works!	2	4	This pump allows us for a hygienic way of transfering fluid.	We want to test the pump together with the filter.
		P7.1	dosLHAMAS		We have implemented the pump into our final setup in combination with the filter and hoses.	It works. The pump strains around 2,5 dL in a minute.	4	5	It works well even if the hoses are a bit bended.	No.

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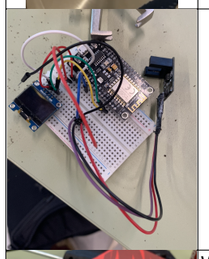
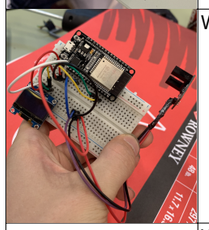
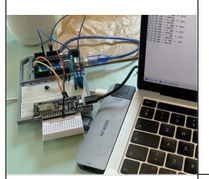
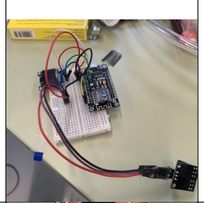
P8	Electronics case	**P8.0**	dosLHAMAS		N/A	Ok for now	3	4	The IR-sensor works	Needs to be moved to the ESP-board
		P8.1			Went to ESP-8266 board	No luck with implementation	4	1	We need another board	Yes - Needs to try another board
		P8.2			Went to ESP-32 board	No luck with implementation, same problems as esp-8266	3	1	We need another board/solution	Try getting the arduino where it works to send data to esp instead
		P8.3			Went to arduino uno combined with ESP-8266	Problems with implementing serial communication in a nice way	4	2	We need to go back and try with the esp8266 once more	Yes, more research with the esp-8266
		P8.4			Went back to the esp8266	The interrupt works, after implementing new code	4	5	We're using the esp8266 as our board	No need
		P9.0	dosLHAMAS		N/A	The strainer easily lets the fluid pass, but we need some kind of meshed cloth to actually filter the fluid.	2	4	We need to figure put a way to make sure that some fluid doesn't get stuck inside the filter and pump when the racking isn't hapening.	Testing the filter with some cloth.

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P9	Filter	**P9.1**	dosLHAMAS		We have added some cloth in terms of some bedding, to get an actual filtering and tests this on the batch of applewine which we made earlier.	The filtering was very effective, but it got blocked after around 5 minutes which led to it being less effective. In total it took around 22 minutes to filter all the dead yeast out, and around 3 emptyings of the filter.	3	4	We decided that the cloth works fine, since the filtering was great, but that we need to test a larger filter. This is a proof of concept.	A larger filter. Eventually 3Dprinted.
		P9.2	dosLHAMAS		We have made the filter longer to ensure that it would not get blocked before the reracking is finsihed.	We assume that it works well, since we have found other examples on this size, and have made estimates on how large it needed to bee from earlier tests.	2	5	We trust that this filter size is large enough. We have further found that it can be placed in a half moon shape, to allow for the user to remove the two tubes, take the filter out and clean the cloth.	No.
		P9.3	dosLHAMAS		The cardboard tube has been replaced by an 3D printed version fitting the old filter.	Looks good and dosen't fall off.	3	5	For better understanding, we decided to do a new more high fidelity model. It is still possible to take the printed version off, and look at the actual filter.	No.
P10	Motor	**P10.0**	dosLHAMAS		N/A	When testing the amps the electric system draws, we found that the multimeter showed around 0,5 A without load and 0.7 A with load.	1	4	[text]	[text]
P11	Second brewing	**P11.0**	dosLHAMAS		We have used another recipe with less sugar. This time 1/10 parts of sugar is added to 4.5 L of apple juice.	The fermentation process started after 12 hours. We will monitor this and make another iteration after 10 days.	4	5	Less sugar and another kind of yeast was added to the recipe.	Yes, we need to test if it continues to ferment after a couple of days/weeks.
		P11.1	dosLHAMAS		6 days have passed with daily stirring.	The yeast is still active. We can observe how the amount of bubbles are very dependent on the stirring	1	4	The stirring is important, since it helps to keep the yeast active/releases CO2	Time must pass before an actual tasting.
		P11.2	dosLHAMAS		For testing our final product we have made a new final batch	The yeast was qucik to get active and bobbling started after a half hour.	2	5	yeast is active and all fittings seems to be both air- and watertight	No need/too late
P12		**P12.0**	dosLHAMAS		N/A	Nice measurements (230x115) but difficult to open the tray since it was difficult to bend the tubes.	3	4	We need to make some fittings allowing the tubes to be bend down along the filter and allow for the tray to open easily	Angled fittings.
		P12.1	dosLHAMAS		Angeling of the fitting in 3D print.	This new fitting allows the tubes to run in parallel with the filter.	2	5	These fittings works well since the tubes does not bend. If they bend it can cause a less effective flow of fluid inside them.	Not for the fittings. For the placement of tubes.

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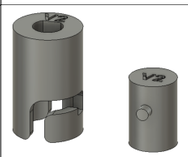
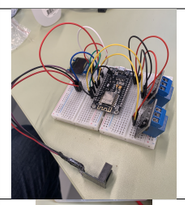
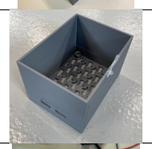
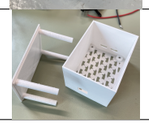
	The tray	**P12.2**	dosLHAMAS		A system for controlling the tube inside the tray	This mechanism with the tubes wrapped in a cirkle on each side of the inner tray, allows for extra length when the tray is pulled out.	3	5	If we create two pieces to hold the tubes in place, we can create a well functioning system for tubes.	In a more sturdy matrial for a more precise result/testing.
		P12.3	dosLHAMAS		We have made the latest protoype in 3D print to test if it works for our beta prototype.	It works	4	5	It would be a good idea to test if you could get a smoother feeling with some other materials, if we were to make an actual product.	No.
P13	Stirring stick mount	**P13.0**	dosLHAMAS		N/A	Works fine, but is too permanent.	1	2	A version that makes detaching of the stick possible	We will try a simple bajonet locking mechanism
		P13.1	dosLHAMAS		A simple bajonet locking mechanism that makes it possible to detach the stirring stick	The mechanism works well, but the stirring stick is too wobly	2	3	We need to make the stick more stable when mounted	If the top of the stick part is extruded above the pins it will probably make the stick more stable
		P13.2	dosLHAMAS		Made the stick part longer above the pins, as well as tightened the tolerances to make the stick less wobbly	Not perfect, but will do just fine for the final prototype	2	4	The part does what it needs to do without being to complex	No.
P14	Motor control	**P5.1**	dosLHAMAS		N/A	We can control the two motors using two relays	4	5	We needed to change to another esp-8266 beacuse the ones we had didn't supply a high enough signal voltage (only 2,7v)	No need for futher testing
P15	Electronics case	**P15.1**	dosLHAMAS		N/A	Ok for now	1	3	A quick case to enclose the electronics	Yes many improvements can be made
		P15.2			Removed compartment for bugconverter and added lhama pattern	Holes for wires need to be move a bit up to make it easier to insert the board	3	4	More final design	Yes slight changes and we are there
		P15.3			Moved the wire holes, added a hole for the USB and made a lid	Works!	3	5	A final case design	No